WEST BENGAL MEDICAL SERVICES CORPORATION LTD.

BIDDING DOCUMENTS FOR

Planning, Design and Construction of 01 (One) Tertiary Healthcare Hospital along with Supply of Medical Equipments and Hospital Furniture in the State of West Bengal on Turnkey Basis

(Bid Reference No. : WBMSCL/NIT-41 /2015)

Section 1

Notice Inviting e-Tender (NIT)

NOTICE INVITING e-TENDER

WEST BENGAL MEDICAL SERVICES CORPORATION LTD.

(Wholly Owned by the Government of West Bengal) CIN: U85110WB2008GC126373 2008-09
Regd. Off.: Swasthya Bhaban Complex, GN-29, Sector-V, Salt Lake, Kolkata-700 091

033-40340-403 / 300 **033-2357-6504,** **Email ID – info@wbmsc.gov.in**

Bid Reference No. : WBMSCL/NIT-**41**/2015 Dated : 27/11/2015

1. West Bengal Medical Services Corporation Ltd (WBMSCL), Swasthya Bhaban Complex, GN- 29, Sector – V, Salt Lake, Kolkata-700091, West Bengal has been requested by the Government of West Bengal to establish and develop on their behalf *Multi-storied Frame-structured Super Specialty Hospital Buildings* along with various allied medical facilities at Uluberia S.D. Hospital in the district of Howrah under the State of West Bengal as shown in the table below.

2. In terms thereof, WBMSCL hereby invites bids through 'e-tendering'

from eligible and qualified Indian bidders for "*Planning, Design and Construction of 01(One) Tertiary Healthcare Hospital along with Supply of Medical Equipments and Hospital Furniture in the State of West Bengal on Turnkey basis*" at Uluberia S.D. Hospital in the district of Howrah under the State of West Bengal as shown in the table below **ON TURNKEY BASIS** (Planning, Design & Execution) in **2-BID SYSTEM** as per Schedule of Requirement**.**

CLUSTER OF UPCOMING HOSPITAL & RELATED BID DATA

Location of Super/Multi Specialty Hospital	Bid Security (Rs in Lakh)	Cost of Bid Document (Rs in Thousand)	Time of Completion (Months)
Uluberia	50.00	5.00	15

3. Intending bidder may download the tender documents from the website: www.wbtenders.gov.in or www.wbmsc.gov.in directly and appropriate Earnest Money / Bid Security of an amount as mentioned in Sl. No. 2 hereinabove may be remitted through Demand Draft/Pay Order / Banker's Cheque issued from any nationalized/scheduled bank in favour of West Bengal Medical Services Corporation Limited and also to be documented through e-filing (scan copy is to be submitted). In the alternative, the Earnest Money/ Bid Security may be furnished by way of a bank guarantee in favour of West Bengal Medical Services Corporation Limited issued by any nationalized/scheduled bank and also to be documented through e-filing (scan copy is to be submitted). The original part of online submission of EMD (Earnest Money Deposit) / Bid Security should be submitted physically to the office of West Bengal Medical Services Corporation Limited under sealed cover within the prescribed date and time limit stated in Sl. 10 of this N.I.T. However West Bengal Medical Services Corporation Limited will not be held responsible for late delivery or loss of the Demand Draft / Pay Order / Banker's Cheque/ Bank Guarantee so mailed through post/courier. Technical Bid and Financial Bid both will have to be submitted concurrently duly digitally signed in the website www.wbtenders.gov.in. Tender Documents may be downloaded from the website and Technical Bid/Financial Bid submitted as per tender time schedule stated in Sl. 10.

4. Cost of the Tender Documents as mentioned in Sl. 2 hereinabove is to be paid through Demand Draft /Pay Order / Banker's Cheque issued from any nationalized/scheduled bank in favour of WBMSCL and also to be documented through e-filing (scan copy is to be submitted). The original part of online submission of the cost of the Tender Documents should be submitted physically to the office of WBMSCL under sealed cover within the prescribed date and time limit stated in Sl. 10 of this N.I.T. However, WBMSCL (Tender Inviting Authority) will not be held responsible for late delivery or loss of the Demand Draft / Pay Order / Banker's Cheque so mailed through post/courier.

5. The documents submitted by the bidders should be properly indexed & digitally signed. Both Technical Bid and Financial Bid / Price Bid in respect of each of this bid are to be submitted in technical (statutory & non-statutory folder) and financial folder concurrently duly digitally signed in the website www.wbtenders.gov.in.

6. The Technical Bid and Financial Bid are to be submitted online on or before the date and time mentioned in Sl. 10 of this NIT.

7. The Financial Bid / Price Bid of the prospective bidder will be considered only if the Technical Document / Technical Bid (both statutory and non-statutory) of the bidder is found qualified by the Tender Evaluation Committee. The decision of the Tender Evaluation Committee will be final and absolute in this respect. The list of responsive / technically qualified and non-responsive bidders will be displayed in the website and also in the Notice Board of the office of the WBMSCL, on the scheduled date and time.

8. Eligibility criteria for participation in the tender.

(i) The tender inviting and accepting authority will determine the eligibility of each bidder. The bidders shall have to meet the minimum eligibility criteria regarding.

(a) Financial Capacity.

(b) Technical Capability comprising of personnel & equipment capability.

(c) Experience/Credentials.

(ii) The eligibility of a bidder will be ascertained on the basis of the digitally signed documents in support of the minimum criteria as mentioned in (a), (b) and (c) above. If any document submitted by a bidder is either manufactured or false, in such cases the eligibility of the bidder/ tenderer will be rejected outright at any stage without any prejudice to the rights of WBMSCL.

(iii) The prospective bidders shall have to meet the following eligibility criteria

(a)Registered WBPWD Class- I/ CPWD / reputed construction company / agency registered under the relevant laws in India / Public Sector Undertaking – subject to ITB 4.5.

(b) Bidder(s) must have satisfactorily completed

For considering for being qualified for the work the bidder must have completed at least one multi-storied building construction project (non-residential) of Rs 300 Crores or three multi-storied building construction projects of Rs 100 Crores each **ON TURNKEY BASIS** (Planning, Design & Execution) comprising from preparation of architectural plan and elevation, structural design and drawing and related inter-disciplinary services including internal and external electrification and fire-fighting works at any place(s) in India during the last 7(Seven) financial years ending on the last day of the month previous to the one in which the tender is invited.

For projects in the private sector, completion certificate along with TDS certificates

evidencing payment of at least 60 % of the completed similar works shall have to submitted.

(a) A bidder must have average annual turnover of at least Rs 500 Crores during the last 3 (three) financial years (i.e. 2012-2013, 2013-2014,2014-2015) for qualifying to be considered to be eligible. The financial turnover is to be certified by a Chartered Accountant. A bidder shall have to be incorporated under the (Indian) Companies Act, 1956 or any amendment, substitution thereof and shall operate in conformity with the provisions of laws in India.

(b) Participation in the form of Joint venture/Consortium / Special Purpose vehicle will not be allowed to participate in the above NIT.

(c) Bidder(s) must submit bid for this bid only.

(d) The other eligibility criteria including eligibility criteria for technical personnel and Plant & Equipment are described in Clause 2 of Section 3 – Evaluation and Qualification Criteria.

9. Bids shall remain valid for a period not less than 180 days after the deadline/last date for Financial Bid submission as specified in Sl. 10 of this NIT. Bids valid for a shorter period shall be rejected as non-responsive. If the bidder withdraws the bid during the period of bid validity the earnest money as deposited will be forfeited forthwith without assigning any reason thereof.

10. Important Information Date & Time Schedule

Sl. No.	Particulars	Date & Time
1.	Date of uploading of Tender Documents online) (Publishing Date)	28/11/2015
2.	Documents download start date (Online)	28/11/2015 at 8.00 PM
3.	Documents download end date (Online)	18/12/2015 at 4.00 PM
4.	Date of Pre Bid Meeting with the intending bidders in the office of WBMSCL	10/12/2015 at 1.00 PM
5.	Bid submission start date (Online)	14/12/2015 at 1.00 PM
6.	Bid submission closing (Online)	18/12/2015 at 4:00 PM
7.	(a) Last date of submission of cost of Tender Documents (Offline). (b) Last date of submission of Earnest Money Deposit (Offline)	22/12/2015 at 3.00 PM
8.	Bid opening date for Technical Bid (Online)	22/12/2015 at 4.00 PM
9	Technical Presentation	23/12/2015 at 1.00 PM
10.	Date & Place for opening of Financial Proposal (Online)	To be notified during uploading of Technical Evaluation Sheet of Bidders
11.	Date of uploading of list of bidders along with financial bids (Online),	Within 48 (forty eight) hours after opening of Financial Bid

11. In the event, any of the specified dates as above being declared a holiday by the Employer or on any account office of WBMSCL being closed, the event of specified date will be extended to the next working day.

12. All standards, technical specifications and codes of practice referred to shall be latest editions of IS-Code including all applicable official

amendments. The selected bidder shall make available at site all relevant Indian Standard Codes of practice as applicable.

13. Wherever Indian Standards do not cover some particular aspects of design / construction, prevailing Indian practice in construction industry shall be preferred to.

14. In case of discrepancy among standard codes of practice, technical specifications and provisions in Employer's Requirements, the order of precedence shall be as below:

a) Provision in General Requirements of Employer's Requirements
b) Technical Specifications in Employer's Requirements,
c) Standard codes of practice.
d) In case of discrepancy in reference to standard codes of practice, the order of precedence shall be IS, IRC.

15. All the sites are located inside the premises of existing Hospital but the proposed project will be on a stand-alone basis in its mode of usage and administration. The bidder, at its own responsibility and risk is encouraged to visit and examine the site of work and its surroundings and obtain all information that may be necessary for preparing the bid and entering into a contract for the work as mentioned in the Notice Inviting e-Tender, before submitting offer. The cost of visiting the site shall be at its own expense.

16. The existing services and utilities may have to be diverted / relocated with proper liaison and approval of WBMSCL. The services and utilities which cannot be diverted but require supporting, proper supporting shall be done so that they are not damaged along their branches. Precautions to be taken while handling the services and utilities are mentioned as under:

(i) Services and Utilities shall not be damaged at any cost. If due to some or the other reason mishap occurs, it should be rectified immediately by the selected bidder at its own cost under intimation of WBMSCL.

(ii) The selected bidder shall take care so that the ongoing activities are not disturbed in any manner whatsoever by the activities of the selected bidder during the execution of the work. The above instructions are only indicative; other precautions which are specified from time to time by WBMSCL shall be followed by the selected bidder at all times.

17. WBMSCL reserves the right to reject any or all applications for participating in bidding process and to accept or reject any or all offer without assigning any reason whatsoever and is not liable for any cost that might have incurred by any bidder at the stage of bidding.

18. The Earnest Money of all bidders deposited in favour of WBMSCL, made by way of Demand Draft / Pay Order / Banker's Cheque, along with the bids will be refunded by WBMSCL without any interest, upon 15 days of signing of the Contract Agreement by the selected bidder and submission of performance security by such selected bidder, whichever is later, and on application to WBMSCL for refund of such earnest money by such unsuccessful bidder. Where such Earnest Money has been tendered by way of Bank Guarantee, such Bank Guarantees will be returned to the unsuccessful bidders, duly discharged, upon 15 days of signing of the Contract Agreement by the selected bidder and submission of performance security by such selected bidder, whichever is later and on application to WBMSCL for return of such discharged Bank Guarantee.

19. Prospective bidders are advised to note carefully the minimum qualification criteria as mentioned in 'Instructions to Bidders' (ITB) and various conditions in "General Conditions of Contract" and other bidding documents as per ITB 6.1 before tendering the bids.

20. Conditional/incomplete bids will not be accepted under any circumstances.

21. The intending bidders are required to quote their rates online.

22. The bidders shall have to comply with the provisions of the (a) Contract Labour (Regulation & Abolition) Act, 1970 (b) Apprentices Act, 1961 and (c) Minimum Wages Act, 1948 or the notifications thereof or any other laws relating to and the rules made and order issued thereunder from time to time pursuant to Clause 6 of the "General Conditions of Contract".

23. In case of ascertaining authority of intending bidders at any stage of bidding process or execution of work, necessary registered irrevocable Power of Attorney is to be produced as and when asked for by the tender inviting and accepting authority / WBMSCL.

24. During scrutiny, if it come to notice of tender inviting authority that credentials or any record is found incorrect/ manufactured/ fabricated, the bidder would not allowed to participate in the tender and its application will be rejected outright without any prejudice to the rights of WBMSCL.

25. WBMSCL reserves the right to cancel the tender process due to unavoidable circumstances without assigning any reason, whatsoever, to the bidders and no claim in this respect will be entertained.

26. Before issuance of notification of award, the tender inviting authority or its authorized representative may verify all credentials and other documents, if found necessary. After verification, if it is found that the documents submitted by the lowest bidder is either manufactured or false in that case, work order will not be issued in favour of the said bidder under any circumstances and the earnest money deposited by the bidder will be forfeited by the tender inviting authority without assigning any reason thereof.

27. Where an individual holds a digital certificate in his own name duly issued to him in respect of a bidder company of which he is a director, such individual person shall, while uploading any tender for and on behalf of such bidder company, shall upload up load a copy of Power of Attorney showing authorisation in his favour, while uploading such tender.

WEST BENGAL MEDICAL SERVICES CORPORATION LTD.

BIDDING DOCUMENTS FOR

Planning, Design and Construction of 01(One) Tertiary Healthcare Hospital along with Supply of Medical Equipments and Hospital Furniture in the State of West Bengal on Turnkey Basis

(Bid Reference No. : WBMSCL/NIT-41/2015)

Section 2
Instructions to Bidders (ITB)

Section 2 – Instructions to Bidders

This Section specifies the procedures to be followed by bidders in the presentation and submission of their bids. Information is also provided on the submission, opening, and evaluation of bids and on the award of contract.

Table of Clauses

A.	General	4
1.	Scope of Bid	4
2.	General guidance for e-tendering	4
3.	Corrupt Practices	5
4.	Eligible Bidders	7
5.	Eligible Personnel, Materials, Equipment and Services	10
B.	Contents of Bidding Document	11
6.	Sections of Bidding Document	11
7.	Clarification of Bidding Document, Site Visit, Pre-Bid Meeting	12
8.	Amendment of Bidding Document/ Extension of Deadlines	13
C.	Preparation of Bids	14
9.	Costs of bidding	14
10.	Language of Bid	14
11.	Documents comprising the Bid	14
12.	Letters of Bid, and Schedules	17
13.	Bid Prices and Discounts	17
14.	Currencies of Bid and Payment	18
15.	Documents comprising the Technical Proposal	19
16.	Documents Establishing the Qualification of the Bidder	19
17.	Period of Validity of Bids	20
18.	Bid Security	20
19.	Format and Signing of Bid	21
D.	Submission and Opening of Bids	21
20.	Submission of Tenders	21
21.	Deadline for Submission of Bids	22
22.	Bid Opening	22
E.	Evaluation and Comparison of Bids	23

23.	Confidentiality	23
24.	Clarification of Bids	24
25.	Deviations, Reservations and Omissions	24
26.	Preliminary examination of Technical Bids	24
27.	Responsiveness of Technical Bid	25
28.	Nonconformities, Errors, and Omissions	25
29.	Qualification of the Bidder	26
30.	Evaluation Criteria	26
31.	Preliminary Examination of Price Bids	29
32.	Evaluation of Price Bids	29
33.	Comparison of Bids	29
34.	Employer's Right to Accept Any Bid, and to Reject Any or All Bids	29
F.	Award of Contract	29
35.	Award Criteria	29
36.	Notification of Award	31
37.	Signing of Contract	32
38.	Performance Security	32

Section 2 - Instructions to Bidders

A. General

1. Scope of Bid

1.1 In connection with the Notice Inviting e-Tender for Planning, Design and Construction of 01(One) Tertiary Healthcare Hospital along with Supply of Medical Equipments and Hospital Furniture in the State of West Bengal on Turnkey Basis, West Bengal Medical Services Corporation Ltd., having its registered office at Swasthya Bhaban Complex, GN-29, Sector – V, Salt Lake, Kolkata-700 091 (hereinafter referred to as "the Employer") issues this Bidding Document for the procurement of Works as specified in Section 5 (Employer's Requirements). The name, identification, and number of contracts of the National Competitive Bidding (NCB) are given below. The tender is invited online and submission of tender will also be online as detailed in the NIT.

1.2 Throughout this Bidding Document:

(a) the term "in writing" means communicated in written form and delivered against receipt;

(b) the terms 'bid' and 'tender' and their derivatives (bidder/tenderer, bid/tender, bidding/tendering, etc.) are synonymous.

(c) except where the context requires otherwise, words indicating the singular also include the plural and words indicating the plural also include the singular; and

(d) "day" means calendar day.

2. General guidance for e-tendering

2.1 Registration of bidder

Any bidder willing to take part in the process of e-tendering will have to be enrolled & registered with the State Government e-procurement system, on www.wbtenders.gov.in. The bidder is to click on the link for e-tendering as given on the web portal and if required, may contact e-procurement Help Desk at Jalasampad Bhavan, 7thFloor, DVC Cell, Salt Lake, Phone: (033)2334-6098.

2.2 Digital Signature Certificate (DSC)

Each bidder is required to obtain a Class-II or Class-III Digital Signature Certificate (DSC) for submission of tenders, from the approved service provider of the National Informatics Centre (NIC). Details are available on the website www.wbtenders.gov.in. DSC is given as a USB e-token.

The bidder can search and download NIT and Tender Documents electronically once it logs on to the website mentioned in Sl. No. 1 of the NIT. This is the only mode of collection of Tender Documents.

The bidders are also advised to upload relevant documents such as certificates, purchase order details etc. well in advance under the "My Documents" Tab at www.wbtenders.gov.in so that those can later be selected and attached during bid submission. This is likely to ensure hassle free upload of bid documents.

There is no upper limit on the size of the file to be uploaded. However, the speed of upload is dependent on the memory available in the client system as well as the network bandwidth used. In order to reduce the file size, bidders are advised to scan the documents in 75-100 DPI so that the optimal clarity is maintained.

The Employer will not be responsible for any delay or the difficulties faced during the submission of bids online by the bidders due to local connectivity or other issues.

3. Corrupt Practices

3.1 The Employer requires that bidders, suppliers, contractors under contracts with the Employer, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, the Employer:

(a) defines, for the purposes of this provision, the terms set forth below as follows:

(i) "corrupt practice"/"bribery" means the offering, giving receiving, or soliciting, directly or indirectly, anything of value to influence improperly the actions of another

party or influencing the process procuring goods or services or executing contracts;

(ii) "fraudulent practice"/"fraud" means any act or omission, including a misrepresentation of information or facts, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation or to influence the process procuring goods or services or executing contracts, to the detriment of the Employer or other participants;

(iii) "coercive practice" means impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

(iv) "collusive practice" means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party or designed to result in bids at artificial prices that are not competitive;

(b) will reject a proposal to award a contract if it determines that the bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract in question; and

(c) will sanction a party or its successor, including declaring ineligible, either indefinitely or for a stated period of time, to participate in any tender/bidding process of the Employer if it at any time determines that the firm has, directly or through an agent, engaged in corrupt, fraudulent, collusive, or coercive practices in competing for, or in executing, a contract of the Employer.

(d) will cancel or terminate a contract if it determines that a bidder /party has, directly or through an agent, engaged in corrupt,

fraudulent, collusive, or coercive practices in competing for, or in executing, a contract with the Employer.

(e) will normally require a Contractor of the Employer to allow the Employer or any person that the Employer may designate, to inspect or carry out audits of the Contractor's accounting records and financial statements in connection with the Contract.

4. Eligible Bidders 4.1 The prospective bidders shall have to meet the following eligibility criteria :

(a) The bidder must be a registered WBPWD Class- I/ CPWD / reputed construction company / agency registered under the relevant laws in India / Public Sector Undertaking—subject to ITB 4.5.

(b) Bidder(s) must have satisfactorily completed

(i) For considering for being qualified for the work of a single package, the bidder must have completed at least one multi-storied building construction project (non-residential)of Rs 300 Crores or three multi-storied building construction project (non-residential) of Rs 100 Crores each **ON TURNKEY BASIS** (Planning, Design & Execution) comprising from preparation of architectural plan and elevation, structural design & drawing and related inter-disciplinary services including internal and external electrification and fire-fighting works at any place(s) in India during the last 3(three) financial years ending on the last day of the month previous to the one in which the tender is invited.

For projects in the private sector, completion certificate along with TDS certificates evidencing payment of at least 60 % of the

completed similar works shall have to submitted.

(c) A bidder must have average annual turnover of at least Rs 500 Crores during the last 3 (three) financial years (i.e. 2012-2013,2013-2014and 2014-2015) for qualifying to be considered to be eligible.

(d) A bidder shall have to be incorporated under the (Indian) Companies Act, 1956 or any amendment, substitution thereof and shall operate in conformity with the provisions of laws of India.

(e) Participation in the form of Joint venture / Custodian / Special Purpose Vehicle will not be allowed to participate in the above NIT.

(f) The other eligibility criteria are described in Clause 2 of Section 3 (Evaluation and Qualification Criteria).

4.2 A bidder shall have to furnish the following documents :

(a) Income Tax , Professional Tax (P.T.) Clearance Certificate , P.T. (Deposit Challan) , PAN Card , VAT Registration Certificate along with Income Tax Return Acknowledgement Receipt for Assessment Year 2015-2016.

(b) Tax Audit Report in Form 3CD along with Balance Sheet & Profit and Loss A/c. for the last 3 (three) years (year just preceding the current financial year will be considered as year-1) viz. 2012-2013, 2013-2014,and 2014-2015

(c) Financial Statement in Form 17 FIN - I of Section 4 (Bidding Forms) digitally signed by the bidder.

(d) Declaration in Form - 9 of Section 4 (Bidding Forms) regarding structure and organization duly digitally signed by the bidder.

4.3 The Employer considers a conflict of interest to be a situation in which a party has an interest that could

improperly influence that party's performance of official duties or responsibilities, contractual obligations, or compliance with applicable laws and regulations, and that such conflict of interest may contribute to or constitutes a prohibited practice by the Employer which requires that bidders, suppliers, and contractors under contracts with the Employer, observe the highest standard of ethics and will take appropriate actions if it determines that a conflict of interest has flawed the integrity of any procurement process. Consequently all bidders found to have a conflict of interest shall be disqualified. A bidder may be considered to be in a conflict of interest with one or more parties in this bidding process if, including but not limited to:

(a) they have controlling shareholders in common; or

(b) they receive or have received any direct or indirect subsidy from any of them; or

(c) they have the same legal representative for purposes of this bid; or

(d) they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another bidder, or influence the decisions of the Employer regarding this bidding process; or

(e) Participation by a bidder in more than one bid (not meaning thereby more than one package) will result in the disqualification of all bids in which the party is involved.

4.4 A firm that is under a declaration of ineligibility by the Employer in accordance with ITB 3 or by any Department of Government of India or any State Government, at the date of the deadline for bid submission or thereafter during process of evaluation, shall be disqualified.

4.5 Bidders shall provide such evidence of their continued eligibility satisfactory to the Employer, as

the Employer shall reasonably request.

5. Eligible Personnel Materials, Equipment and Services

5.1 The bidder must have the requisite numbers of Technical Personnel, Plants and Equipment as enumerated in Forms 4, 7 and 9 of Section 4 (Bidding Forms). The materials, equipment and services to be supplied under the Contract may have their origin in any country except prohibited by any statute.

5.2 For purposes of ITB 5.1 above, "origin" means the place where the materials and equipment are mined, grown, produced or manufactured, and from which the services are provided. Materials and equipment are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that differs substantially in its basic characteristics or in purpose or utility from its components.

5.3 The bidders are cautioned to read the specifications carefully, as there may be special requirements. The specifications are the minimum requirements for the products. The products offered must meet or exceed requirements mentioned in the technical specifications. The products shall conform in strength, quality and workmanship to the accepted standards of the relevant industry. Modifications of or additions to basic standard products of less size or capability to meet these requirements will not be acceptable.

B. Contents of Bidding Document

6. Sections of Bidding Document

6.1 The Bidding Document consists of Parts 1, 2, and 3, which include all the Sections indicated below, and should be read in conjunction with any Addenda issued in accordance with ITB 8.

PART I Bidding Procedures
Section 1 – Notice Inviting e-Tender (NIT)
Section 2 - Instructions to Bidders (ITB)

Section 3 - Evaluation and Qualification Criteria (EQC)
Section 4 - Bidding Forms (BDF)

PART II Requirements
Section 5 - Employer's Requirements (ERQ)

PART III Conditions of Contract and Contract Forms
Section 6 - General Conditions of Contract (GCC)
Section 7 - Particular Conditions of Contract (PCC)
Section 8 - Contract Forms (COF)

6.2 The Employer is not responsible for the completeness of the Bidding Document and their Addenda, if they were not obtained directly from the source stated by the Employer in the Invitation for Bids.

6.3 The bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Document. Failure to furnish all information or documentation required by the Bidding Document may result in the rejection of the bid.

7. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting

7.1 A prospective bidder requiring any clarification of the Bidding Document shall contact the Employer in writing by sending an e.mail to the Employer's e.mail address deo.wbmsc@gmail.com raise his queries during the pre-bid meeting if provided for in accordance with ITB 7.4. and 7.5. The Employer shall upload in the website hosting the Bidding Document, its responses to bidders' queries. Should the Employer deem it necessary to amend the Bidding Document as a result of a request for clarification, it shall do so following the procedure under ITB 8.

7.2 The bidder is advised to visit and examine the Sites of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a

contract for construction of the Works. The costs of visiting the Site shall be at the bidder's own expense.

7.3 The bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.

7.4 The bidder's designated representative is invited to attend a pre-bid meeting at Swasthya Bhaban, GN-29, Sector V, Salt Lake, Kolkata 700 091. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

7.5 The bidder is requested, as far as possible, to submit any questions in writing, to reach the Employer not later than one week before the meeting.

7.6 Minutes of the pre-bid meeting, including the text of the questions raised, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be uploaded in the e-tender portal i.e. www.wbtenders.gov.in within 7 (seven) days from the date of Pre-bid meeting. Any modification to the Bidding Document that may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an addendum pursuant to ITB 8 and not through the minutes of the pre-bid meeting.

7.7 Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.

8. Amendment of 8.1 At any time prior to the deadline for submission of

	Bidding Document/ Extension of deadlines		bids and in case of the extension of deadline for the submission of bids up to bid opening, the Employer may amend the Bidding Document by issuing addenda.
		8.2	Any addendum issued shall be part of the Bidding Document and shall be uploaded in the e-tender portal i.e. www.wbtenders.gov.in and the website of the Employer at www.wbmsc.gov.in.
		8.3	To give prospective bidders reasonable time in which to take an addendum into account in preparing their bids or for other causes and consideration, the Employer may, at its discretion, extend the deadline for the submission of bids.

C. Preparation of Bids

9.	Costs of Bidding	9.1	The bidder shall bear all costs associated with the preparation and submission of its bid, and the Employer shall not be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.
10.	Language of Bid	10.1	The bid, as well as all correspondence and documents relating to the bid exchanged by the bidder and the Employer, shall be written in English only. Supporting documents and printed literature that are part of the bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in English, in which case, for purposes of interpretation of the bid, such translation shall govern.
11.	Documents comprising the Bid	11.1	Tenders are to be submitted online following the process mentioned in Sl. Nos. 3 and 4 of NIT in two folders at a time for each package, in respect whereof bid is being submitted, one being the Technical Proposal / Technical Bid and the other being the Financial Proposal / Price Bid before the prescribed date and time duly signed with a valid

Digital Signature Certificate (DSC). The documents are to be uploaded scanned for viruses and duly digitally signed so that the documents will get encrypted (transformed into non readable formats). The folder must be identifiable in respect of each of the packages for which the bidder is submitting a bid.

11.2 The Technical Bid in respect of each package shall comprise of the scanned copies of the following documents in one folder :

Statutory cover of Technical Bid containing:

(i) Prequalification Application as per format (duly filled up) given in Form- 1, Section – 4 (Bidding Forms)

(ii) Demand Draft/ Banker's Cheque / Pay Order/ Bank Guarantee towards earnest money (EMD)/ Bid Security as prescribed in the NIT against the work, drawn in favour of West Bengal Medical Services Corporation Limited.

(iii) NIT (Section - 1) and Instructions to Bidders (Section - 2) (properly uploaded with digital signature).

(iv) Qualification Information (duly filled in by the bidder), as per format given in Form – 16 of Section – 4 (Bidding Forms).

(v) General and Particular Conditions of Contract (Sections 6 and 7).

(v) Employer's Requirements (Section -5),

(vi) Form of bid duly filled in by the bidder.

Non-statutory cover of Technical Bid containing copies of:

(i) Receipted challan of deposit of Professional Tax (PT) deposit for the Financial Year 2014-2015, PAN Card, IT Return for the Assessment Year 2014-2015 and VAT Registration Certificate.

(ii) Certificate of incorporation under Companies Act.

(iii) Articles of Association and Memorandum of Association.

(iv) Power of Attorney in favour of signatory of bids.

(v) List of plant and machineries and technical personnel of the bidder along with structure and organization as per proforma given in Forms 4, 7 and 9 (Section 4 – Bidding Forms).

(vi) In case of submission of bid credentials of completion of at least one multi-storied building construction (non-residential)project of Rs 300 Crores or three multi-storied building construction (non-residential) projects of Rs. 100 Crores each **ON TURNKEY BASIS** (Planning, Design & Execution) comprising from preparation of architectural plan and elevation, structural design and drawing and related inter-disciplinary services including internal and external electrification and fire-fighting works at any place(s) in India during the last 3(three) financial years ending on the last day of the month previous to the one in which the tender is invited. Scanned copy of original credential certificate as stated in Sl. 8 (ii) of NIT has to be submitted.

(vii) Experience profile is to be submitted as per proforma given in Form - 2, Section 4 (Bidding Forms).

(viii) Tax Audit Report in Form 3CD alongwith Balance Sheet & Profit and Loss A/c. for the last 3 (three) years (year just preceding the current financial year will be considered as year-1) viz. 2012-2013 and 2013-2014 and 2014-2015 Financial Statement shall be given as per Performa given in Form – 17, Section 4 (Bidding Forms).

In case of failure to submit any of the above mentioned documents (for both statutory and non statutory cover) in respective folders, the Employer shall be entitled to summarily reject the bid.

11.3 The Price Bid for each package shall comprise the following documents in one cover (folder) :

(a) Bill of Quantity (BOQ) in the specified format in respect of the package(s), the bidder is submitting bid for, with -

(i) Cost of construction inclusive of all taxes and charges in respect of all the sites in the package taken together, presuming a built up area of 80,000 square feet for 5-storeyed hospital.
(ii) Cost of medical equipments inclusive of all taxes, charges, installation and training in respect of all the sites in the package taken together.
(iii) Cost of furniture inclusive of all taxes, charges, installation and training in respect of all the sites in the package taken together.

(b) Following documents (in PDF)
(i) Breakup of cost of construction as specified in the format being Forms 3.1D, of Section 4 (Bidding Forms).
(ii) Cost of individual medical equipments as specified in the format being Forms 3.2 of Section 4 (Bidding Forms).
(iii) Cost of individual items of furniture as specified in the format being Forms 3.3 of Section 4 (Bidding Forms).
(iv) Cost of consumables / reagents for the equipments that require proprietary item.

Comparison of Financial Bid will however be done based on the sum total of a(i), a(ii) and a(iii) of Clause 11.3.

12. Letters of Bid, and Schedules

12.1 The Letters of Technical Bid and Price Bid shall be prepared using the relevant forms furnished in Section 4 (Bidding Forms). The forms must be completed without any alterations to the text, and no substitutes shall be accepted. All blank spaces shall be filled in with the information requested.

13. Bid Prices and Discounts

13.1 The prices and discounts quoted by the bidder in the Letter of Price Bid shall conform to the requirements specified below.

13.2 The price to be quoted in the Letter of Price Bid, in

accordance with ITB 12.1, shall be the total price of the bid.

13.3 The price quoted by the bidder is not subject to any discount or adjustment.

13.4 All duties, taxes, and other levies payable by the selected bidder under the Contract, or for any other cause, shall be considered to be included in the prices and the total Bid Price submitted by the bidder. The Bid Price quoted by the bidder shall be final and shall not be adjusted and/or increased for change in any duty / tax / other levies or outgoings. In other words, the selected bidder will not be paid anything more than the Bid Price, which is all inclusive.
However, the Employer will assist (on a no recourse basis and in good faith, based on the selected bidder's representations and in good faith thereof) the selected bidder / contractor to obtain any lawful exemptions from payments of Duties or Taxes on Plant and Materials which are to be incorporated as a part of the Permanent Works by issue of a appropriate certificate in the requisite format certifying the estimated quantities of Plant / Materials that are to be incorporated into the Works. The responsibility for obtaining any such exemptions from the competent authority will remain with the selected bidder and the Employer shall in no way be responsible for admissibility of the claims or eligibility of the selected bidder.

14. Currencies of Bid and Payment

14.1 The unit rates and the prices shall be quoted by the bidder entirely in Indian National Rupees (INR) only. The Employer shall be entitled to reject any bid, if the same has been submitted in any other currency.

15. Documents Comprising the Technical Proposal

15.1 The bidder shall furnish, as part of the Technical Bid, a technical proposal including a statement of work methods, equipment, personnel, schedule and any other information as stipulated in Section

4 (Bidding Forms), in sufficient detail to demonstrate the adequacy of the bidder's proposal to meet the work requirements and the completion time.

15.2 The bidder will have to present before the Tender Evaluation Committee (TEC, which is an expert technical body), conceptual drawings, work program, modalities of execution in terms of modern mechanical construction equipment with image display conforming to technical specification and Employer's Requirements. The TEC will take into consideration various factors, collectively and holistically, especially factors having a direct bearing on 'time-bound completion' nature of the Works. If the TEC in their subjective assessment finds any discrepancy in bidder's capability to render the Works satisfactorily based on their presentation and other factors which are corroborative of their stated credentials such as financial strength, experience in similar work, personnel & establishment, plant & equipment or other factors which have a bearing on the bidder's capability to perform the contract, if awarded, the overall evaluation weightage will be calibrated for such bidder accordingly.

15.3 To establish the conformity of the goods and related services to the Bidding Documents, the bidder shall furnish as part of its bid, the documentary evidence that the Goods / Products conform to the technical specifications and standard specified in Section 5 (Employer's Requirements).

16. Documents Establishing the Qualifications of the Bidder

16.1 To establish its qualifications to perform the Contract in accordance with Section 3 (Evaluation and Qualification Criteria) the bidder shall provide the information requested in the corresponding information sheets included in Section 4 (Bidding Forms).

17. Period of Validity of Bids

17.1 Bids shall remain valid for a period of not less than 180 days after the bid submission deadline date prescribed by the Employer. A bid valid for a shorter period shall be rejected by the Employer as non responsive.

17.2 In exceptional circumstances, prior to the expiration of the bid validity period, the Employer may request bidders to extend the period of validity of their bids. The request and the responses shall be made in writing. If a bid security is requested to be extended in accordance with ITB 18, it shall also be extended 28 (twenty-eight) days beyond the deadline of the extended validity period. A bidder may refuse the request without forfeiting its bid security. A bidder granting the request shall not be required or permitted to modify its bid.

18. Bid Security

18.1 The bidder shall upload along with scanned copy of its bid in the e-tender portal i,e. www.wbtenders.gov.in, the appropriate folders, as part of its bid, a scanned copy of payment of Earnest Money/Bid Security of the amount as indicated in Sl. 3 of the NIT for each package, the bidder is submitting a bid for. The bidder shall submit Earnest Money / Bid Security and cost of bid / tender for each package the bidder is submitting its bid, along with a forwarding letter to the appropriate authority to be notified by the Employer on or before the last date of submission of bid.

18.2 The bid security shall be in the form of Demand Draft / Pay Order / Banker's Cheque/ Bank Guarantee from a scheduled bank in favour of West Bengal Medical Services Corporation Limited. The bid security shall be valid for 28 (twenty-eight) days beyond the original validity period of the bid, or beyond any period of extension if requested under ITB 17.2.

18.3 Any bid not accompanied by an enforceable and compliant bid security required in accordance with ITB 17.1, shall be rejected by the Employer as non responsive.

18.4 The bid security of bidders shall be refunded as promptly as possible upon the successful bidder's furnishing of the performance security pursuant to ITB 38.

18.5 The bid security may be forfeited:

(a) if a bidder withdraws its bid during the period of bid validity specified by the bidder on the Letter of Bid, except as provided in ITB 18.2 or

(b) if the successful bidder fails to:

i) sign the Contract in accordance with ITB 37.1;

ii) furnish a performance security in accordance with ITB 38.1.

19. Format and Signing of Bid

19.1 The bid shall be digitally signed by a person or persons duly authorized to sign on behalf of the bidder as stated in Sl. 3 of the NIT.

D. Submission and Opening of Bids

20. Submission of Tenders

20.1 Tenders are to be submitted online as stated in Sl. Nos. 3, 4 and 5 of the NIT in two folders at a time for each package, one being Technical Proposal / Technical Bid and the other being Financial Proposal /Price Bid before the prescribed date and time with Digital Signature Certificate (DSC). The documents are to be uploaded scanned for viruses and duly signed, digitally so that the documents will get encrypted (transformed into non readable formats).

21. Deadline for Submission of Bids

21.1 Complete bids (including Technical and Financial) must be uploaded in the e-tender website i.e. www.wbtenders.gov.in not later than the date as mentioned in the N.I.T under Sl. 10.

21.2 The Employer may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Documents in accordance with ITB 8, in which case all rights and obligations of the Employer and bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

22. Bid Opening

22.1 The Technical Bid will be opened online by the authority receiving tenders or by his authorized representative at time, date and the place specified in the NIT under Sl. 10 in the manner specified in the NIT. The authority receiving tenders or his authorized representative, shall decrypt all Technical Bids submitted by the bidders and copy it in any storage device such as a compact disc, pen drive or hard drive. The manner of online opening of Financial Bid will be same as Technical Bid opening.

22.2 All folders containing the Technical Bids shall be opened one at a time, and the following recorded:

(a) the name of the bidder;
(b) the presence of a Bid Security, if required; and
(d) any other details as the Employer may consider appropriate.

Only Technical Bids recorded at bid opening shall be considered for evaluation.

22.3 The Employer shall prepare a record of the opening of Technical Bids. A copy of the record shall be uploaded to the website www.wbtenders.gov.in.

22.4 At the end of the evaluation of the Technical Bids, the Employer will upload on its website www.wbmsc.gov.in the name of the bidders who have submitted substantially responsive Technical Bids. The date and time of opening of Price Bids will also be uploaded on the website of the Employer at www.wbmsc.gov.in.

22.5 The Employer shall conduct the opening of the Price Bid of all bidders who have submitted substantially responsive Technical Bids and who have been determined as being qualified in terms of ITB 36. All folders containing Price Bids shall be opened one at a time and the following recorded:

(a) the name of the bidder;
(b) the Bid Prices; and
(c) any other details as the Employer may consider appropriate.

Only Price Bids recorded during the opening of Price Bids shall be considered for evaluation. No bid shall be rejected at the time of opening of Price Bids except when the Price Bid is not in accordance with the Bidding Documents.

22.6 The Employer shall prepare a record of the opening of Price Bids that shall include, the name of the bidder and the Bid Price for the package.

E. Evaluation and Comparison of Bids

23. Confidentiality

23.1 Information relating to the examination, evaluation, comparison, and post qualification of bids and recommendation of contract award, shall not be disclosed to bidders or any other persons not officially concerned with such process until information on award of Contract is communicated to all bidders.

23.2 Any attempt by a bidder to influence the Employer in the evaluation of the bids or Contract award decisions may result in the rejection of its bid.

24. Clarification of Bids

24.1 To assist in the examination, evaluation and comparison of the Technical and Price Bids, the Employer may, at its discretion, ask any bidder for a clarification of its bid. Any clarification submitted by a bidder that is not in response to a request by the Employer shall not be considered. The Employer's request for clarification and the

response shall be in writing. No change in the substance of the Technical Bid or, prices in the Price Bid shall be sought, offered, or permitted.

24.2 If a bidder does not provide clarifications of its bid by the date and time set in the Employer's request for clarification, its bid may be rejected.

25. Deviations, Reservations, and Omissions

25.1 During the evaluation of bids, the following definitions apply:

(a) "Deviation" is a departure from the requirements specified in the Bidding Document;

(b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and

(c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Document.

26. Preliminary Examination of Technical Bids

26.1 The Employer shall examine the Technical Bid to confirm that all documents and technical documentation requested in ITB 11.2 have been provided, and to determine the completeness of each document submitted. If any of these documents or information is missing, the bid may be rejected.

27. Responsiveness of Technical Bid

27.1 The Employer's determination of a bid's responsiveness is to be based on the contents of the bid itself, as defined in ITB 11.

27.2 A substantially responsive Technical Bid is one that meets the requirements of the Bidding Document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that,

(a) if accepted, would:

(i) affect in any substantial way the scope, quality, or performance of the Works specified in the Contract; or

(ii)limit in any substantial way, inconsistent with the Bidding Document, the Employer's rights or the bidder's obligations under the proposed Contract; or

(b) if rectified, would unfairly affect the competitive position of other bidders presenting substantially responsive bids.

27.3 The Employer shall examine the technical aspects of the Bid submitted in accordance with ITB 15, Technical Proposal, in particular, to confirm that all requirements of Section 5 (Employer's Requirements) have been met without any material deviation or reservation.

27.4 If a bid is not substantially responsive to the requirements of the Bidding Document, it shall be rejected by the Employer and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.

28. Nonconformities, Errors, and Omissions

28.1 Provided that a bid is substantially responsive, the Employer may waive any nonconformities in the bid that do not constitute a material deviation, reservation or omission.

28.2 Provided that a Technical Bid is substantially responsive, the Employer may request that the bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities in the Technical Bid related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any aspect of the Price Bid. Failure of the bidder to comply with the request may result in the rejection of its bid.

29. Qualification of the Bidder

29.1 The Employer shall determine to its satisfaction during the evaluation of Technical Bids whether bidders meet the qualifying criteria specified in Section 3 (Evaluation and Qualification Criteria).

29.2 The determination shall be based upon an examination of the documentary evidence of the bidder's qualifications submitted by the bidder, pursuant to ITB 15.1.

30. Evaluation Criteria

30.1 The bidders complying with the qualifying criteria specified in Section 3 (Evaluation and Qualification Criteria), will be duly intimated and they will be asked to appear before the Tender Evaluation Committee (TEC) which is to be notified later and satisfy the TEC with respect to their work program, modalities of execution, conceptual drawing, specification of finishing items of the proposed building, image display of carrying out the construction with modern mechanical equipment (as specified) at different stages and various information relating to the proposal of the bidder with respect to the package under consideration. This presentation will need clarity and compatibility with the credentials and documents that have been submitted at the time of participating in the bid. The Employer will need reflection of convincing and reassuring commitment from bidders at the time of presentation about their ability to carry out the work at the locations geographically apart from each other simultaneously at one point of time with the assistance of modern mechanical equipment and in a synchronized way to eliminate entirely, any possibility of delay of activities during the scheduled time of completion of the Project.

30.2 **MARKING METHODOLOGY**

Sl No	**Criteria**	**Maximum Marks**	**Range of Parameter & Corresponding mark**
1	Average Annual Turn Over (Rs in crore) of the bidder during the last 3 FY 2012-'13, 2013-'14,2014-15, certified by a Chartered Accountant	**20**	501 cr to 1000 cr. = 10
			1001 cr to 1500 cr = 15
			>1500 cr = 20
2	Value of Construction works of similar nature completed during the last 3-Financial Years supported by certificate by the client/ TDS	**20**	301 cr to 500 cr = 10
			501 cr to 1000 cr = 15
			>1001 cr= 20
3	No of technical personnel under the permanent pay roll of the bidder certified by HR/Personnel-branch i. No of Graduate Engineers ii. No of Diploma Engineers iii. Others as per Clause 2.4	**20**	150 no -500 no = 10
			501 no – 1000 no =15
			>1001no = 20
4	Value of Plant & Machineries as per Clause 2.5 either	**20**	200 cr to 300 cr = 10

	owned by the bidder or taken on lease, supported by declaration		301 cr to 400 cr = 15
			>401 lac = 20
5	Technical presentation	**20**	
6	Total Mark (Technical Score)	**100**	

Financial bids of the bidders securing a total technical score of 50 and above would only be opened.

The Price Bid of bidders, who do not meet the qualifying criteria prescribed in ITB 4.1 will not be opened and considered. The Price Bids of bidders whose technical score is less than 50 will also not be opened and considered. An affirmative determination (i.e. securing minimum technical score) shall be a prerequisite for the opening and evaluation of a bidder's Price Bid. A negative determination shall result in the disqualification of the bid, in which event the Employer shall not open the Price Bid of the bidder.

31. Preliminary Examination of Price Bids

31.1 The Employer shall examine the Price Bid to confirm that all documents and schedules requested in ITB 11.3 have been provided, and to determine the completeness of each document submitted. If any of these documents or information are missing, the bid may be rejected.

32. Evaluation of Price Bids

32.1 The Employer shall consider the Price Bid of the bidder in respect of each of the packages for which it has submitted its bid. Though bidders are required to upload in a separate PDF, the breakup of the various sub-categories in terms of ITB 11.3. (b) , such as price bid in respect of each of the sites and items rates for each item of furniture and

medical equipment etc., such breakup shall not be considered at the time of evaluation of Price Bids. No other evaluation criteria or methodologies shall be permitted.

33. Comparison of Bids

33.1 All technically qualified bidders shall be at par notwithstanding individual scores.

33.2 The Employer shall compare all the Price Bids of technically qualified bidders of each package to determine the lowest Price Bid.

34. Employer's Right to Accept Any Bid, and to Reject Any or All Bids.

34.1 The Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to bidders. In case of annulment, all bids submitted and specifically, bid securities, shall be promptly returned to the bidders.

F. Award of Contract

35. Award Criteria

35.1 The Employer shall award one Contract in respect of entire package or in its sole discretion (based on the recommendation of the TEC), separate contract in respect of each of the sites comprised in the package, to the bidder (who is technically qualified having achieved adequate marks as required hereunder), whose offer has been determined to be the lowest evaluated bid for each of the packages and which is substantially responsive to the Bidding Documents, provided further that the bidder is determined to be qualified to perform the Contract satisfactorily.

36. Notification of Award

36.1 The bidder whose bid has been accepted will be notified of the award by the Employer prior to expiration of the bid validity period by uploading in the e-tender portal and www.wbmsc.gov.in or by e-mail or facsimile confirmed by registered letter. This letter (hereinafter and in the Conditions of Contract

called the "Letter of Acceptance/Notification of Award") will state the sum that the Employer will pay the Contractor in consideration of the execution, completion and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the "Tendered Amount") in respect of each package.

36.2 The Employer, may in its sole discretion, instead of awarding one contract to the successful bidder for the package, award separate contracts to the successful bidder in respect of each sites comprised in the package separately. If the Employer decides to do so, the Employer will state the sum that the Employer will pay such bidder in consideration of the execution, completion, and maintenance of the Works by the selected bidder in respect of each site, which shall be equal to the quoted price in respect of each site contained in the Price Bid of the selected bidder. It is clarified that aggregate of contract price in respect of all sites contained in a single package, shall be the Price Bid of the selected bidder in respect of the entire package.

36.3 Until a formal contract is prepared and executed in respect of each package or each site, as the case may be, the Notification of Award shall constitute a notification of commencement of Works, subject only to the furnishing of a performance security in accordance with the provisions of ITB 38.1, whereupon the Contract shall come into force.
from the Letter of Acceptance/ Notification of Award.

37. Signing of Contract

37.1 Promptly after notification, the Employer shall send the selected bidder in respect of each package the Form of Contract Agreement either to be executed for each package or site wise. Each page of the Contract Agreement should be signed by the Employer's Representative and the Contractor's authorized signatory. If there are any corrections,

cuttings, omissions, over writings, insertions, etc. (after issue of Tender Document) their number should be clearly mentioned on each page of the Contract Document before signing.

37.2 Within 21 days of receipt of the Form of Contract Agreement, the selected bidder in respect of each of the packages shall sign with date separate contracts, for each package or for each of the sites, as the case may be and return it to the Employer. The Contract shall only come into existence, when the Performance Security is furnished in terms of ITB 38.1.

37.3 No payment for the work done will be made to the selected bidder till the Contract Agreement is signed by the selected bidder and performance security along with the Manufacturer's Authorization Form, duly filled in and signed by Section 4 (Bidding Forms) have been submitted by the selected bidder.

38. Performance Security

38.1 Within 10 days of the receipt of Notification of Award from the Employer, the selected bidder for each of the packages shall furnish the Performance Security in accordance with the conditions of contract, using for that purpose the Performance Security Form included in Section 8 (Contract Forms), or another form acceptable to the Employer. If separate contracts are awarded in respect of each site comprised in a package to the selected bidder of such package, then the selected bidder has to submit Performance Security separately for each of the sites.

Failure of the successful bidder to submit the above mentioned Performance Security or to sign the Contract Agreements in respect of each package, shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security. In that event the Employer may award the Contract to the next lowest evaluated bidder whose offer is substantially responsive and is determined

by the Employer to be qualified to perform the Contract satisfactorily at the price at which the successful bidder was awarded the Contract or the Employer, may, at its discretion go in for fresh tenders.

Statutory cover

1. NIT
2. EMD (FORM 19 of Section 4 or DD) & Tender fees (DD)
3. FORM: 1, 2, 6 of Section 4
4. FORM: 4, 5, 7, 9, 18, 21 of Section 4
5. FORM 10, 11, 12, 13, 14, 16 of Section 4
6. FORM 17(Form FIN-1 Form FIN-2 Form FIN-3 Form FIN-4) of Section 4

Finance Cover or Price Bid

1. BOQ
2. Form- 3, 3.1 of Section 4
3. Form 3.2, 3.3 of Section 4
4. CMC and Consumables

My Document Format or Non-statutory cover

Sl No	Category Name	Sub Category Description	Details	Remarks
A	**CERTIFICATES**	CERTIFICATES	1.Income Tax Clearance Certificate along with Income Tax Return and Acknowledgement	

			Receipt for Assessment Year 2013-2014 2. P.T. (Deposit Challan) for Assessment Year 2013-2014 3. PAN Card 4. VAT Registration Certificate and Acknowledgement Receipt for Assessment Year 2013-2014 5. Certificate of incorporation under Companies Act. 6. Articles of Association and Memorandum of Association 7. Power of Attorney in favour of signatory of bids.	

B	**CREDENTIAL**	CREDENTIAL 1	Value of Construction works of similar nature completed during the last 3-Financial Years supported by certificate by the client/ TDS	
C	**EQUIPMENT**	MACHINERIES LABORTARY	Number of Plants & Machineries as per Clause 2.5 either owned by the bidder or taken on lease, supported by declaration (i) No of Plants (ii) No of machineries (iii) No of equipment	
D	**FINANCIAL INFO**	P/L AND BALANCE SHEET 2011-2012	PROFIT & LOSS AND BALANCE SHEET ALLONG WITH TAX AUDIT REPORT IN FORM 3CD	
		P/L AND BALANCE SHEET 2012-2013	PROFIT & LOSS AND BALANCE SHEET ALLONG WITH TAX AUDIT REPORT IN FORM 3CD	
		P/L AND BALANCE SHEET 2013-2014	PROFIT & LOSS AND BALANCE SHEET ALLONG WITH TAX AUDIT REPORT IN FORM 3CD	
E	**MANPOWER**	TECHNICAL PERSONNEL	No of technical personnel under the permanent pay roll of the bidder certified by	

			HR/Personnel-branch (i) No of Graduate Engineers (ii) No of Diploma Engineers (iii) Others as per Clause 2.4	

WEST BENGAL MEDICAL SERVICES CORPORATION LTD.

BIDDING DOCUMENT FOR

Planning, Design and Construction of 01 (One) Tertiary Healthcare Hospital along with Supply of Medical Equipments and Hospital Furniture in the State of West Bengal on Turnkey Basis

(Bid Reference No. : WBMSCL / NIT- 41 /2015)

Section 3

Evaluation & Qualification Criteria

Section 3 – Evaluation and Qualification Criteria

- Without Prequalification –

This section contains all the criteria that the Employer shall use to evaluate bids and qualify Bidders. In accordance with ITB 30 and ITB 32, no other method, criteria and factors shall be used. The bidder shall provide all the information requested in the forms included in Section 4 (Bidding Forms).

Table of Criteria

1.	Evaluation …….	4
2	Qualification …….	4
2.1	Eligibility…….	4
2.1.1	Nationality …….	4
2.1.2	Conflict of Interest……..	4
2.1.3	WBMSCL Eligibility……	4
2.1.4	Government-owned Entity ……..	5
2.2	Financial Situation……..	5
2.2.1	Historical Financial Performance……	5
2.2.2	Average Annual Turnover ……..…….	5
2.2.3	Financial Resources……	6
2.3	Experience…….	6

2.3.1	General Construction Experience …….	6
2.3.2	Specific Construction Experience Contracts of Similar Size and Nature…….	6
2.4	Personnel ……...	7
2.5	Equipment ……	8

1. Evaluation

In addition to the criteria listed in ITB 30 the following criteria shall apply:

1.1. Adequacy of Technical Proposal

Evaluation of the bidder's Technical Proposal will include an assessment of the bidder's technical capacity to mobilize key equipment and personnel for the Contract consistent with its proposal regarding work methods, scheduling and material sourcing in sufficient detail and fully in accordance with the requirements stipulated in Section 5 (Employer's Requirements) and Section 3 (Evaluation and Qualification Criteria).

2. Qualification Eligibility

2.1 Eligibility

Criteria Requirement	Compliance Requirements	Documents Submission Requirements

2.1.1 Nationality

Nationality in accordance with ITB 4.1	Must meet requirement	Form ELI-1 with attachments

2.1.2 Conflict of Interest

No conflict of interest in accordance with ITB 4.3	Must meet requirement	Letter of Technical Bid

2.1.3 WBMSCL Eligibility

Not having been declared ineligible by WBMSCL or any Department of Government of India or any State Government, as described in ITB 4.4	Must meet requirement	Letter of Technical Bid

2.1.4 Government owned entity

Bidder required to meet conditions of ITB Sub-Clause 4.5	Must meet requirement	Form ELI-1 with attachments

2.2 Financial Situation

Criteria Requirement	Compliance Requirements	Documents Submission Requirements

2.2.1 Historical Financial Performance

Submission of audited balance sheets, other financial statements for the last three years to demonstrate the current soundness of the bidder's financial position and its prospective long term profitability. Using Forms FIN – 1 in Section 4 (Bidding Forms) the bidder must demonstrate that the bidder's net worth is positive	Must meet requirement	Forms ELI-1, with attachments of Section 4

2.2.2 Average Annual Turnover

Minimum average annual turnover of INR 500 Crores calculated as total certified payments received for contracts in progress or completed, within the last 7(seven) years.	Must meet requirement	Form FIN-2 of Section 4

2.2.3 Financial Resources

The bidder must demonstrate access to, or availability of, financial resources such as liquid assets, unencumbered real assets, lines of credit, and		Form FIN-3 & FIN-4 of Section 4

other financial means, other than any contractual advance payments to meet the overall cash flow requirement.		

2.3 Experience

Criteria Requirement	Compliance Requirements	Documents Submission Requirements

2.3.1 General Construction Experience

Experience under construction contracts in the role of contractor for at least the last 10 (ten) years prior to the application submission deadline in the field of construction of multi-storied building (preferably non-residential)	Must meet requirement	Form EXP-1 of Section 4

2.3.2 Specific Construction Experience Contracts of Similar Size and Nature

(j) For considering for being qualified for the work of a single package, the bidder must have completed at least one multi-storied building construction project (non-residential) of Rs 300 Crores or three multi-storied building construction projects (non-residential) of Rs 100 Crores each **ON TURNKEY BASIS** (Planning, Design & Execution) comprising from preparation of architectural plan and elevation, structural design & drawing and related inter-disciplinary services including internal and external electrification and fire-	Must meet requirement	Form 2 of Section 4

fighting works at any place(s) in India during the last 3 (three) financial years ending on the last day of the month previous to the one in which the tender is invited. For projects in the private sector, completion certificate along with TDS certificates evidencing payment of at least 60 % of the completed similar works shall have to submitted.Partially completed works shall also be considered for determining the eligibility if documentary evidence in support of the fact that the value of the completed value of partially completed works stands more than rs 300 crore		

2.4 Personnel

The bidder, while bidding for the package, must engage the following technical personnel (having minimum 8-year experience for diploma holder and 5-year experience for degree holder) in their pay- roll of full time or in part-time basis engagement per site.

i. 1-Graduate Civil Engineers for day to day management /supervision/inspection of progress of work
ii. 2-Diploma Civil Engineers for day to day management /supervision/inspection of progress of work
iii. 1-Surveyor
iv. 2-Quantity Surveyors
v. 1- Safety Officer / Engineer
vi. 1-Diploma Mechanical Engineer
vii. 1-Graduate Electrical Engineer
viii. 1-Diploma Electrical Engineers
ix. 1-Biomedical Engineer (per package)
x. 1-Hospital Management Personnel (per package)

Apart from engineers cited above to be deputed at site for overseeing different phases of construction, a team of Key Personnel of following criteria is pre-requisite. **Three lead project engineers** on behalf of the bidder should be named in the contract with whom day to day interactions shall be made by the representative(s) of the employer for execution and supervision of the works.

KEY PERSONNEL OF THE PROJECT TEAM

The bidder shall be required to form a multi-disciplinary team for this assignment

with qualified and experienced key personnel and other required supporting staff for delivering the final output. The design as well as architectural team should have the requisite experience and expertise for design of similar works as offered by the bidder and accepted by the Employer.

The resumes of the following Key Personnel have to get approved by the Employer or his representative(s) prior to signing of contract of agreement.

A. Team Leader & Building Design Engineer:

A Post Graduate in Structural Engineering (Civil) with 10-year or a Graduate Engineer (Civil) with 15-year of minimum experience in design of building works and detailing of major RCC / PSC / steel-concrete composite superstructure with different types of foundation including pile foundation for buildings.

B. Geotechnical Engineer and Building Foundation Expert

A Post Graduate degree in Geo-technical or Foundation Engineering having 10-year experience or Graduate Civil engineer having a minimum 15-year experience out of which at least 5-year of experience in supervising soil & geo-technical investigations for major building works , design of foundations of all types including large diameter piles for building structures and construction of major buildings.

C. Architect

A Graduate Architect having a minimum 10-year experience out of which 5-year experience for preparation of hospital building planning detailing for major building.

The bidder shall provide details of the proposed personnel and their experience records in the relevant Information Forms included in Section 4 (Bidding Forms).

The bidder shall be required to name a principal candidate and an alternate candidate for each key position.

At least, two Project Engineers shall have relevant experience in execution of contracts involving construction of pumping stations with electro-mechanical items.

2.5 Equipment

The bidder must demonstrate that it has the key equipment for the Package comprising of 6-site listed hereinafter.

Availability (either owned or leased to be valid at least till completion of project) required for single site of the following **key and critical equipment**:

Sl no	List of Plants & Machineries	Requirement
1	Mini Batching Plant (Capacity 5 m^3 / hr)	1 no
2	Field testing equipment	1 sets
3	Tower crane up to 25 m height	1 no
4	Construction elevator	2 nos
5	Hydraulic rotary rig / Rotary rig/ Bore Piling Rig- as applicable and required	1 no / 3 nos
6	Theodolite + leveling machine (latest model)	[1+1]nos
7	Truck & tipper	3 nos
8	Vibrator / equipment	08 nos
9	Concrete pump	1 no
10	Mechanical excavator	1 no
11	Steel staging & shuttering material	40000 sq. ft.

The bidder shall provide further details of proposed items of equipment using the relevant form in Section 4 (Bidding Forms).

The bidder is to provide their own estimate of the number of equipment, commensurate with their work plan and methodology.

The bidder to fill up the table based on its assessment of requirement of the project to be completed within the stipulated time period.

The bidder shall give an undertaking to mobilize additional plant and equipment as will be found necessary during execution of the work to meet the target completion date, without any additional cost to the Employer.

WEST BENGAL MEDICAL SERVICES CORPORATION LTD.

BIDDING DOCUMENT FOR

Planning, Design and Construction of 01 (One) Tertiary Healthcare Hospital alongwith Supply of Medical Equipments and Hospital Furniture in the State of West Bengal on Turnkey Basis

(Bid Reference No. : WBMSCL/NIT-41/2015)

Section 4

Bidding Forms

Section 4 – Bidding Forms
-Without Prequalification-

This Section contains the forms which are to be completed by the bidder and submitted as part of his Bid.

Table of Forms

FORM: 1 Letter of Technical Bid

FORM: 2 Declaration by the Bidder

FORM: 3 Letter of Price Bid

FORM 3.1D Breakup of construction cost

FORM 3.2 Medical Equipments – 5 storeyed

FORM 3.3 Furniture – 5 storeyed building

FORM 4 Deployment of minimum no. of Plant and Machinery by the contractor.

FORM 5 Bank Certificate

FORM 6 Power of Attorney in favour of Signatory of the Bid

FORM 7 Machineries

FORM: 8 Equipment for testing materials & concrete at site laboratory

FORM: 9 Personnel

Form PER-1 Proposed Personnel

Form PER-2: Resume of Proposed Personnel

FORM: 10 Equipment **FORM: 11**

Site Organization **FORM: 12**

Method Statement **FORM: 13**

Mobilization Schedule **FORM: 14**

Construction Schedule **FORM: 15**

Deleted

FORM: 16 Bidders Qualification

Form ELI-1: Bidder's Information Sheet

FORM: 17 Financial Information

Form FIN-1: Financial Situation

Form FIN-2: Average Annual Construction Turnover

Form FIN-3: Financial Resources

Form FIN-4: Current Contract Commitments/ Works in Progress

FORM: 18 General Construction Experience

FORM: 19 Bid Security: Bank Guarantee

FORM: 20 Form of Notification of Award

FORM: 21 Manufacturer's Authorization Form
FORM: 22 Summary Information sheet (Table – A, Table – B, Table – C, Table – D)

FORM: 1

Letter of Technical Bid in form of Affidavit

(**To be furnished on non-judicial stamp-paper of appropriate value, duly notarised**)

Date: …….

NIT No.: _____

Name of Contract:
Planning, Design and Construction of 01 (One) Tertiary Healthcare Hospital alongwith Supply of Medical Equipments and Hospital Furniture in the State of West Bengal on Turnkey Basis

To
Managing Director,
West Bengal Medical Services Corporation Ltd,
Swasthya Bhaban Complex,
GN- 29, Sector – V, Salt Lake,
Kolkata-700 091.

We, the undersigned, declare that:

(a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) 8.

(b) We offer to execute in conformity with the Bidding Documents the following works:

_____

(c) Our Bid consisting of the Technical Bid and the Price Bid shall be valid for a period of 180 days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

(d) If our bid is accepted, we commit to obtain a performance security in accordance with the Bidding Documents.

(e) Our company has been incorporated in accordance with the laws of India and governed by them.

(f) Our company, including its suppliers, do not have any conflict of interest in accordance with ITB 4.3;

Our company is participating as a bidder having satisfied the eligibility criteria in accordance with ITB 4.1;

(h) Our company, its affiliates or subsidiaries, including any suppliers for any part of the contract, has not been declared ineligible by WBMSCL, any Department of the Government of India or any State Government;

(g) We agree to permit WBMSCL or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors appointed by the WBMSCL.

(h) We understand that:

(i) The tender inviting and accepting authority can amend the scope and value of the contract bid under this project.

(ii) The tender inviting and accepting authority reserves the right to reject any application without assigning any reason.

(i) All the statements made in the attached documents are true and correct. In case of any information submitted proved to be false or concealed, the application may be rejected and no objection /claim will be raised by the bidder company.

Enclo:
1. Statutory Documents
2. Non Statutory Documents
3. Forms & Annexure duly filled up, signed & notarized (where applicable)

Name……

In the capacity of……

Signed …….

Duly authorised to sign the Bid for and on behalf of (if applicable)……..

Date…….

FORM: 2

DECLARATION BY THE BIDDER

(Affidavit on Non-Judicial Stamp Paper of Rs.10/- duly attested by Notary / Magistrate)

This is to certify that We, M/s. _____, in submission of this offer confirm that:-

We have inspected the site of work and have made myself/ourselves fully acquainted with local conditions in and around the site of work. We have carefully gone through the Instructions to Bidders (ITB) and all the documents, Forms & Annexure, etc. mentioned therein alongwith the drawing attached. We have also carefully gone through the ITB, Employer's Requirements, Particular Conditions of Contract, General Conditions of Contract, Forms & annexures etc. to be submitted duly filled up & notarized in the form of Affidavit, where applicable, and time of completion (which is sacrosanct) of work:" *Planning, Design and Construction of 01 (one) Tertiary Healthcare Hospital alongwith Supply of Medical Equipments and Hospital Furniture in the State of West Bengal on Turnkey Basis*" at Uluberia S.D. Hospital , Howrah in the State of West Bengal.

i) Our tender is offered taking due consideration of all factors including site information and conditions of each and every proposed location of the upcoming Super-specialty Hospital stated in the detailed Instructions to Bidders to execute the work up to the standards as laid out in Employer's Requirements and other sections of ITB.

ii) We understand that the work being done on Turnkey Basis (Planning, Design & Execution) though we require approval at different stages of the work starting from concept plan & design to implementation of the work from the Employer / Employer's Representative, such approval do not absolve owning up of responsibility incumbent to us for adequacy of design, standard of work & its safety, maintaining prescribed specification of the work and upholding secured movement of all the stakeholders inside the premises of existing hospital.

iii) We promise to abide by all the stipulations of the Contract documents and carry out and complete the work to the satisfaction of the Employer.

iv) We also agree to procure Plants and Machineries at our cost required for the work. We also submit that we have Organizational Structure comprising adequate Technical Personnel in the line of requirement of IFB. We also agree to accomplish the job entrusted to us in the stipulated time laid out in IFB except situations not under our control.

v) We have not made any misleading or false representation in the forms, statements and attachments in proof of the qualification requirements;

vi) We do not have records of poor performance such as abandoning the work, not properly completing the contract, inordinate delays in completion, litigation history or financial failures etc.

vii) Business has not been banned with us by any Central / State Government Department/ Public Sector Undertaking or Enterprise of Central / State Government.

viii) We have submitted all the supporting documents and furnished the relevant details as per prescribed format.

ix) List of Similar Works satisfying Qualification Criterion as indicated hereinafter, does not include any work which has been carried out by us through a subcontractor on a back to back basis.

x) The information and documents submitted with the tender by us are correct and we are fully responsible for the correctness of the information and documents submitted by us.

xi) We understand that in case any statement/information/document furnished by us or to be furnished by us in connection with this offer, is found to be incorrect or false, our EMD in full will be forfeited and business dealing will be banned.

SEAL, SIGNATURE & NAME OF THE BIDDER
Signing this document

PROFORMA

	Similar nature of work done			**Work in progress**			
Sl. No.	Name of the work with Tender No.	Employer & Contact no	Estimated Amount	Sl. No.	Name of the work with Tender No.	Employer & Contact no	Estimated Amount

Note:

1. In support of having completed above works attach self-attested copies of the completion certificate from the owner/client indicating the name of work, the description of work done by the bidder, date of start, date of completion (contractual & actual), value of contract as awarded and as executed by the bidder and value of material supplied free by the client.

2. Such credential certificates issued by Govt. Organizations/ Semi Govt. Organizations / Public Sector Undertakings / Autonomous Bodies / Municipal Bodies / Public Ltd. Cos. shall only be accepted for assessing the eligibility of a bidder. For projects in private sector, appropriate TDS Certificates evidencing the value of work, must be submitted.

3. Information must be furnished for works carried out by the bidder in his own name as a prime contractor or proportionate share as member of a joint venture. In the latter case details of contract value including extent of financial participation by partners in that work should be furnished.

4. If a bidder has got a work executed through a subcontractor on a back to back basis, the bidder cannot include such a work for his satisfying the Qualification Criterion even if the client has issued a Completion Certificate in favour of that bidder.

5. Only similar works completed during the previous years which meet the Qualification Criteria need be included in this list.

_____

Signed by an authorized officer of the company

_____

Title of the officer

_____

Name of the Company with Seal

Date_____

FORM: 3

Letter of Price Bid

Date: …….

NIT No.: _____

Name of Contract:
Planning, Design and Construction of 6 (six) Tertiary Healthcare Hospital alongwith Supply of Medical Equipments and Hospital Furniture in the State of West Bengal on Turnkey basis.

To
Managing Director,
West Bengal Medical Services Corporation Ltd (WBMSCL),
SwasthyaBhaban Complex,
GN- 29, Sector – V, Salt Lake,
Kolkata-700091, West Bengal

We, the undersigned, declare that:

(a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with instructions to Bidders (ITB) 8;

(b) We offer to execute in conformity with the Bidding Documents the following Works : -

_____

(c) The total price of our bid is the sum total of the costs mentioned in the specified formats being Forms 3.1 D, 3.2, 3.3.

(d) Our bid shall be valid for a period of 120 days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

(e) If our bid is accepted, we commit to obtain a performance security in accordance with the Bidding Documents.

(f) We understand that this bid, together with your written acceptance thereof included in your Notification of Award, shall constitute a binding contact between us, until a formal contract is prepared and executed; and

(g) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.

Name……
In the capacity of……
Signed …….
Duly authorized to sign the bid for and on behalf of……..
Date…….

Form- 3.1

Breakup of Construction Cost

Sl No	Hospital	Area to be Built (in Sq. Ft)	Rate/Sq. Ft	Cost (Area to be Built X Rate/Sq. Ft)
1	Uluberia	80,000		
Cost (3.1) (Total Cost of Construction)				

Cost (3.1) for Construction is to be filled in the specified field assigned against "**Construction** " in the BOQ in .xls

Form 3.2
Medical Equipments - 5 Storeyed

Sl.	**Description of item/ Medical Equipment**	**Quantity in number**	**Unit Cost*** (In INR)	**Cost*** (Quantity X Unit Cost) (In INR)
	Radiology			
1	Digital Radiography System (Ceiling Suspended)	**1**		
2	500 M.A. X-ray machine with Radiography and Fluroscopy	**0**		
3	300 M.A. X-ray machine with Radiography and Fluroscopy	**1**		
4	Portable Xray Machine (60 ma) Mobile	**0**		
5	C arm with accessories	**1**		
6	CR System	**1**		
7	Colour Doppler	**1**		
8	Mammography Unit	**0**		
	ICU/CCU			
9	Biphasic Defibrillator	**2**		
10	Multiparameter Monitors	**2**		
11	Suction machine	**3**		
12	Head Light Source	**1**		
13	Fibreoptic Bronchoscope with light source	**0**		
14	Nebulizers	**5**		
15	Emergency crash Cart	**2**		
16	Portable Lights	**2**		

17	Patient warmer	**2**		
ss	**Operation Theatre**			
18	Anesthesia Work Station with Ventillators	**4**		
19	Resucication Kit	**4**		
20	OT table	**4**		
21	OT Lights	**4**		
22	Flash Sterilizer	**1**		
23	Surgical Diathermy	**4**		
24	Automatic External Defibrillator	**1**		
	Physio Therapy Department			
25	Interferential therapy unit	**1**		
26	Ultra sound therapy Unit	**1**		
27	Hydrocolator	**1**		
28	Electric Muscle Stimulator	**1**		
29	Computerised traction & Microwave therapy	**1**		
30	Exercise Therapy Equipment	**1**		
31	Infra red lamp	**1**		
32	Wax Bath	**1**		
33	Shoulder wheel	**1**		
	Paediatrics			
34	Radiant Warmer with Bassinet	**4**		
35	Baby Incubators	**2**		

36	Photo Therapy Equipments	**2**		
37	Neonatal Ventillator	**2**		
	OPD Equipments			
38	ECG machine computerized	**2**		
39	B.P.apparatus table model (Analog)	**10**		
40	B.P.apparatus stand model (Analog)	**10**		
	Gyanecology			
41	Foetal Doppler	**2**		
	ENT			
42	Audiometer	**1**		
43	Operating Microscope (ENT)	**1**		
44	ENT Operation set including headlight	**2**		
45	ENT Nasal Set	**1**		
46	Laryngoscope fibreoptic ENT	**5**		
47	Laryngoscope indirect	**2**		
48	Otoscope	**2**		
49	Head Light (cold light)	**2**		
50	Sound Proof Room	**1**		
	Opthalmology			
51	Snellen chart/Drum with remote	**1**		
52	Trial lens sets with frames	**1**		
53	Log Mar Vision Charts	**1**		
54	Opthalmoscope - Direct	**2**		
55	Slit Lamp	**1**		
56	Retino scope	**2**		
57	Perimeter	**1**		
58	Opthalmic Dr Chair	**1**		
59	Keratometre	**1**		

60	Auto Refractometer	**1**		
61	Non contact tonomter	**1**		
62	Dental Chair with accessories	**2**		
63	Dental X Ray	**1**		
64	Dental Instruments & Accessories	**2**		
	Laboratory Equipments			
65	Electric Colorimeter	**1**		
66	Semi -Auto analyser Bio Chem	**1**		
67	Micro pipettes of different volumes (set of 10 pipettes)	**1**		
68	Shaker Water bath	**1**		
69	Hot Air oven	**1**		
70	Lab Incubator	**1**		
71	Hot plates	**1**		
72	Rotor / Shaker	**1**		
73	Counting chamber	**2**		
74	Paediatric Glucometer	**1**		
75	Glucometer	**2**		
76	Haemoglobinometer	**1**		
77	Automated Microtome	**1**		
78	Elisa Reader cum washer	**1**		
79	Electrolyte Analyser	**1**		
80	Glycosylated Haemoglobinometer	**1**		
81	Haematology Analyser	**1**		
82	Laboratory Autoclaves	**2**		

83	Ordinary Refrigerator	**2**		
84	Floatation Bath	**2**		
85	Class – I Bio Safety Cabinet	**1**		
86	Cyto Spin	**1**		
	Endoscopy Equipments			
87	Endoscope (OGD)	**1**		
88	Laparoscope operating major with accessories	**1**		
	Medical Gas System			
89	Medical Gas system	**1**		
	Mortuary			
90	Cold Storage Mortuary Cabinet (6 bodies)	**4**		
Cost (3.2) (Total cost of Equipments for one 5 Storeyed Hospital)				

* The cost is inclusive of all Taxes and charges

The specified field assigned against "**Equipment (B)**" in the BOQ in .xls consist of sum of the following,

a. Cost (3.2) multiplied by number of 5 storeyed hospital in the Package

Form 3.3
(Furniture - 5 Storyed Hospital)

Sl.	**Description of item/Furniture**	**Quantity in number**	**Unit Cost*** (In INR)	**Cost*** (Quantity X Unit Cost) (In INR)
	General Furniture			
91	General Beds	**240**		
92	Bassinets	**25**		
93	Pre OP Beds	**6**		
94	Post-Op Beds	**6**		
95	Private Rooms Beds	**20**		
96	Semi Private Beds	**40**		
97	Examination Couches	**20**		
98	Bed side lockers	**330**		
99	Crib attachment	**25**		
100	SS Food Trolley adj. ht	**330**		
101	Strecher trolley	**30**		
102	Bed side screen	**180**		
103	Multipurpose Stool with SS top	**330**		
104	Drug trolley SS	**50**		
105	Mattresses	**360**		
106	Minor OT table	**4**		
107	Delivery Table	**4**		

	Office Furniture			
108	Executive Chair	**8**		
109	Executive Table	**8**		
110	Office Table	**70**		
111	Office Chair	**200**		
112	Visitor Chair	**200**		
113	Side Table	**90**		
114	Full ht Storage	**70**		
115	Conference Table	**1**		
116	Library Rack	**5**		
117	White Board	**6**		
118	Notice Board	**4**		
119	Low ht Storage	**30**		
120	Slottet angle rack MS	**20**		
121	Slotted angle MS rack	**20**		
122	Over head cupboard	**2**		
123	Dining table 4Seater	**6**		
124	Dining Chair			
125	Consultant Table	**60**		
126	3 seater perfo Chair	**90**		
127	Glass storwel	**1**		
128	full ht Storage	**1**		
129	15 seater conf table	**1**		
130	2 seater sofa	**5**		
131	center table	**5**		
132	Bed For infants 750X400	**20**		
133	Injection trolley	**16**		
134	Dresser trolley	**6**		

135	Chair with Arm	**120**		
136	Chair without arm	**80**		
137	Chair Revolving	**20**		
138	Visitor chair 3 seater	**200**		
139	Weighing Machine adult	**20**		
140	Weighing Machine Baby	**10**		
141	Sectrtariate table	**15**		
142	Half Sectrtariate Table	**20**		
143	Almirah Big 6.5'	**60**		
144	Alimirah 6ft	**40**		
145	Almirah Small	**30**		
146	Stel rack Large	**30**		
147	Steel Rack medium	**20**		
148	Steel rack Small	**20**		
149	File cabinet	**20**		
150	Detachable side rails for GHF-394	**60**		
151	Table dispensing	**16**		
152	Bed side screen	**240**		
153	Water purifier	**20**		
Cost (3.3) **(Total cost of Furniture for one 5 Storeyed Hospital)**				

* The cost is inclusive of all Taxes and charges
The specified field assigned against "**Furniture (C)**" in the BOQ in .xls consist:
a. Cost (3.3) multiplied by number of 5 storeyed hospital in the Package

FORM 4

(To be furnished as AFFIDAVIT in Non-Judicial Stamp paper of appropriate value duly notarized)

DEPLOYMENT OF MINIMUM NO. OF PLANT AND MACHINERY BY THE CONTRACTOR

Whereas it is entirely the responsibility of the bidder to deploy sufficient plant and modern mechanical equipment to ensure compliance with the Contract, the following list is an indicative list of the minimum number of plant and machinery which the bidder must provide per site by way of undertaking in the form of AFFIDAVIT to this effect is to be submitted.

Sl no	List of Plants &Machineries	Requirement
1	Cement concrete batch mix plant arrangement (capacity 40-60 Tph)	1 no
2	Field testing equipment	1 set
3	Tower crane up to 25 m (G+4) height	1 nos
4	Construction elevator	2 nos
5	Hydraulic Rotary rig/Rotary rig	3 nos
6	Latest model of Theodolite + Leveling machine	2 nos
7	Truck & tipper	3 nos
8	Vibrator / equipment	10 nos
9	Concrete pump	2 nos
10	Mechanical excavator	1 nos
11	Steel staging & shuttering material	0.5 lakh sqft

FORM 5

BANK CERTIFICATE

This is to certify that M/s. _____ is a reputed company with a good financial standing.

If the contract for the work, namely Planning, Design and Construction of 6 (six) Tertiary Healthcare Hospital along with Supply of Medical Equipments and Hospital Furniture in the State of West Bengal on Turnkey Basis is awarded to the above Company; we shall be able to provide overdraft/credit facilities to the extent of Rs. _____ to meet their working capital requirements for executing the above contract during the contract period.

(Signature)

Name of the Bank:

Senior Bank Manager:

Address of the Bank:

FORM 6

Power of Attorney in favour of signatory of the bid

*(To be executed on non-judicial stamp paper of appropriate value)*KNOW ALL MEN BY THESE PRESENTS THAT WE, ……[insert the name of the bidder]…….. a Company incorporated under the Companies Act, 1956 and having its registered office at ……[insert address] ……(hereinafter referred to as the bidder) having been authorized by the Board of Directors of the Company, inter alia, to execute contracts in the name of and for and on behalf of the Company.

I ……[insert name of the person giving the Power of Attorney]…….presently holding the position of …….. (insert designation of the person giving the Power of Attorney)…… in the company do hereby constitute, appoint and authorize Shri…… (insert name, designation and residential address of the person to whom the Power of Attorney is being given)…… as our true and lawful attorney to do in our name and on our behalf all such acts, deeds, things necessary and incidental for submission of our bid against NIT no. ……..floated by WBMSCL. I hereby further authorize the above attorney for signing and submission of the bid and all other documents, information related to the bid including undertakings, letters, certificates, declarations, clarifications, acceptances, guarantees, any amendments to the bid and such documents related to the bid, and providing responses and representing us in all the matters before WBMSCL in connection with the bid for the said tender till the completion of the bidding process. I accordingly hereby nominate, constitute and appoint above named …… severally, as the lawful attorney to do all or any of the acts specifically mentioned immediately herein above.

WE do hereby agree and undertake to ratify and confirm whatever either of the said Attorney shall lawfully do or cause to be done under and by virtue of this Power of Attorney and the Acts of Attorney to all intents and purposes are done as if the same had been done on behalf of the Company if these presents had not been made.

IN WITNESS whereof I, ……..have executed these presents this the……. day of ……at ……...…….

Specimen Signature of Attorney
Name…….
EXECUTANT
Designation...……...
Name of Company……..……
Designation……..
Signature of the Attorney Attested
……
EXECUTANT
Name……
Designation……
Office Seal……

FORM 7

MACHINERIES (In favour of owner / lessee)

(Original document of own possession and / or arranged through lease deed to be annexed)
(If already engaged anticipated date of release of such machineries to be annexed with an undertaking)

Name of Machine / Instrument	Make	Type	Capacity	Motor / Engine No.	Machine No.	Possession Status		Date of release if Engaged
						Idle	Engaged	
1	2	3	4	5	6	7	8	9

For each item of equipment the application should attach copies of
(i) Document showing proof of full payment
(ii) Receipt of Delivery
(iii) Road Challan from Factory to delivery spot is to be furnished.

Signature of Bidder
(including *title and capacity* in which application is made)

FORM 8

Equipment for testing of materials & concrete at site laboratory (indicative only)

All necessary equipment for conducting necessary tests shall be provided at the site laboratory by the bidder at his own cost.

Sl. No.	Equipments	Quantity
1	Cube testing machine	2 Nos.
2	Slump Cone	6 Nos.
3	Tensile Briquette testing machine	2 Nos.
4	Vicats apparatus with Desk Pot	2 Nos.
5	Megger& earth resistance tester	4 Nos.
6	Pumps and pressure gauges for hydraulic testing of pipes	4 Nos.
7	Weighing scale platform type 100 kg capacity	4 Nos.
8	Graduated glass cylinder	As per requirement
9	Sets of sieves for coarse aggregate [40,20,10,4.75 mm]	4 Nos.
10	Sets of sieves for fine aggregate [4.75; 2.36, 18; 600; 300 & 150 micron	4 Nos.
11	Core cutter for soil compaction with accessories	2 Nos.
12	Cube moulds size 150mm x 150mm x 150mm	18 Nos.
13	Cube moulds size 150mm x 150mm x 150mm	90 Nos.
14	Moisture content rapid moisture meter standard	4 Nos.
15	Hot Air Oven Tem. Range 500C to 3000C	2 Nos.
16	Electronic balance 600g x 0.01g. 10lg and 50kg	3 Nos.
17	Physical balance weight up to 5kg	1 Nos.

18	Digital thermometer up to 1500 C	2 Nos.
19	Poker Thermometer (Concrete Road) 00C to 500 & 1500C	2 Nos.
20	Measuring Jars 100ml, 200ml, 500ml	2 Nos. set of each size.
21	Gauging trowels 100mm & 200mm with wooden handle	4 Nos.
22	Spatula 100mm & 200mm with long blade wooden handle	2 Nos. set of each size.
23	Vernirecallipers 12" and 6" sizes	2 Nos. each
24	Digital PH motor least count 01mm	1 No.
25	Digital Micrometer least count .01mm	1 No.
26	Digital paint thickness meter for steel 500 micron range	2 Nos.
27	GI tray 600 x 450 x 50mm, 450x300x40mm, 300xc250x40mm	2 Nos.
28	Electric Morter mixer 0.25 Cum capacity	1 No.
29	Rebound hammer test Digital rebound hammer	1 No.
30	Screw gauge 0.1mm – 10mm, least count 0.05	2 Nos.
31	Water testing Kit	2 Nos.
32	Aggregate impact value testing machine with blow counter	As per requirement
33	Crushing value apparatus	As per requirement
34	Thickness gauge for measuring flakiness index	As per requirement
35	Elongation gauge	As per requirement
36	Measuring Cylinder 3,5,10 & 15 litre Cylinder	As per requirement
37	Pycnometer	2 Nos.
38	Motorized Sieve shaker	2 Nos.

Any other equipment for laboratory tests at site will be the way it is outlined in relevant IS-Codes and / or as directed by the Employer's Representative. Quality control engineer shall monitor collection of Sample and conducting regular testing at site maintaining propriety and the very best standard followed in industry of construction.

All relevant IS Codes, special publications as per latest amendment/edition, latest edition of WB PWD SOR, WB PW(Road)D SOR and CPWD SOR shall be made available at site by the contractor at his own cost.

Personnel
Bidders should provide the names of suitably qualified personnel to meet the requirements specified in Section 3 (Evaluation and Qualification Criteria). The data on their experience should be supplied using the Form below for each candidate.

FORM 9
STRUCTURE AND ORGANISATION

A.1 Name of Contractor :

A.2 Office Address :

Telephone No. and Cell Phone No. :

Fax No :
E mail :

A.3 Details of Bank Accounts :

i) Name of Bank :
ii) Name of Branch and Address with Phone No. :

iii) Account No :

iv) MICR No :
v) IFSC Code :

A.4 Attach an Organization -chart showing the structure of the company and names of Key personnel and technical staff along with their Bio-data. :

Note: Application covers Limited Company or Corporation

Signature of Contractor
(including *title and capacity* in which application is made)

Form PER-1: Proposed Personnel

1.	Title of position*
	Name
2.	Title of position*
	Name
3.	Title of position*
	Name
4.	Title of position*
	Name

*As listed in Section 3 (Evaluation and Qualification Criteria).

Form PER-2: Resume of Proposed Personnel

Position		
Personnel information	Name	Date of birth
	Professional qualifications	
Present employment	Name of employer	
	Address of employer	
	Telephone	Contact (manager/ personnel officer)
	Fax	E-mail
	Job title	Years with present employer

Summarize professional experience in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company/Project/Position/ Relevant Technical and management experience

Equipment:

The bidder shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment listed in Section 3 (Evaluation and Qualification Criteria) A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the bidder.

FORM 10

Item of Equipment		
Equipment Information	Name of manufacturer	Model and Power rating
	Capacity	Year of manufacture
Current Status	Current Location	
	Details of Current commitments	
Source	Indicate source of the equipment ☐ Owned ☐ Rented ☐ Leased ☐ Specially manufactured	

Omit the following information for equipment owned by the bidder

Owner	Name of owner	
	Address of owner	
	Telephone	Contact name and title
	Fax	Telex
Agreements	Details of rented/lease/manufactures specific to the project	

FORM 11

Site Organisation

(TO BE PROVIDED BY THE BIDDER)

FORM 12

Method Statement

(TO BE PROVIDED BY THE BIDDER)

FORM 13

Mobilization Schedule

(TO BE PROVIDED BY THE BIDDER)

FORM 14

Construction Schedule

(TO BE PROVIDED BY THE BIDDER)

FORM 16

Bidders Qualification

To establish its qualifications to perform the contract in accordance with Section 3 (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding Information Sheets included hereunder.

Form ELI – 1 :Bidder's Information Sheet

	Bidder's Information
Bidder's legal name	
Bidder's year of constitution	
Bidders's Registered address	
Bidder's authorized representative (name, address, telephone numbers, fax numbers, e-mail address)	
Attached are copies of the following original documents. ❑ 1. Articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and 4.2 ❑ 2. Authorization to represent the company named in above, in accordance with ITB 20.2. ❑ 3. In case of a government-owned entity, any additional documents not covered under 1 above required to comply with ITB 4.5.	

FORM 17

Form FIN-1 : Financial Situation

Each bidder must fill in this form

		Financial Data for Previous 3 years		
		Year 1	Year 2	Year 3
	Information from Balance Sheet			
1.	Total Assets			
2.	Total liabilities (secured loans, unsecured loans and current liabilities)			
3.	Misc. expenditure to the extent not written off			
4.	**Net worth (1-2—3)**			
A.	**Investments**[1]			
B.	**Current Assets**			
i.	Inventories			
ii.	Sundry debtors			
iii.	Cash & Bank and other current assets[2]			
iv.	Loans & Advances[3]			
	Total Current Assets			
C.	**Current liabilities and provisions**			
i.	Current liabilities and provisions			
ii.	Provisions			
iii.	Unsecured loans[4]			
	Total Current liabilities and provisions			
D.	**Working Capital Limits and Utilisation**			
1.	Fund based Limit[5]			
2.	Non Fund based Limit[6]			
	Utilised as on last day of Financial year[7]			
3.	Fund based Limit			
4.	Non Fund based Limit			
5.	Fund based limit available (1 – 3)			
6.	Non Fund based limit available(2-4)			
7.	Total Working Capital Limit Available (5 + 6)			
E.	**Total Cash Flow available (A+B – C+D)**			
	Information from Income Statement			
	Total Revenue			

	Profit before taxes			
	Profits after taxes			
1.	Investments shall include only those investments which are unencumbered as certified by the Statutory Auditor.			
2.	Cash & Bank and other current assets will not include margin money deposit, earnest money deposit, retention money, money lying in any escrow account, unbilled revenue.			
3.	Loans and advances shall not include tax deducted at source and advance tax, deposits lying with statutory authorities or deposits lying under any judicial order.			
4.	Amounts repayable within one year shall be included.			
5.	Secured loans, lease rentals payable within one year and debentures, preference shares payable within one year shall be included.			
6.	Credit Limits should supported by Certificate from the Lead Bank			
7.	Utilisation of working capital limits should be supported by certificate of the Statutory Auditor.			
	Attached are copies of financial statements (balance sheets including all related notes and income statements) for the last 3 years as indicated above, complying with the following conditions.			
	All such documents reflect the financial situation of the bidder or partner to a JV and not sister or parent company			
i)	Historical statements must be audited by a certified accountant			
ii)	Historical statements must be complete, including all notes to the Financial Statements.			
iii)	Historical financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).			

Form FIN-2 : Average Annual Turnover

Each bidder must fill in this form

Annual Turnover Data for the last 3 years			
Year			**Amount in INR**
Average Annual Turnover			

The information supplied should be the Annual Turnover of the Bidder in terms of the amounts billed to clients for each year for work in progress or completed, converted to INR at the rate of exchange at the end of the period reported.

Form FIN-3: Financial Resources

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines, of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as indicated in Section 3 (Evaluation and Qualification Criteria)

Financial Resources		
No.	Source of Financing	Amount (INR equivalent)
1.		
2.		
3.		

Form FIN-4, Current Contract Commitments/Works in Progress

Bidders should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

Current Contract Commitments					
No.	Name of Contract	Employer's Contract Address, Tel, Fax	Value of Outstanding Work [Current INR Equivalent]	Estimated Completion Date	Average Monthly Invoicing Over Last Six Months [INR/month)]
1					
2					
3					
4					
5					

Note: If bidders are bidding for more than one package in terms of ITB 4.1, then financial capacity for such bidding, may be appropriately indicated in the forms FIN -1, FIN – 2, FIN – 3 and FIN – 4.

FORM 18

Form EXP-1: General Construction Experience

Each bidder must fill in this form

General Construction Experience				
Starting Month Year	Ending Month Year	years	Contract Identification and Name, Name and Address of Employer, Brief Description of the Works Executed by the Bidder and the Value of the Contract	Role of Bidder

FORM 19

Bid Security

Bank Guarantee

……..Bank's Name, and Address of Issuing Branch or Office…… Beneficiary:

West Bengal Medical Services Corporation Ltd., having its registered office at Swasthya Bhaban Complex, GN- 29, Sector – V, Salt Lake, Kolkata-700 091 (hereinafter referred to as "the Employer")

Name and Address of Employer :	West Bengal Medical Services Corporation Ltd., having its registered office at Swasthya Bhaban Complex, GN- 29, Sector – V, Salt Lake, Kolkata-700 091.
Date:	Bid Security No:

We have been informed that ……..name of the bidder……. (hereinafter called "the Bidder") has submitted to you its bid dated…… (hereinafter called "the Bid") for the execution of …….. name of contract…….. under NIT No…….(the NIT")

Furthermore, we understand that, according to your conditions, bids must be supported by a bid security.

At the request of the Bidder, We……..name of Bank…….. hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of ……amount in figures…….(amount in words……..) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder :

(a) has withdrawn its Bid during the period of bid validity specified by the Bidder in the Form of Bid. Or

(b) does not accept the correction of errors in accordance with the Instructions to Bidders (hereinafter "the ITB") of the NIT; or

(c) has submitted any document and has made any statement in the Bid, which is either manufactured or false; or

(d) having been notified of the acceptance of its Bid by the Employer during the period of bid validity, (i) fails or refuses to execute the Contract Agreement or (ii) fails or refuses to furnish the Performance Security, in accordance with the ITB.

This guarantee will expire: (a) if the Bidder is the successful Bidder, upon our receipt of copies of the Contract Agreement signed by the Bidder and the performance security issued to you upon the instruction of the Bidder, and (b) if the Bidder is not the successful Bidder, upon the earlier of (i) our receipt of a notice from you that contract has been signed with the successful Bidder, or (ii) twenty- eight days after the expiration of the Bidder's bid.

This Guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor .

This Guarantee will neither be cancelled nor revoked by the Bank without the written authorization of WBMSCL.

Consequently, any demand for payment under this guarantee must be received by us at the office on or before that date.

……..Bank's seal and authorized signature(s).

FORM 20

(FORM OF NOTIFICATION OF AWARD)
(BY SPEED POST / ACK. DUE)
(On the letter head of WBMSCL)

NO. : _____ / Dated :

To
Name & Address of the Bidder

Dear Sirs,

Sub: TENDER No. _____ FOR _____
Ref: Your tender dated _____ and letter dated _____ .

This is to notify you that your tender for the work under reference has been accepted by the Competent Authority of _____ for a total Contract Price of Rs. _____/- (Rupees _____ only).

Pursuant to clause _____ of the Contract, you are required to furnish irrevocable Contract Performance Security for an amount equivalent to 10% (ten percent) of the Contract Price. The Guarantee of an amount of Rs. _____/- (Rupees _____ only) is thus required to be submitted within 7 days of issue of this Notification of Award.

The time of _____ weeks/ days allowed for execution of the Project will be reckoned from the date of this Notification of Award.

You are requested to contact _____ (complete designation and address of the project-in-charge) for carrying out the contract.

You are also requested to attend this office within 7 days from the date of issue of this letter for execution of the formal agreement. It may be noted that no payment shall be made for any work carried out by you till the Agreement is executed and till such time the Contract Performance Security has been submitted by you.

This Notification of Award is being sent to you in duplicate and you are requested to return without delay one copy of the letter duly signed and stamped, in token of your acknowledgement.

Kindly note that this Notification of Award shall constitute a binding contract between us pending execution of formal Agreement.

Your letter referred to above shall form part of the Contract.

Yours faithfully,

West Bengal Medical Services Corporation Ltd.

FORM: 21

MANUFACTURER'S AUTHORISATION FORM

(TO BE SUBMITTED ON SUPPLIER LETTERHEAD, SIGNED BY A PERSON COMPETENT AND HAVING THE POWER OF ATTORNEY [Notarized copy to be attached] TO BIND THE PRODUCER)

Tender No. ——————————————————— Date:———————————

WHEREAS _____ who are official producers of _____ and having production facilities at _____ do hereby authorize _____ located at _____ (hereinafter, the "bidder") to submit a bid of the following Products produced by us, for the Supply Requirements associated with the above Invitation for Bids.

[Note : Please Specify the Product Name & Model No here.]

When resold by _____ these products are subject to applicable warranty terms of your Tender Documents/ ToR.

We assure you that in the event of _____ not being able to fulfill its obligation as our Sales & Service Provider in respect of your Tender Documents/ ToR, we would continue to meet our the terms stated in the abovementioned Tender Documents/ ToR through alternate arrangements.

We also confirm that _____ is our authorized service provider / system integrator and can hence provide maintenance and upgrade support for our products.

We also undertake to supply the materials in the event of the non-supply of the materials by _____ as per your Tender Documents/ ToR.

Name In the capacity of

Signed

Note: This letter of authority must be on the letterhead of the manufacturer and signed by a person competent and having the Power of Attorney (Notarized copy to be attached) to bind the producer, and must be included by the bidder within 4 (four) months from date of Notification of Award.

Form 21 A
CMC rate in INR of Medical Equipments
(after completion of 3 years warranty)

Sl.	Description of item/ Medical Equipment	Quantity in number	Year1	Year2	Year2	Year4	Year5
	Radiolog						
1	Digital Radiography System (Ceiling Suspended)	1					
2	500 M.A. X-ray machine with Radiography and Fluroscopy	1					
3	300 M.A. X-ray machine with Radiography and Fluroscopy	1					
4	Portable X-ray Machine (60 ma) Mobile	1					
5	C arm with accessories	1					
6	CR System	1					
7	Colour Doppler	1					
8	Mammography Unit	1					
	ICU/CCU						
9	Biphasic Defibrillator	1					
10	Multiparameter Monitors	1					
11	Suction machine	1					
12	Head Light Source	1					
13	Fibreoptic Bronchoscope with light source	1					

14	Nebulizers	1					
15	Emergency crash Cart	1					
16	Portable Lights	1					
17	Patient warmer	1					
	Operation						
18	Anesthesia Work Station with	1					
19	Resucication Kit	1					
20	OT table	1					
21	OT Lights	1					
22	Flash Sterilizer	1					
23	Surgical Diathermy	1					
24	Automatic External Defibrillator	1					
	Physio Therapy						

25	Interferential therapy unit	1					
26	Ultra sound therapy Unit	1					
27	Hydrocolator	1					
28	Electric Muscle Stimulator	1					
29	Computerised traction &	1					
30	Exercise Therapy Equipment	1					

31	Infra red lamp	1					
32	Wax Bath	1					
33	Shoulder wheel	1					
	Paediatrics						
34	Radiant Warmer with Bassinet	1					
35	Baby Incubators	1					
36	Photo Therapy Equipments	1					
37	Neonatal Ventillator	1					
	OPD Equipments						
38	ECG machine computerized	1					
39	B.P. apparatus table model (Analog)	1					
40	B .P.apparatus stand model(Analog)	1					
	Gynecology						
41	Foetal Doppler	1					
	ENT						
42	Audiometer	1					
43	Operating Microscope (ENT)	1					
44	ENT Operation set including headlight	1					
45	ENT Nasal Set	1					
46	Laryngoscope fibreoptic ENT	1					
47	Laryngoscope indirect	1					
48	Otoscope	1					
49	Head Light (cold light)	1					
50	Sound Proof Room	1					

Opthalmology							
51	Snellen chart/Drum with remote	1					
52	Trial lens sets with frames	1					
53	Log Mar Vision Charts	1					
54	Opthalmoscope- Direct	1					
55	Slit Lamp	1					
56	Retino scope	1					
57	Perimeter	1					
58	Opthalmic Dr Chair	1					
59	Keratometre	1					
60	Auto Refractometer	1					
61	Non contact tonomter	1					
62	Dental Chair with accessories	1					
63	Dental X Ray	1					
64	Dental Instruments &	1					
	Laboratory						
65	Electric Colorimeter	1					
66	Semi -Auto analyser Bio	1					
67	Micro pipettes of different volumes (set	1					
68	Shaker Water bath	1					
69	Hot Air oven	1					
70	Lab Incubator	1					
71	Hot plates	1					
72	Rotor / Shaker	1					
73	Counting chamber	1					
74	Paediatric Glucometer	1					

75	Glucometer	1					
76	Haemoglobinometer	1					
77	Automated Microtome	1					
78	Elisa Reader cum washer	1					
79	Electrolyte Analyser	1					
80	Glycosylated Haemoglobinometer	1					
81	Haematology Analyser	1					
82	Laboratory Autoclaves	1					
83	Ordinary Refrigerator	1					
84	Floatation Bath	1					
85	Class – I Bio Safety Cabinet	1					
86	Cyto Spin	1					
	Endoscopy						
87	Endoscope (OGD)	1					
88	Laparoscope operating major with accessories	1					
Medical Gas System							
89	Medical Gas system	1					
	Mortuar						
90	Cold Storage Mortuary Cabinet (6 bodies)	1					

Form 21 B
Prices of Consumables of Medical Equipments

Sl.	Description of item/ Medical Equipment	Items (as applicable)	Rate in INR
	Radiology		
1	Digital Radiography System (Ceiling Suspended) (Film of different sizes should be compatible with the offered Dry Imager camera)	1. Film (Size…..)	1.
		2.	2.
		3.	3.
	ICU/CCU		
2	Nebulizers	1.	1.
		2.	2.
	Operation Theatre		
3	Anesthesia Work Station with Ventillators	1.	1.
		2.	2.
4	Resucication Kit	1.	1.
		2.	2.
	Paediatrics		
5	Radiant Warmer with Bassinet	1. Probe	
		2.	
6	Neonatal Ventillator	1.	
		2.	

	OPD Equipments		
7	ECG machine computerized	1.Lead	
		2.Paper gold	
8	Dental X Ray	1	1
		2	2
	Laboratory Equipments		
9	Electric Colorimeter (Reagents, Calibrator, Control etc)	1. Reagent	1.
		2. Reagent	2.
		3.	3.
10	Semi -Auto analyser Bio Chem (Reagents, Calibrator, Control etc)	1. Reagent	1.
		2. Reagent	2.
		3. Reagent	3.
		4.	4.
		5.	5.
11	Micro pipettes of different volumes (set of 10 pipettes)	1.Tips	1.
12	Paediatric Glucometer	1.	1.
13	Glucometer	1. strip	1.
14	Haemoglobinometer (Reagents, Calibrator, Control etc)	1. Reagent	1.
		2. Reagent	2.
		3.Calibrator	3.
15	Automated Microtome	1.Blade	1
16	Elisa Reader cum washer(Reagents, Calibrator,Control etc)	1. Reagent	1.
		2. Reagent	2.
		`3. Calibrator	3.
		4.Control	4.
17	Electrolyte Analyser (Reagents, Calibrator, Control etc)	1. Reagent	1.

18	Glycosylated Haemoglobinometer (Reagents , Calibrator, Control etc)	1.	1.
		2.	2.
		3.	3.
19	Haematology Analyser (Reagents , Calibrator , Control etc)	1.	1.
		2.	2.
		3.	3.
20	Class-I Bio Safety Cabinet	1.	1.
	Medical Gas system		
21	Medical Gas system	1.	
		2.	
		3.	
		4.	
		5.	

Form 22
SUMMARY INFORMATION SHEET OF TENDER REF. NO.
WBMSCL/NIT-41/2015

Name of the bidder with address:
……
……
……
……

Table A : Average Annual Turn Over (Rs in Crore) of the bidder during the last 3 FY

Year	Annual Turn Over (Rs in Crore)
Total	

N.B: Information provided in the above table should have parity with the information provided in **Form – 17 (From FIN-2) of Section – 4 NIT**

Table B: Value of Construction works completed during the last 7-Financial Years

Year	Value of Construction works completed (Rs in Crore)		
	Completed works	Completed portion of ongoing works	Total
Total			

Table C: No of technical personnel under the permanent pay roll of the bidder

Sl No.	Technical Post	Number of personnel under the permanent pay roll
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
	Total	

N.B: Information provided in the above table should have parity with the information provided in **Form – 9 (A.4), Form PER-1 and Form PER-2 of Section – 4**

Table D: Number of Plants & Machineries either owned by the bidder or taken on lease

Sl. No	Plant/ Machinery	Unit	Number owned / taken on lease
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			

N.B: Information provided in the above table should have parity with the information provided in **Form – 7 of Section – 4**

Section 5.0

Employer's Requirement

5.1 List of the Hospital

5.2 Site Plan for 01site with Soil Investigation Report

5.3 The Area Statements of the Hospital

5.4 Schedule of Finishes

5.5 Scope & Specification of Civil Works

5.6 Scope & Specification of Electrical Works

5.7 Schedule of Medical Equipment and Hospital Furniture

5.8 Payment Schedule

Section 5.1
List of Hospital

List of Hospital

Location of Multi/superspeciality Hospital	No of Storied	No. of Bed	Area / Floor (Sq. Ft.)	Total covered Area	Time of Completion
Uluberia	5 Storied	300	16,000	80,000	15

Sl no	District	Location	Multi Speciality	Super Speciality
1	Howrah	Uluberia S.D. Hospital	Medicine, General Surgery, Gyneacology & Obstetrics, Paediatics & Neo – natalogy, Support Service, Imaging Service, Clinical Pathology	Orthopedics, Trauma Care

Section 5.2
Site Plan for 1 Site



SITE PLAN

ULUBERIA S.D. HOSPITAL

West Bengal Medical Services Corporation Ltd.
Swasthya Bhaban Complex
GN - 29/5, Salt Lake, Sector - V

SOIL INVESTIGATION REPORT

SOILEX

BORE LOG DATA SHEET

SITE: Uluberia Sub - Divisional Hospital, Dist-Howrah,

S – SPT
U – Undisturbed Sample
D – Disturbed sample

Borehole No.	1	Borehole Diameter	150mm.
R.L. of Ground	Same lv. Of Rd.	Commenced On	10.11.2015
Termination Depth	35.0m.	Completed On	11.11.2015
Water Level	0.5m.		

STRARTA	DEPTH(m) From	To	SAMPLES Type	Depth(m)	N value
Filled up soil with different heterogeneous materials	0.0	0.5			
Soft blackish grey silty clay with decomposed wood	0.5		U	1.5-2.10	
			S	3.0-3.45	N=2
			U	4.5-5.10	
			S	6.0-6.45	N=2
			S	7.5-7.95	N=2
			U	9.0-9.60	
		10.0			
Firm bluish grey clayey silt with kankar	10.0				
			S	10.5-10.95	N=7
			U	12.0-12.60	
			S	13.5-13.95	N=12
			S	15.0-15.60	N=14
		16.0			
Firm mottled brown and bluish grey silty clay	16.0				
			U	16.5-17.10	
			S	18.0-18.45	N=15
			U	19.0-19.60	
		20.0			

SOILEX

BORE LOG DATA SHEET

SITE: Uluberia Sub - Divisional Hospital, Dist-Howrah,

S – SPT
U – Undisturbed Sample
D – Disturbed sample

Borehole No.	1	Borehole Diameter	150mm.
R.L. of Ground	Same lv. Of Rd.	Commenced On	10.11.2015
Termination Depth	35.0m.	Completed On	11.11.2015
Water Level	0.5m.		

STRARTA	DEPTH(m) From	To	SAMPLES Type	Depth(m)	N value
Brown silty fine sand	20.0				
			U	20.0-20.60	
			S	22.0-22.45	N=26
		23.0			
Stiff grayish brown silty clay	23.0				
			U	24.0-24.60	
			S	26.0-26.45	N=17
			S	28.0-28.45	N=22
			U	30.0-30.60	
			S	32.0-32.45	N=23
			U	34.0-34.60	
			S	35.0-35.45	N=25
		35.0			

SOILEX

BORE LOG DATA SHEET

SITE: Uluberia Sub - Divisional Hospital, Dist-Howrah,

S – SPT
U – Undisturbed Sample
D – Disturbed sample

Borehole No.	2	Borehole Diameter	150mm.
R.L. of Ground	Same lv. Of Rd.	Commenced On	11.11.2015
Termination Depth	35.0m.	Completed On	12.11.2015
Water Level	0.5m.		

STRARTA	DEPTH(m) From	To	SAMPLES Type	Depth(m)	N value
Filled up soil with different heterogeneous materials	0.0	0.5			
Soft blackish grey silty clay with decomposed wood	0.5		S	1.5-1.95	N=1
			U	3.0-3.60	
			S	4.5-4.95	N=2
			U	6.0-7.10	
			S	7.5-7.95	N=7
			U	8.0-8.60	
			S	9.0-9.45	N=8
		10.0			
Firm bluish grey clayey silt with kankar	10.0				
			U	10.5-11.10	
			S	12.0-12.45	N=4
			U	14.0-14.60	
		16.0			
Firm mottled brown and bluish grey silty clay	16.0				
			S	16.0-16.45	N=10
			U	17.0-17.60	
			S	18.0-18.45	N=15
		20.0			

SOILEX

BORE LOG DATA SHEET

SITE: Uluberia Sub - Divisional Hospital, Dist-Howrah,

S – SPT
U – Undisturbed Sample
D – Disturbed sample

Borehole No.	2	Borehole Diameter	150mm.
R.L. of Ground	Same lv. Of Rd.	Commenced On	11.11.2015
Termination Depth	35.0m.	Completed On	12.11.2015
Water Level	0.5m.		

STRARTA	DEPTH(m) From	To	SAMPLES Type	Depth(m)	N value
Brown silty fine sand	20.0				
			U	20.0-20.60	
			S	22.0-22.45	N=16
			S	24.0-24.45	N=26
		26.0			
Stiff grayish brown silty clay	26.0				
			U	26.0-26.60	
			S	28.0-28.45	N=37
			S	30.0-30.45	N=39
			U	31.0-31.60	
			S	32.0-32.45	N=41
			U	35.0-35.60	
		35.0			

SOILEX

BORE LOG DATA SHEET

SITE: Uluberia Sub - Divisional Hospital, Dist-Howrah,

S – SPT
U – Undisturbed Sample
D – Disturbed sample

Borehole No.	3	Borehole Diameter	150mm.
R.L. of Ground	Same lv. Of Rd.	Commenced On	12.11.2015
Termination Depth	35.0m.	Completed On	13.11.2015
Water Level	0.5m.		

STRARTA	DEPTH(m) From	To	SAMPLES Type	Depth(m)	N value
Filled up soil with different heterogeneous materials	0.0	0.5			
Soft blackish grey silty clay with decomposed wood	0.5		S	2.0-2.45	N=2
			U	3.0-3.45	
			U	4.0-4.60	
			S	6.0-6.45	N=2
			S	7.0-7.45	N=2
			U	8.0-8.60	
		10.0			
Firm bluish grey clayey silt with kankar	10.0				
			S	10.0-10.45	N=3
			U	11.0-11.60	
			S	12.0-12.45	N=5
			U	13.0-13.60	
			S	14.0-14.45	N=12
		16.0			
Firm mottled brown and bluish grey silty clay	16.0				
			U	16.0-16.60	
			S	17.0-17.45	N=13
			S	18.0-18.45	N=14
			U	19.0-19.60	
		20.0			

SOILEX

BORE LOG DATA SHEET

SITE: Uluberia Sub - Divisional Hospital, Dist-Howrah,

S – SPT
U – Undisturbed Sample
D – Disturbed sample

Borehole No.	3	Borehole Diameter	150mm.
R.L. of Ground	Same lv. Of Rd.	Commenced On	12.11.2015
Termination Depth	35.0m.	Completed On	13.11.2015
Water Level	0.5m.		

STRARTA	DEPTH(m) From	To	SAMPLES Type	Depth(m)	N value
Brown silty fine sand	20.0		S	20.0-20.45	N=23
			U	22.0-22.60	
		23.0			
Stiff grayish brown silty clay	23.0				
			S	24.0-24.45	N=14
			U	26.0-26.60	
			S	28.0-28.45	N=22
			S	30.0-30.45	N=25
			U	32.0-32.60	
			S	35.0-35.45	N=29
		35.0			

SOILEX

BORE LOG DATA SHEET

SITE: Uluberia Sub - Divisional Hospital, Dist-Howrah,

S – SPT
U – Undisturbed Sample
D – Disturbed sample

Borehole No.	4	Borehole Diameter	150mm.
R.L. of Ground	Same lv. Of Rd.	Commenced On	13.11.2015
Termination Depth	35.0m.	Completed On	14.11.2015
Water Level	0.5m.		

STRARTA	DEPTH(m) From	To	SAMPLES Type	Depth(m)	N value
Filled up soil with different heterogeneous materials	0.0	0.5			
Soft blackish grey silty clay with decomposed wood	0.5		S	1.5-1.95	N=2
			S	3.0-3.45	N=3
			U	4.5-5.10	
			S	6.0-6.45	N=3
			U	7.5-8.10	
			S	9.0-9.45	N=2
		10.0			
Firm bluish grey clayey silt with kankar	10.0				
			U	10.5-11.10	
			S	11.5-11.95	N=2
			U	12.0-12.60	
			S	14.0-14.45	N=11
			S	15.0-15.45	N=13
		16.0			
Firm mottled brown and bluish grey silty clay	16.0				
			S	16.0-16.45	N=16
			S	18.0-18.45	N=19
		20.0			

SOILEX

BORE LOG DATA SHEET

SITE: Uluberia Sub - Divisional Hospital, Dist-Howrah,

S – SPT
U – Undisturbed Sample
D – Disturbed sample

Borehole No.	4	Borehole Diameter	150mm.
R.L. of Ground	Same lv. Of Rd.	Commenced On	13.11.2015
Termination Depth	35.0m.	Completed On	14.11.2015
Water Level	0.5m.		

STRARTA	DEPTH(m) From	To	SAMPLES Type	Depth(m)	N value
Brown silty fine sand	20.0				
			U	20.0-20.45	
			S	21.5-21.95	N=21
			U	22.0-22.60	
			S	24.0-24.45	N=23
			S	25.5-25.95	N=24
			U	26.0-26.60	
			S	27.0-27.45	N=27
		28.0			
Stiff grayish brown silty clay	28.0				
			U	28.0-28.60	
			S	29.0-29.45	N=31
			U	30.0-30.60	
			U	32.0-32.60	
			S	34.5-34.95	N=32
			S	35.0-35.45	N=37
		35.0			

SOILEX

BORE LOG DATA SHEET

SITE: Uluberia Sub - Divisional Hospital, Dist-Howrah,

S – SPT
U – Undisturbed Sample
D – Disturbed sample

Borehole No.	5	Borehole Diameter	150mm.
R.L. of Ground	Same lv. Of Rd.	Commenced On	14.11.2015
Termination Depth	35.0m.	Completed On	15.11.2015
Water Level	0.5m.		

STRARTA	DEPTH(m) From	To	SAMPLES Type	Depth(m)	N value
Filled up soil with different heterogeneous materials	0.0	0.5			
Medium to soft greyish silty clay with decomposed wood and high silt	0.5		S	1.5-1.95	N=3
			U	3.0-3.60	
			S	4.5-5.10	N=3
			U	6.0-6.60	
			U	7.5-8.10	
			S	9.0-9.45	N=3
		10.0			
Firm bluish grey clayey silt with kankar	10.0				
			S	10.5-10.95	N=4
			U	12.0-12.60	
			S	14.0-14.45	N=12
			S	15.0-15.60	N=16
		16.0			
Firm mottled brown and bluish grey silty clay	16.0				
			U	16.0-16.60	
			S	17.0-17.45	N=20
			U	18.0-18.60	
		20.0			

SOILEX

BORE LOG DATA SHEET

SITE: Uluberia Sub - Divisional Hospital, Dist-Howrah,

S – SPT
U – Undisturbed Sample
D – Disturbed sample

Borehole No.	5	Borehole Diameter	150mm.
R.L. of Ground	Same lv. Of Rd.	Commenced On	14.11.2015
Termination Depth	35.0m.	Completed On	15.11.2015
Water Level	0.5m.		

STRARTA	DEPTH(m) From	To	SAMPLES Type	Depth(m)	N value
Brown silty fine sand	20.0				
			U	20.0-20.60	
			S	22.0-22.45	N=21
			S	24.0-24.45	N=24
			U	25.0-25.60	
			S	26.0-26.45	N=30
		28.0			
Stiff grayish brown silty clay	28.0				
			U	28.0-28.60	
			S	30.0-30.45	N=33
			U	32.0-32.60	
			S	35.0-35.45	N=35
		35.0			

SOILEX

BORE LOG DATA SHEET

SITE: Uluberia Sub - Divisional Hospital, Dist-Howrah,

S – SPT
U – Undisturbed Sample
D – Disturbed sample

Borehole No.	6	Borehole Diameter	150mm.
R.L. of Ground	Same lv. Of Rd.	Commenced On	16.11.2015
Termination Depth	35.0m.	Completed On	17.11.2015
Water Level	0.5m.		

STRARTA	DEPTH(m) From	To	SAMPLES Type	Depth(m)	N value
Filled up soil with different heterogeneous materials	0.0	0.5			
Medium to soft grayish silty clay with decomposed wood and high silt	0.5	10.0	S	2.0-2.45	N=2
			U	3.0-3.60	
			S	4.5-4.95	N=3
			U	6.0-6.60	
			S	7.0-7.45	N=3
			U	8.0-8.60	
			S	9.0-9.45	N=4
Firm bluish grey clayey silt with kankar	10.0	16.0	U	10.0-10.60	
			S	12.0-12.45	N=5
			S	14.0-14.45	N=7
			U	15.0-15.60	
Firm mottled brown and bluish grey silty clay	16.0	20.0	U	16.0-16.60	
			S	17.0-17.45	N=15
			U	18.0-18.60	
			S	19.0-19.45	N=17.

SOILEX

BORE LOG DATA SHEET

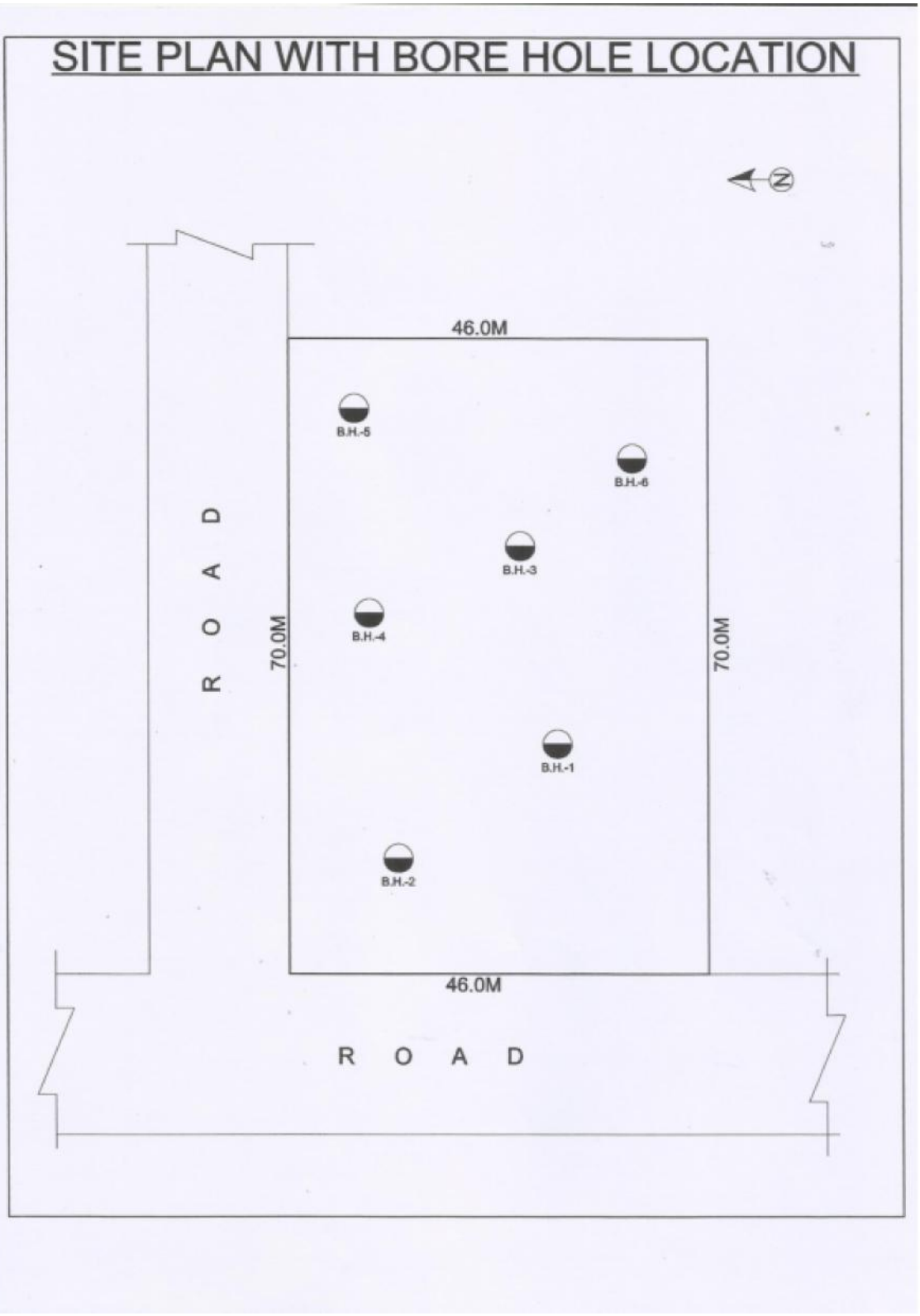
SITE: Uluberia Sub - Divisional Hospital, Dist-Howrah,

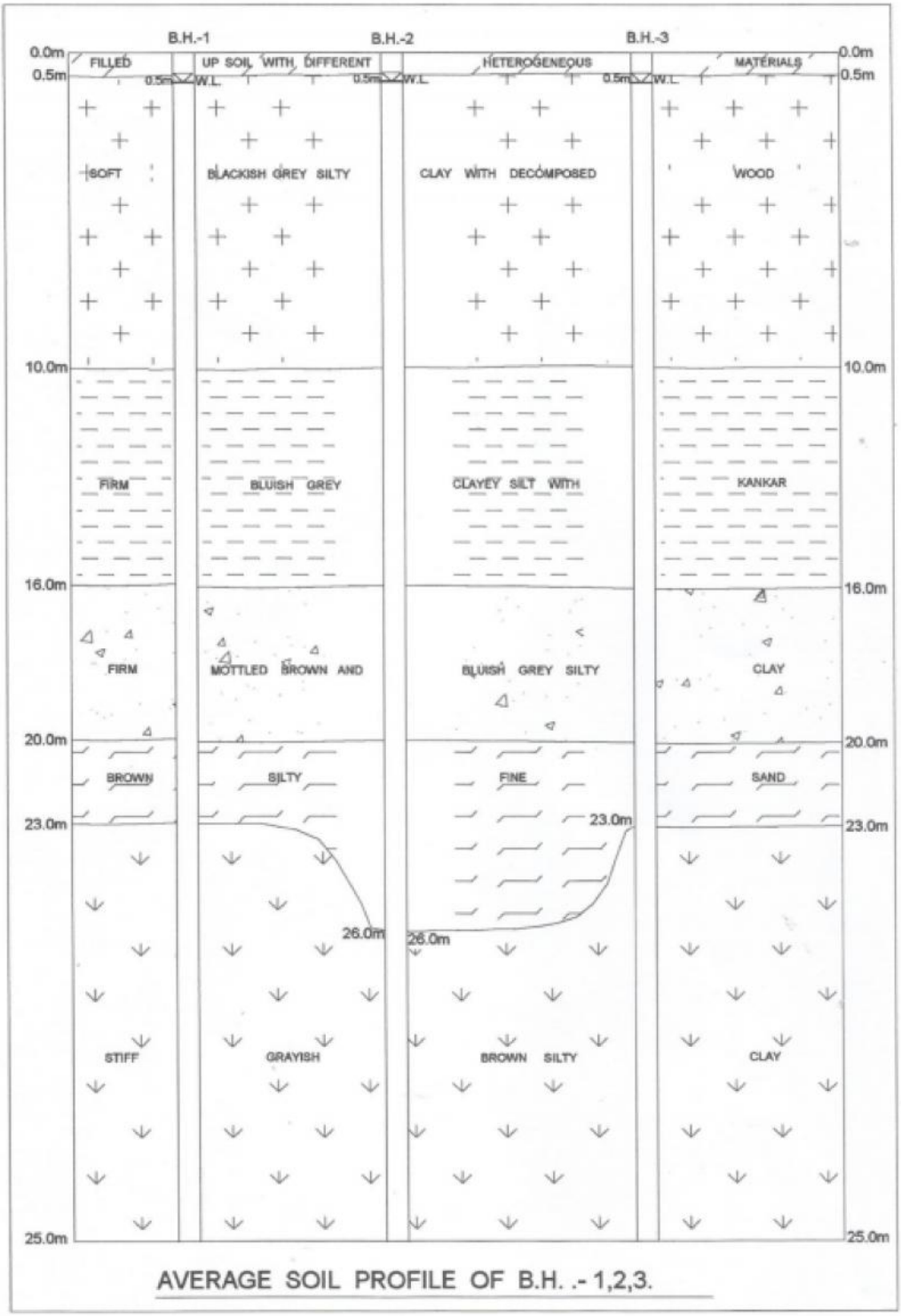
S – SPT
U – Undisturbed Sample
D – Disturbed sample

Borehole No.	6	Borehole Diameter	150mm.
R.L. of Ground	Same lv. Of Rd.	Commenced On	16.11.2015
Termination Depth	35.0m.	Completed On	17.11.2015
Water Level	0.5m.		

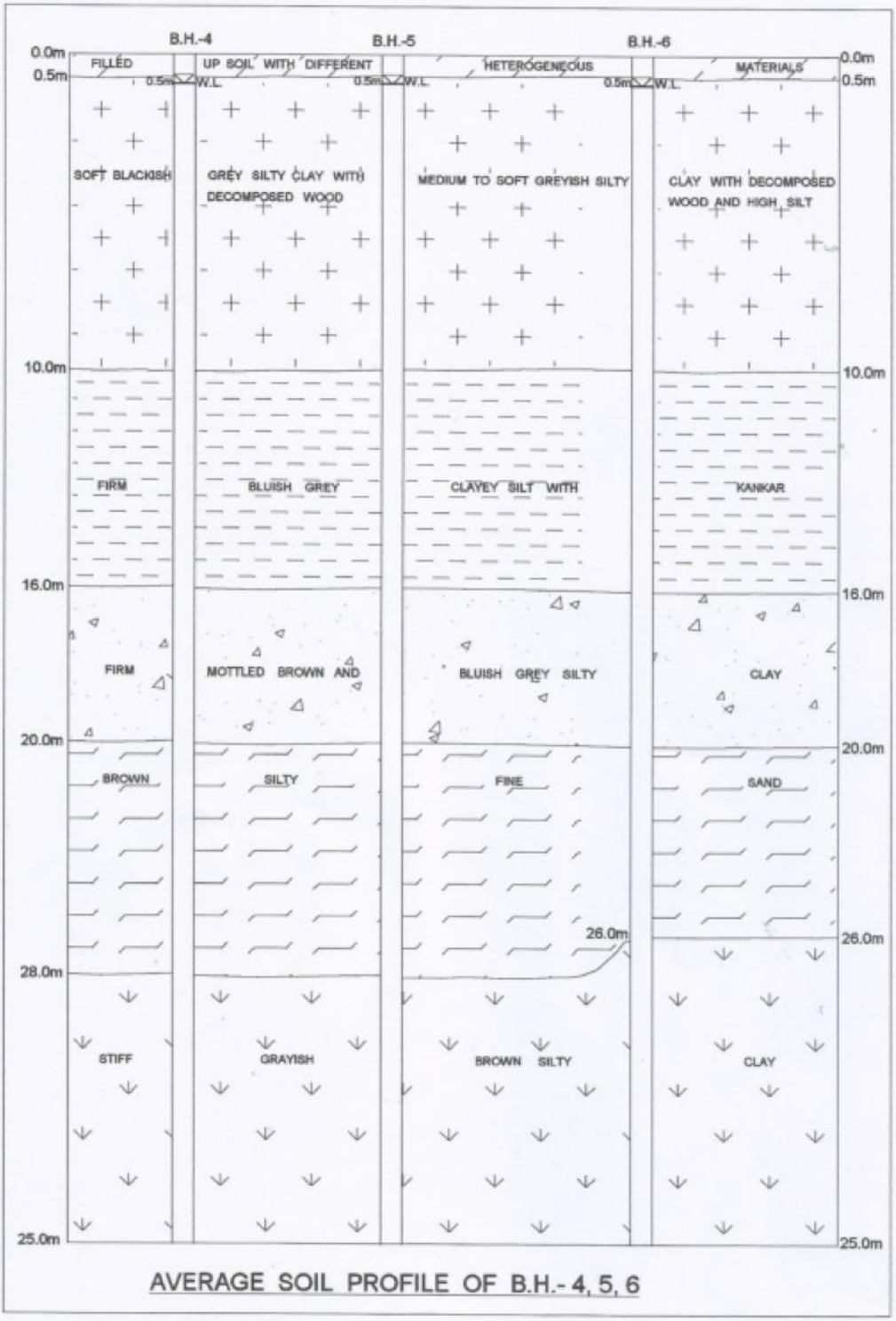
STRARTA	DEPTH(m) From	To	SAMPLES Type	Depth(m)	N value
Brown silty fine sand	20.0				
			S	20.0-20.45	N=18
			U	21.0-21.60	
			S	22.0-22.45	N=17
			S	24.0-24.45	N=22
			S	25.0-25.45	N=25
		26.0			
Stiff grayish brown silty clay	26.0				
			U	26.0-26.60	
			S	28.0-28.45	N=30
			U	30.0-30.60	
			S	32.0-32.45	N=36
			S	35.0-35.45	N=40
		35.0			

SITE PLAN WITH BORE HOLE LOCATION

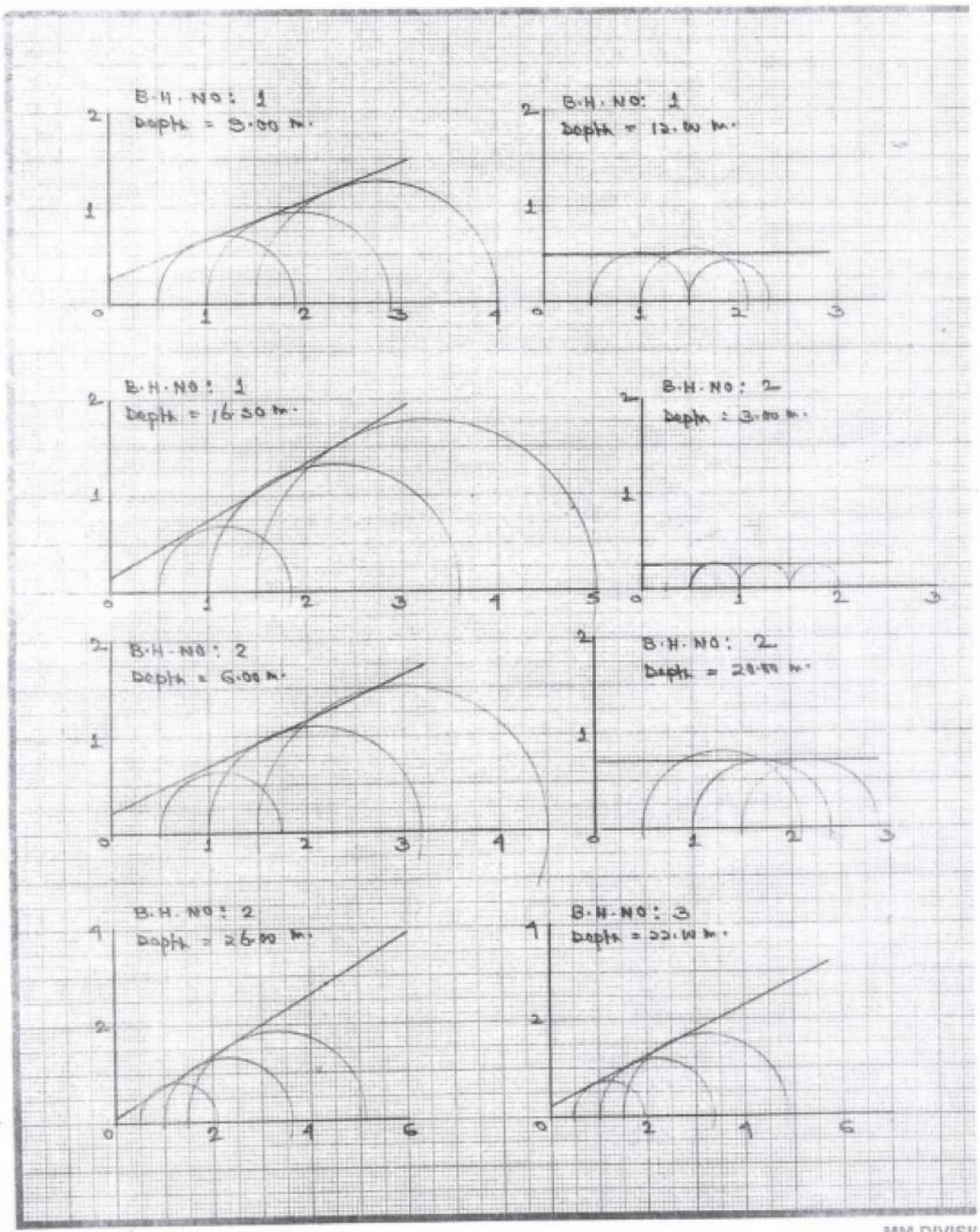




AVERAGE SOIL PROFILE OF B.H. .- 1,2,3.

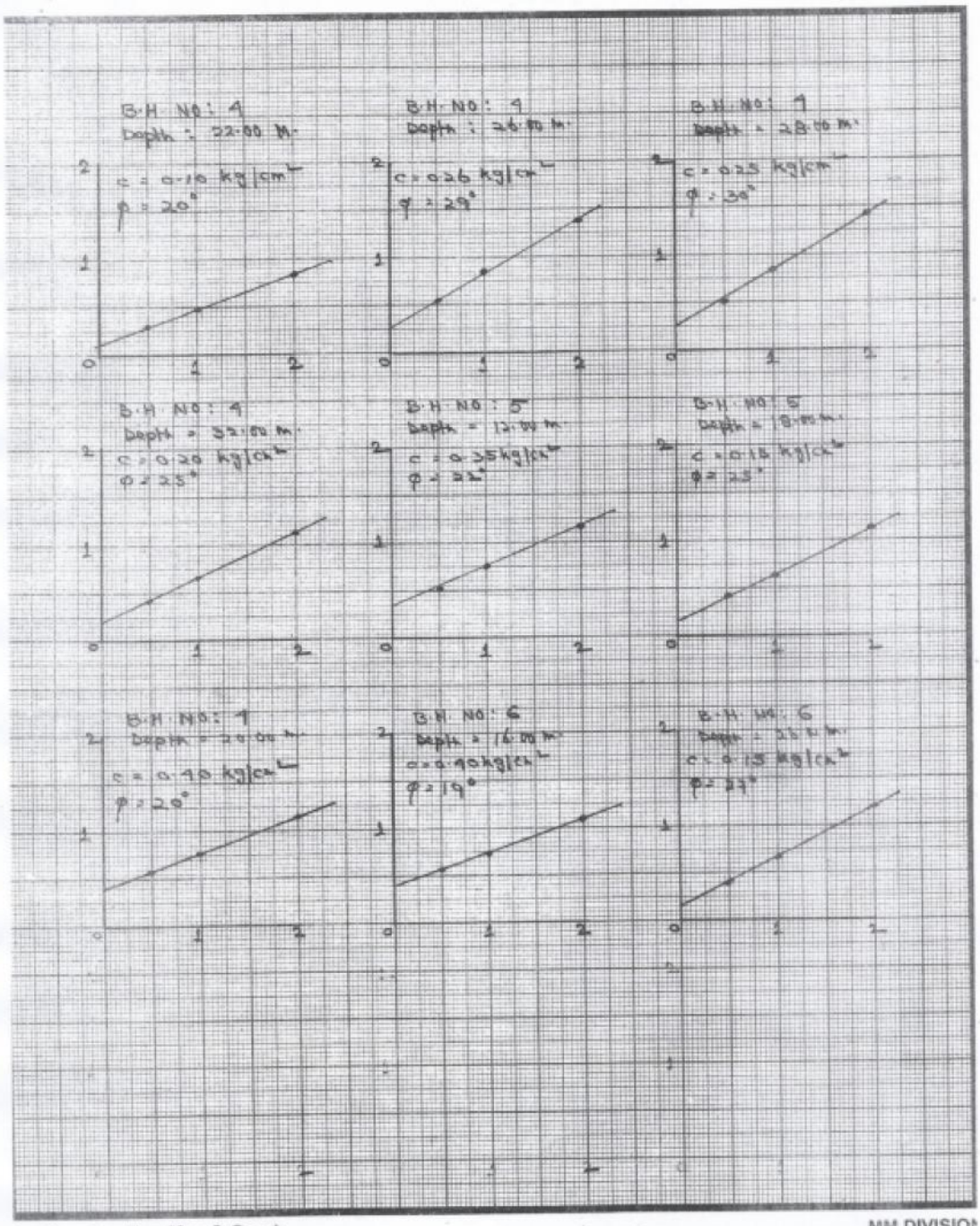


AVERAGE SOIL PROFILE OF B.H.- 4, 5, 6



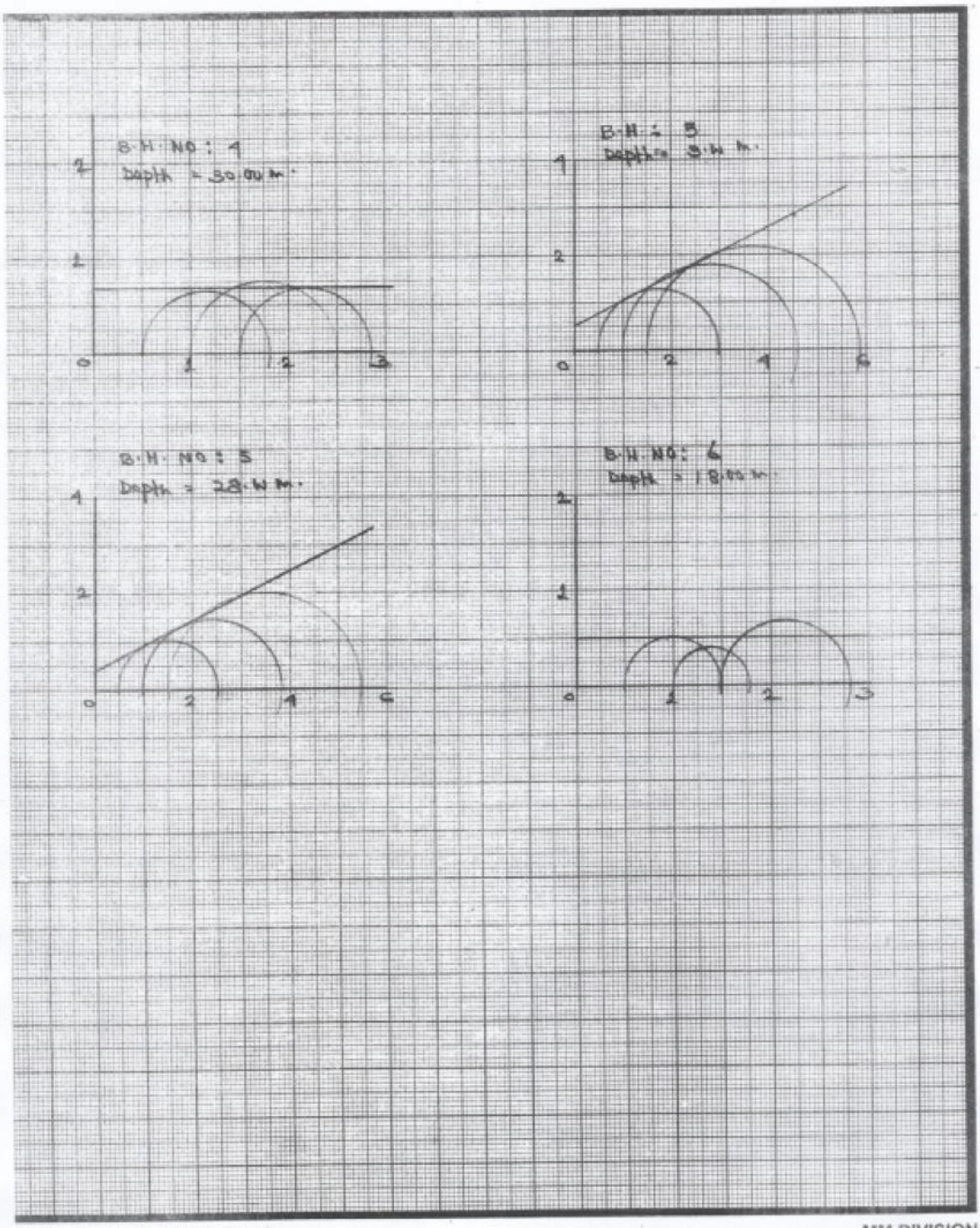
Joy Gopal outline Map & Graph

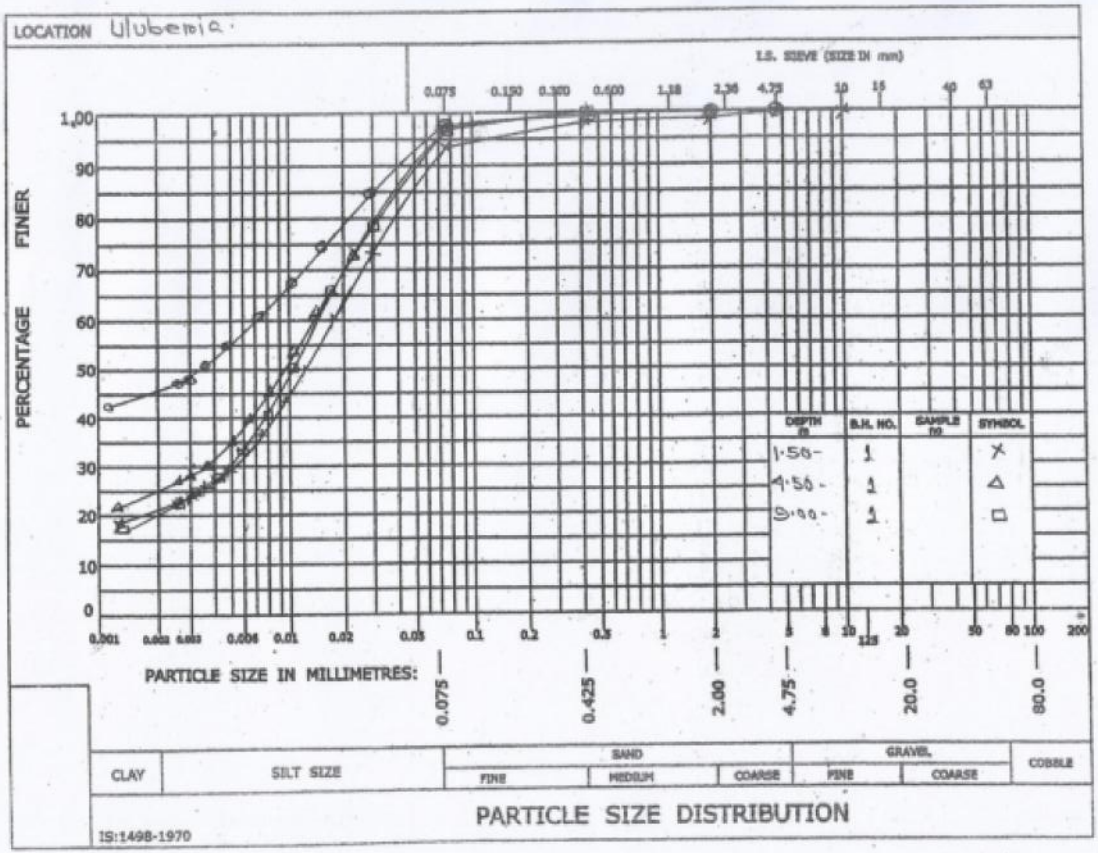
MM DIVISK

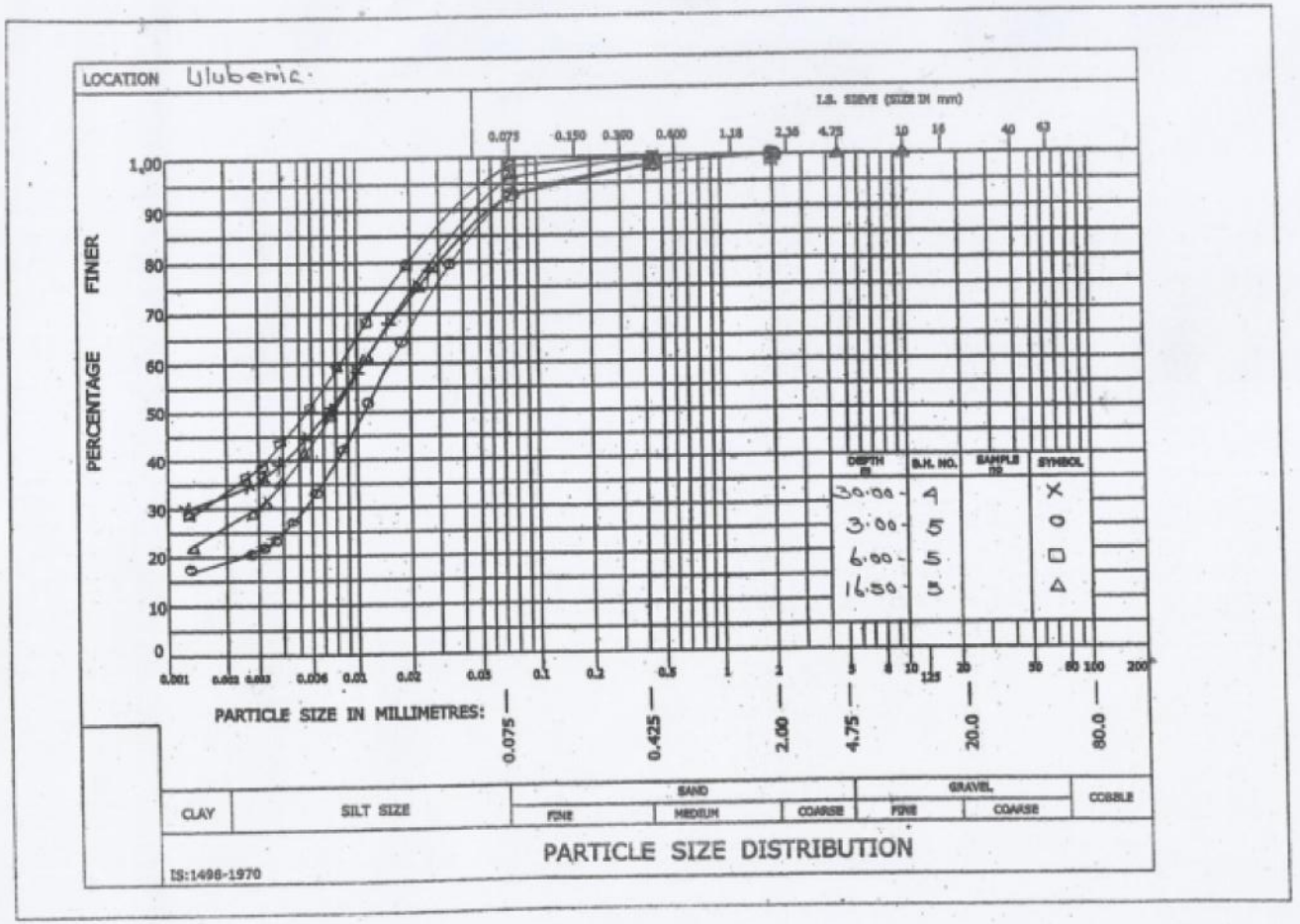


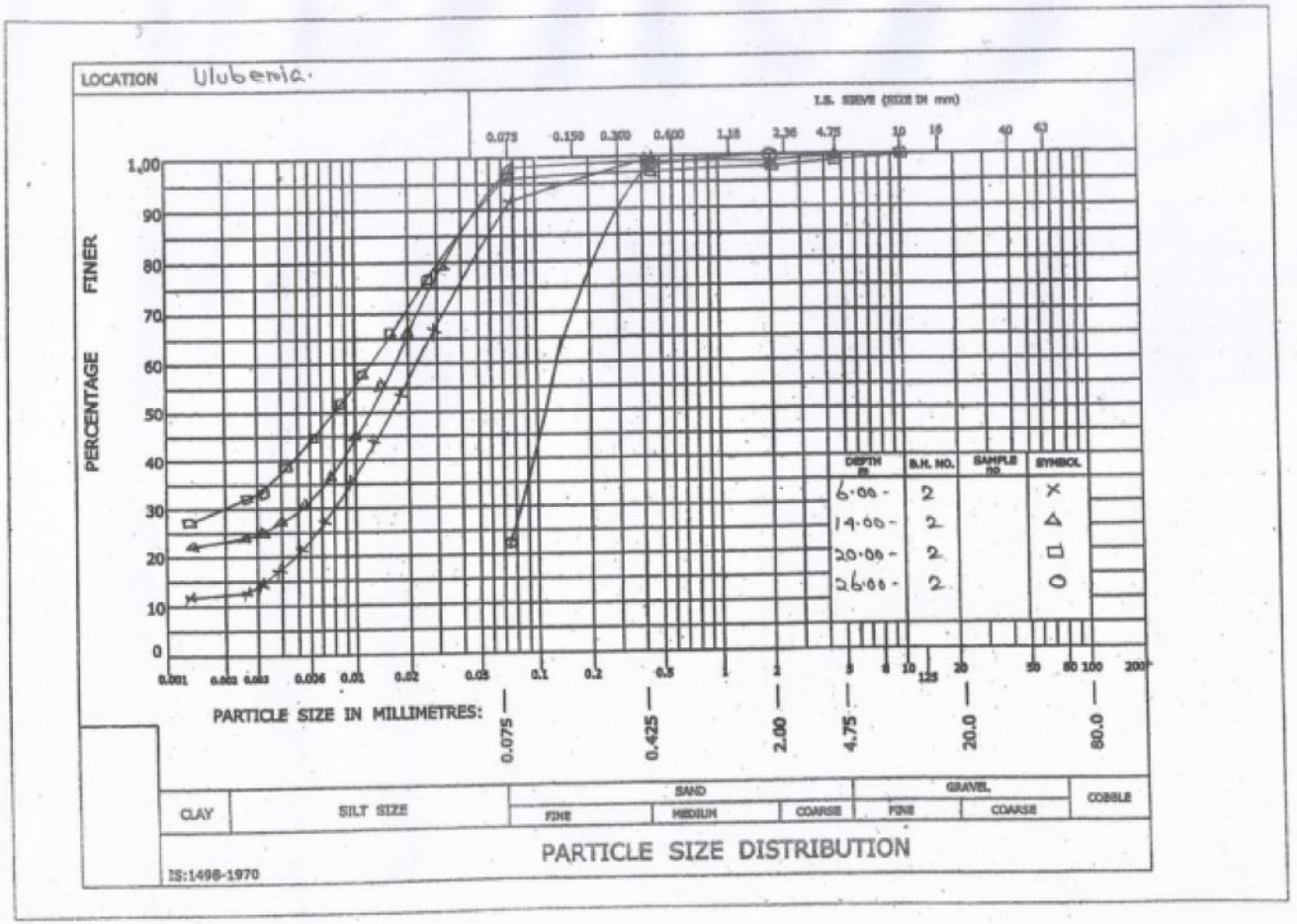
Joy Gopal outline Map & Graph

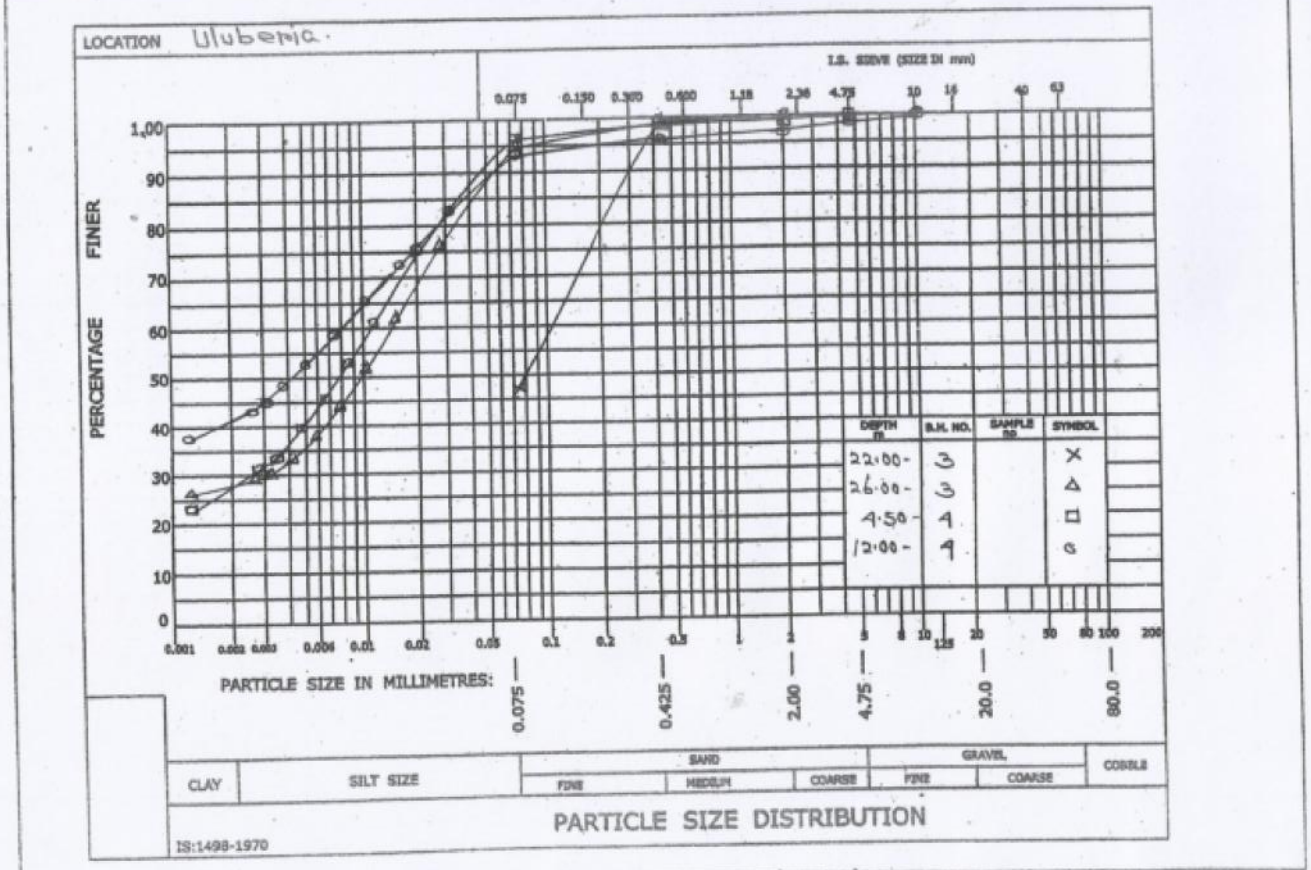
MM DIVISIO

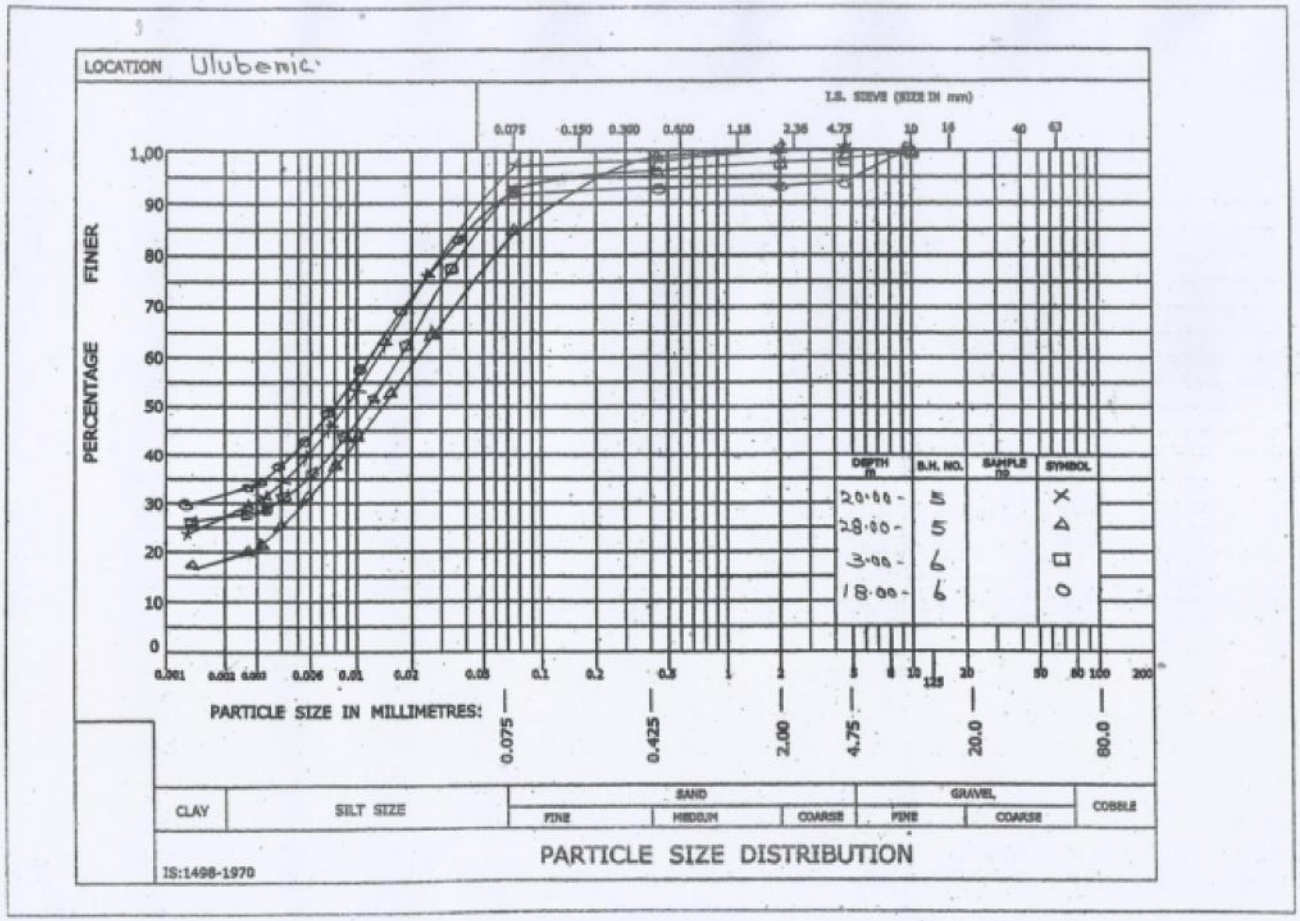

B.H. NO : 1
Depth = 30.00 m.
B.H. : 3
B.H. NO : 5
Depth = 28.44 m.
B.H. NO : 6
0
1
2
3
4
5
6

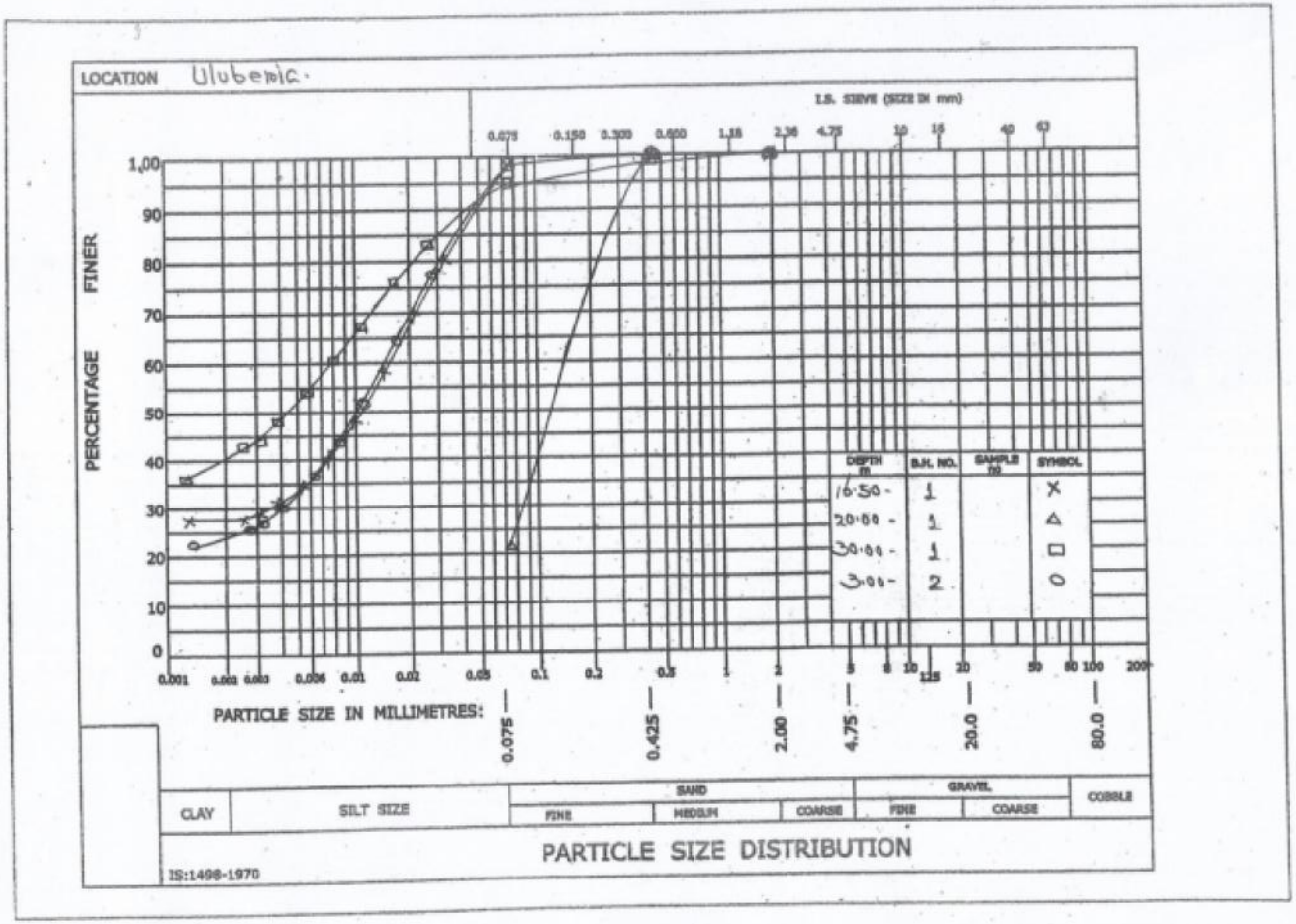

LOCATION Ulubenia.
I.S. SIEVE (SIZE IN mm)
0.075 0.150 0.300 0.600 1.18 2.36 4.75 10 15 40 63
PERCENTAGE FINER
1.00 90 80 70 60 50 40 30 20 10 0
DEPTH m
B.H. NO.
SAMPLE NO
SYMBOL
1·50- 1 X
4·50- 1 △
9·00- 1 □
0.001 0.002 0.003 0.006 0.01 0.02 0.05 0.1 0.2 0.3 1 2 5 8 10 20 50 80 100 200
PARTICLE SIZE IN MILLIMETRES:
0.075 0.425 2.00 4.75 20.0 80.0
CLAY
SILT SIZE
SAND
FINE MEDIUM COARSE
GRAVEL
FINE COARSE
COBBLE
IS:1498-1970
PARTICLE SIZE DISTRIBUTION


LOCATION Ulubemia.
I.S. SIEVE (SIZE IN mm)
0.075
0.150
0.300
0.600
1.18
2.36
4.75
10
16
40
63
PERCENTAGE FINER
1.00
90
80
70
60
50
40
30
20
10
0
DEPTH m
B.H. NO.
SAMPLE no
SYMBOL
30.00 - 4 X
3.00 - 5 O
6.00 - 5 □
16.50 - 5 △
0.001
0.002
0.003
0.006
0.01
0.02
0.03
0.1
0.2
0.5
1
2
5
6
10
125
20
50
80
100
200
PARTICLE SIZE IN MILLIMETRES:
0.075
0.425
2.00
4.75
20.0
80.0
CLAY
SILT SIZE
SAND
FINE
MEDIUM
COARSE
GRAVEL
FINE
COARSE
COBBLE
PARTICLE SIZE DISTRIBUTION
IS:1498-1970


LOCATION Ulubenia.
I.S. SIEVE (SIZE IN mm)
0.075 0.150 0.300 0.600 1.18 2.36 4.75 10 16 40 63
PERCENTAGE FINER
100 90 80 70 60 50 40 30 20 10 0
DEPTH m
B.H. NO.
SAMPLE NO
SYMBOL
6·00 - 2 ×
14·00 - 2 △
20·00 - 2 □
26·00 - 2 ○
0.001 0.002 0.003 0.006 0.01 0.02 0.03 0.1 0.2 0.5 1 2 5 8 10 12.5 20 50 80 100 200
PARTICLE SIZE IN MILLIMETRES:
0.075 0.425 2.00 4.75 20.0 80.0
CLAY
SILT SIZE
SAND
FINE
MEDIUM
COARSE
GRAVEL
FINE
COARSE
COBBLE
PARTICLE SIZE DISTRIBUTION
IS:1498-1970


LOCATION Ulubenia.
I.S. SIEVE (SIZE IN mm)
0.075
0.150
0.300
0.600
1.18
2.36
4.75
10
16
40
63
PERCENTAGE FINER
1.00
90
80
70
60
50
40
30
20
10
0
DEPTH m
B.H. NO.
SAMPLE NO.
SYMBOL
22.00 - 3 X
26.00 - 3 Δ
4.50 - 4 □
12.00 - 4 ○
0.001
0.002
0.003
0.006
0.01
0.02
0.05
0.1
0.2
0.5
1
2
5
8
10
12.5
20
50
80
100
200
PARTICLE SIZE IN MILLIMETRES:
0.075
0.425
2.00
4.75
20.0
80.0
CLAY
SILT SIZE
SAND
FINE
MEDIUM
COARSE
GRAVEL
FINE
COARSE
COBBLE
PARTICLE SIZE DISTRIBUTION
IS:1498-1970


LOCATION Ulubenic
I.S. SIEVE (SIZE IN mm)
0.075 0.150 0.300 0.600 1.18 2.36 4.75 10 16 40 63
PERCENTAGE FINER
1.00 90 80 70 60 50 40 30 20 10 0
DEPTH m
B.H. NO.
SAMPLE no
SYMBOL
20·00 - 5 X
28·00 - 5 Δ
3·00 - 6 □
18·00 - 6 O
PARTICLE SIZE IN MILLIMETRES:
0.075 0.425 2.00 4.75 20.0 80.0
CLAY
SILT SIZE
SAND
FINE
MEDIUM
COARSE
GRAVEL
FINE
COARSE
COBBLE
IS:1498-1970
PARTICLE SIZE DISTRIBUTION

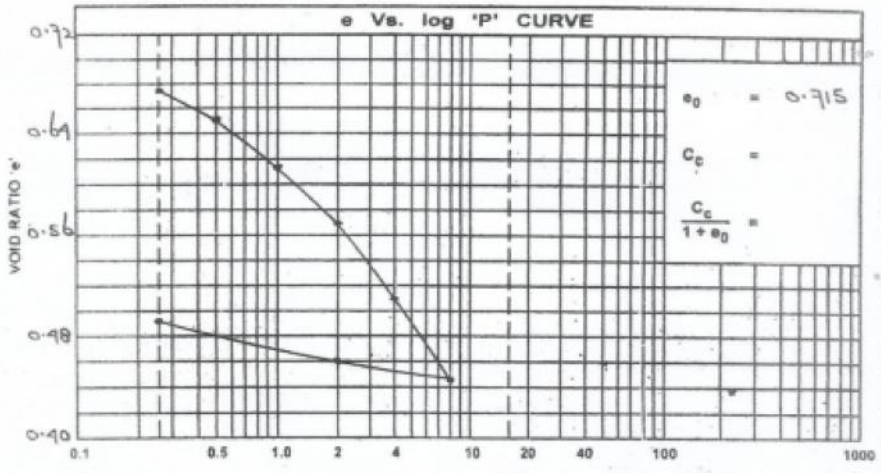

LOCATION Ulubenic.
I.S. SIEVE (SIZE IN mm)
0.075
0.150
0.300
0.600
1.18
2.36
4.75
10
16
40
63
PERCENTAGE FINER
100
90
80
70
60
50
40
30
20
10
0
0.001
0.002
0.003
0.006
0.01
0.02
0.05
0.1
0.2
0.5
1
2
5
8
10
12.5
20
50
80
100
200
PARTICLE SIZE IN MILLIMETRES:
0.075
0.425
2.00
4.75
20.0
80.0
DEPTH m
B.H. NO.
SAMPLE No
SYMBOL
16.50 - 1 X
20.00 - 1 △
30.00 - 1 □
3.00 - 2 ○
CLAY
SILT SIZE
SAND
FINE
MEDIUM
COARSE
GRAVEL
FINE
COARSE
COBBLE
PARTICLE SIZE DISTRIBUTION
IS:1498-1970

LOCATION :- Ulubenia

BORING No. 1

DEPTH 1.50 -

SAMPLE NO. :

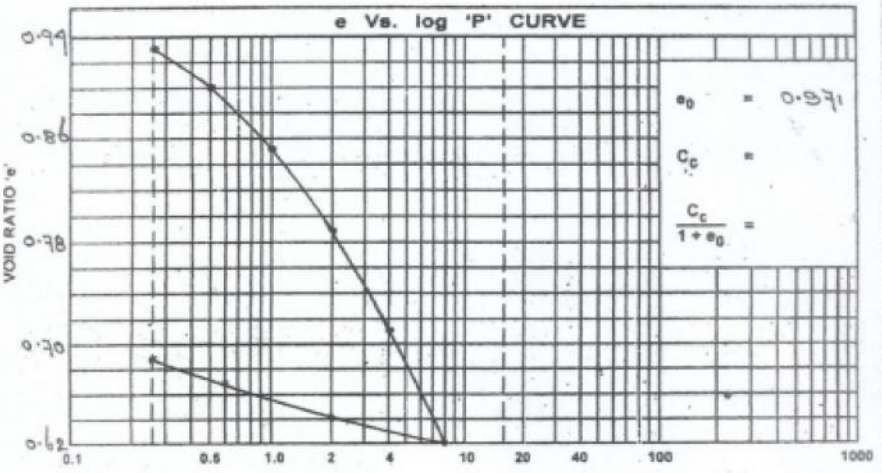


CONSOLIDATION TEST DATA

BORING No. 2

DEPTH 3.00 -

SAMPLE NO. :



CONSOLIDATION TEST DATA

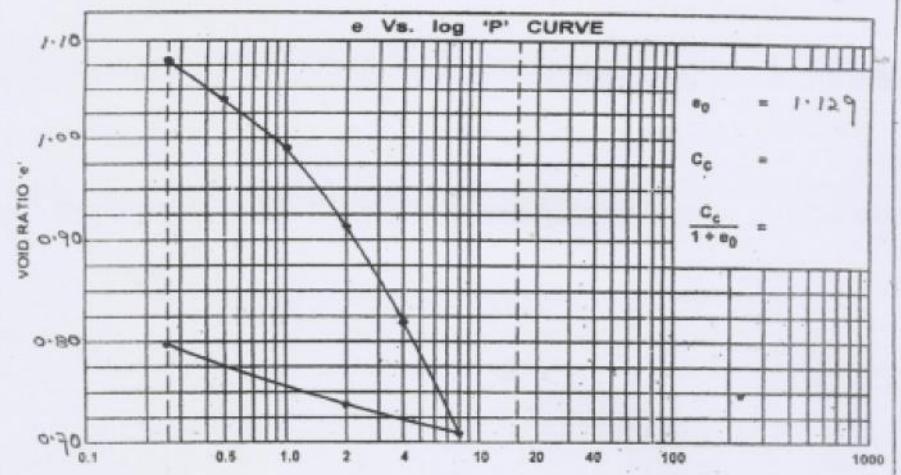
SHEET No.

LOCATION :- Ulubenic.

BORING No. 4

DEPTH 4.50 -

SAMPLE NO. :

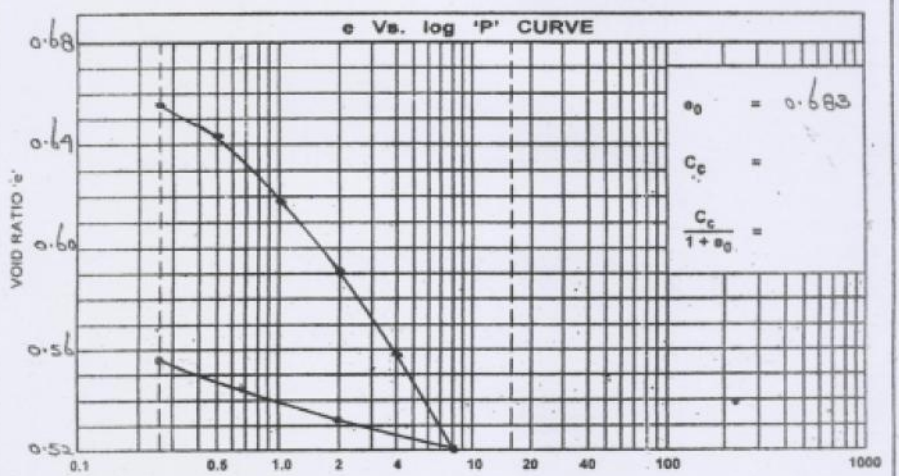


CONSOLIDATION TEST DATA

BORING No. 4

DEPTH 12.00 -

SAMPLE NO. :



CONSOLIDATION TEST DATA

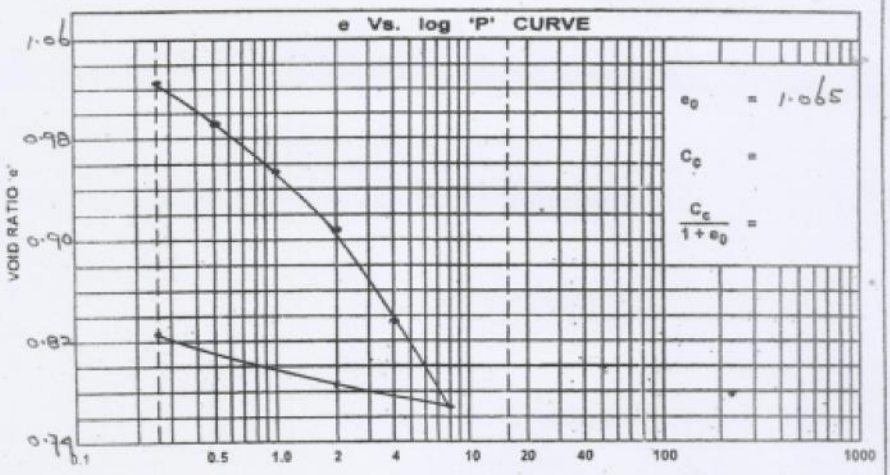
SHEET No.

LOCATION :- Ulubenia.

BORING No. 2

DEPTH 6.00 -

SAMPLE NO. :

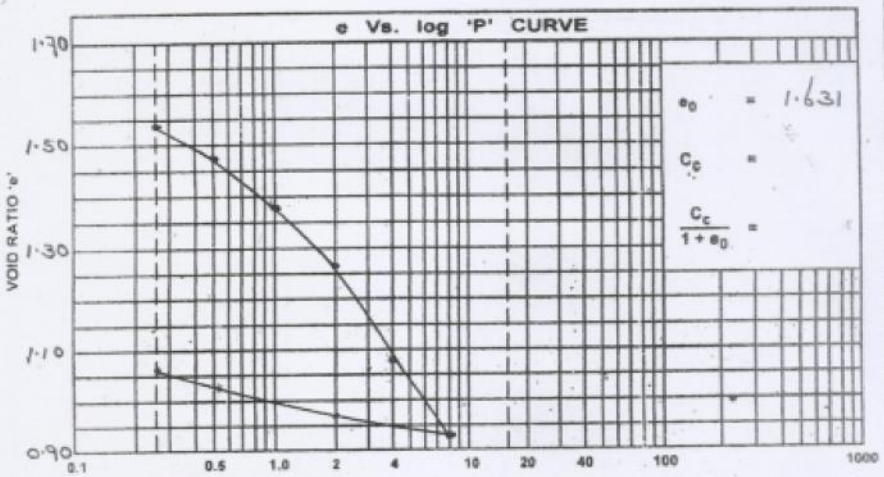


CONSOLIDATION TEST DATA

BORING No. 3

DEPTH 8.00 -

SAMPLE NO. :



CONSOLIDATION TEST DATA

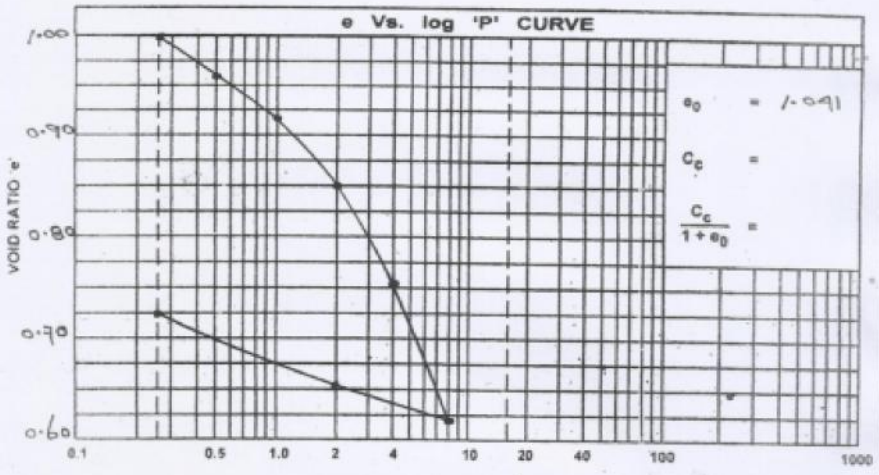
SHEET No.

LOCATION :-

BORING No. 2

DEPTH 10.50 -

SAMPLE NO. :

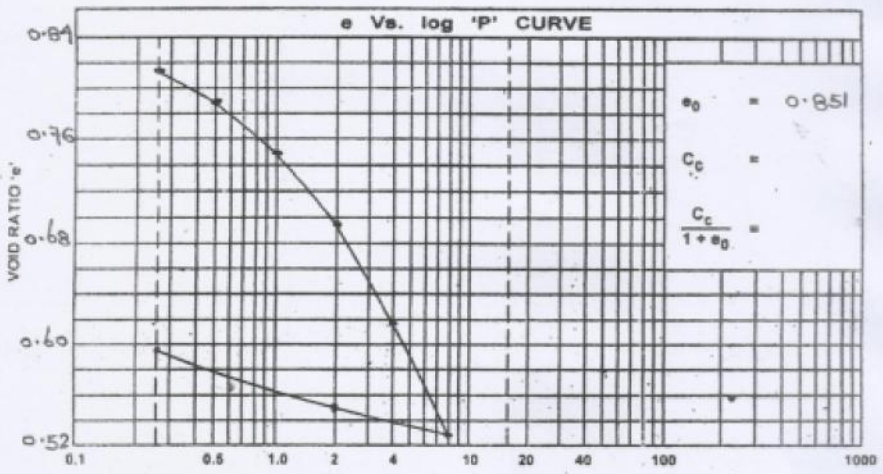


CONSOLIDATION TEST DATA

BORING No. 3

DEPTH 4.00 -

SAMPLE NO. :



CONSOLIDATION TEST DATA

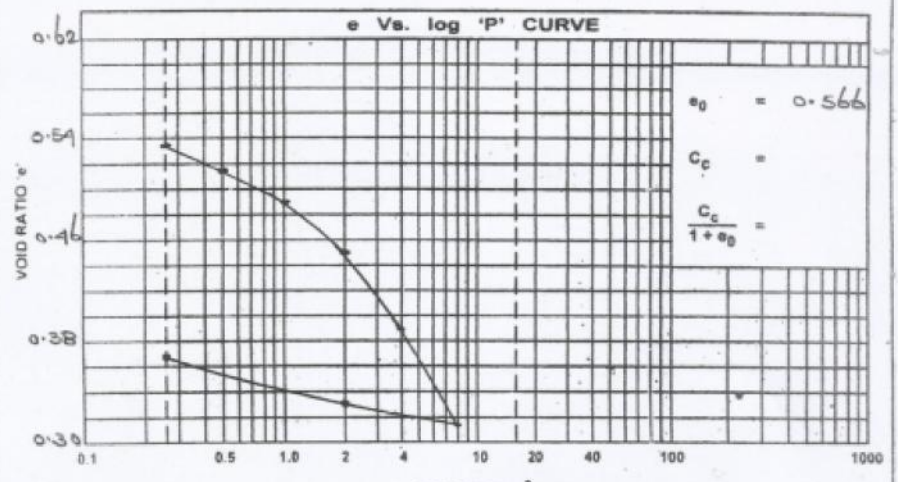
SHEET No.

LOCATION :-

BORING No. 3

DEPTH 16.00 -

SAMPLE NO. :

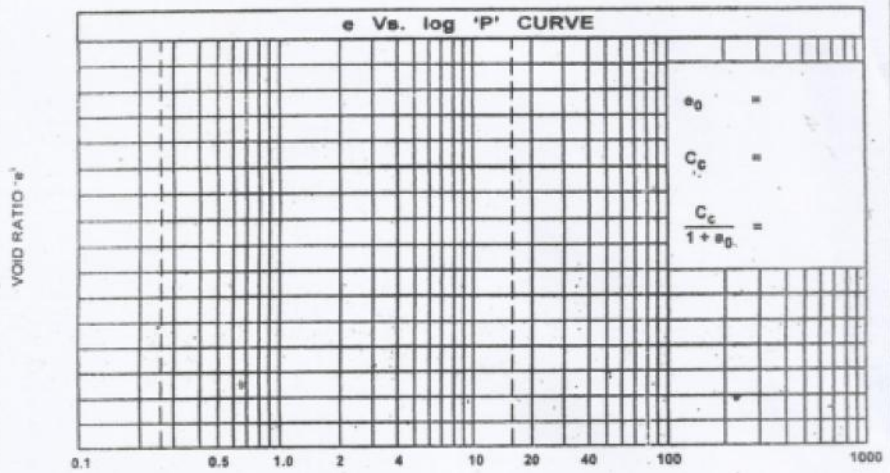


CONSOLIDATION TEST DATA

BORING No.

DEPTH

SAMPLE NO. :



CONSOLIDATION TEST DATA

SHEET No.

Location: Uluberia Sub-Divisional Hospital, Dist-Howrah.

TEST RESULT SHEET

SHEET NO.- 1

SOILEX

B.H. No.	Depth of Sample in Metres	Liquid Limit	Plastic Limit	% Passing 75 micron	Specific Gravity	Unconfined/Traxial Compression: Type of Test	Bulk/Dry Density gm./c.c.	Water Content %	Lateral Pressure kg./cm2	Compressive Strength kg./cm2	Cohesion kg./cm2	Angle of Internal Friction Degree	Consolidation: Consolidation Pressure kg./cm2	Co-efficient of Volume decrease cm2/kg.	Grading: % Gravel	% Sand	% Silt	% Clay
1	1.50	41	22	94 (hyd)	2.64	UU UC	1.80	28.2	-	-	0.24 0.16	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0613 0.0436 0.0297 0.0189 0.0108	-	6	73	21
2	3.00	44	23	99 (hyd)	2.64	UU UC	1.84	30.5	-	-	0.34 0.25	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0673 0.0498 0.0340 0.0220 0.0132	-	1	75	24
3	3.00	45	24	99 (hyd)	2.65	UU	1.84	30.5	-	-	0.25	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0675 0.0498 0.0341 0.0222 0.0133	-	1	76	23
5	3.00	N	P	93 (hyd)	2.63	UU	1.79	27.6	-	-	0.26	27	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0516 0.0321 0.0265 0.0111 0.0035	-	7	74	19
6	3.00	41	21	93 (hyd)	2.64	UC	1.82	31.6	-	-	0.29	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0621 0.0556 0.0425 0.0321 0.0121	2	5	71	22
3	4.00	62	21	96 (hyd)	2.62	UC	1.72	39.2	-	-	0.22	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0632 0.0435 0.0291 0.0231 0.0144	-	4	60	36

Location: Uluberia Sub-Divisional Hospital, Dist-Howrah.

TEST RESULT SHEET

SHEET NO.- 2

SOILEX

						Unconfined/Traxial Compression							Consolidation		Grading			
B.H. No.	Depth of Sample in Metres	Liquid Limit	Plastic Limit	% Passing 75 micron	Specific Gravity	Type of Test	Bulk/Dry Density gm./c.c.	Water Content %	Lateral Pressure kg./cm2	Compressive Strength kg./cm2	Cohesion kg./cm2	Angle of Internal Friction Degrees	Consolidation Pressure kg./cm2	Co-efficient of Volume decrease cm2/kg	% Gravel	% Sand	% Silt	% Clay
1	4.50	49	26	97 (hyd)	2.62	UC	1.72	35.7	-	-	0.20	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0625 0.0521 0.0355 0.0211 0.0156	-	3	72	25
4	4.50	77	29	96 (hyd)	2.60	UC	1.61	49.7	-	-	0.23	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0738 0.0511 0.0359 0.0247 0.0151	-	4	68	28
2	6.00	N	P	91 (hyd)	2.63	UU	1.77	35.7	-	-	0.21	25	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0572 0.0383 0.0259 0.0176 0.0097	-	9	79	12
5	6.00	70	29	99 (hyd)	2.64	UC	1.71	29.4	-	-	0.25	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0482 0.0325 0.0215 0.0151 0.0035	-	1	65	34
6	6.00	67	24	97 (hyd)	2.64	UC	1.71	62.5	-	-	0.21	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0625 0.0521 0.0456 0.0321 0.0215	-	3	72	25
4	7.50	48	25	98 (hyd)	2.64	UU	1.86	30.6	-	-	0.21	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0678 0.0499 0.0342 0.0225 0.0135	-	2	78	20

Location: Uluberia Sub-Divisional Hospital, Dist-Howrah.

TEST RESULT SHEET

SHEET NO.- 3

SOILEX

B.H. No.	Depth of Sample in Metres	Liquid Limit	Plastic Limit	% Passing 75 micron	Specific Gravity	Unconfined/Traxial Compression: Type of Test	Bulk/Dry Density gm./c.c.	Water Content %	Lateral Pressure kg./cm2	Compressive Strength kg./cm2	Cohesion kg./cm2	Angle of Internal Friction Degree	Consolidation: Consolidation Pressure kg./cm2	Consolidation: Co-efficient of Volume decrease cm2/kg.	Grading: % Gravel	% Sand	% Silt	% Clay
5	7.50	88	32	95 (hyd)	-	UC	1.66	71.2	-	-	0.16	0	-	-	-	5	60	35
2	8.00	85	32	100 (hyd)	2.65	UU	1.45	82.4	-	-	0.20	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.1017 0.0735 0.0509 0.0396 0.0190	-	-	50	50
3	8.00	113	34	91 (hyd)	2.56	UC	1.44	82.3	-	-	0.19	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.1016 0.0734 0.0508 0.0395 0.0189	-	9	50	41
6	8.00	60	23	98 (hyd)	-	UC	1.73	42.8	-	-	0.23	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0610 0.0512 0.0421 0.0325 0.0215	-	2	70	28
1	9.00	37	19	97 (hyd)	-	UU	1.75	30.0	-	-	0.25	0	-	-	-	3	77	20
6	10.00	57	21	96 (hyd)	2.65	UC	1.74	44.8	-	-	0.27	0	-	-	-	4	71	25
2	10.50	77	25	99 (hyd)	2.60	UC	1.69	43.7	-	-	0.19	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0654 0.0478 0.0351 0.0265 0.0186	-	6	54	40
4	10.50	82	29	92 (hyd)	-	UC	1.61	81.8	-	-	0.17	0	-	-	-	8	56	36

Location: Uluberia Sub-Divisional Hospital, Dist-Howrah.

TEST RESULT SHEET

SHEET NO.- 4

SOILEX

B.H. No.	Depth of Sample in Metres	Liquid Limit	Plastic Limit	% Passing 75 micron	Specific Gravity	Unconfined/Traxial Compression							Consolidation		Grading			
						Type of Test	Bulk/Dry Density gm./c.c.	Water Content %	Lateral Pressure kg./cm2	Compressive Strength kg./cm2	Cohesion kg./cm2	Angle of Internal Friction Degrees	Consolidation Pressure kg./cm2	Co-efficient of Volume decrease cm2/kg.	% Gravel	% Sand	% Silt	% Clay
3	11.00	78	26	99 (hyd)	2.62	UU	1.70	43.8	-	-	0.50	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0656 0.0479 0.0352 0.0266 0.0187	-	1	76	23
1	12.00	79	25	98 (hyd)	2.65	UU UC	1.95	27.0	-	-	0.73 0.49	0	-	-	-	2	54	44
4	12.00	66	27	94 (hyd)	-	UC	1.96	21.6	-	-	0.74	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0346 0.0277 0.0177 0.0098 0.0063	2	4	53	41
5	12.00	67	23	95 (hyd)	1.94	DS	1.99	32.6	-	-	0.35	22	-	-	-	5	65	30
3	13.00	67	28	96 (hyd)	2.64	UU	1.98	21.7	-	-	0.60	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0348 0.0278 0.0178 0.0099 0.0064	-	4	72	24
2	14.00	47	19	98 (hyd)	-	UU UC	1.95	25.1	-	-	0.53 0.41	0	-	-	-	2	75	23
6	15.00	52	18	98 (hyd)	1.64	UU	1.88	31.1	-	-	0.42	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0448 0.0381 0.0262 0.0204 0.0132	-	2	74	24

Location: Uluberia Sub-Divisional Hospital, Dist-Howrah.

TEST RESULT SHEET

SHEET NO.- 5

SOILEX

B.H. No.	Depth of Sample in Metres	Liquid Limit	Plastic Limit	% Passing 75 microns	Specific Gravity	Unconfined/Traxial Compression							Consolidation		Grading			
						Type of Test	Bulk/Dry Density gm./c.c.	Water Content %	Lateral Pressure kg./cm2	Compressive Strength kg./cm2	Cohesion kg./cm2	Angle of Internal Friction Degree	Consolidation Pressure kg./cm2	Co-efficient of Volume decrease cm2/kg.	% Gravel	% Sand	% Silt	% Clay
3	16.00	53	19	94 (hyd)	2.66	UC	1.89	31.2	-	-	0.44	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0449 0.0382 0.0263 0.0205 0.0134	-	6	54	40
5	16.00	55	22	96 (hyd)	2.66	UU	1.89	30.9	-	-	0.46	0	-	-	-	4	69	27
6	16.00	62	22	93 (hyd)	1.92	DS	1.96	36.1	-	-	0.40	19	-	-	-	7	53	40
1	16.50	54	21	99 (hyd)	-	UC	1.92	32.1	-	-	0.64	0	-	-	-	1	72	27
2	17.00	56	23	99 (hyd)	1.65	UU	1.94	32.3	-	-	0.65	0	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0450 0.0384 0.0265 0.0208 0.0136	-	1	72	27
5	18.00	N	P	94 (hyd)	1.90	DS	1.82	27.6	-	-	0.15	25	-	-	-	6	60	34
6	18.00	65	25	92 (hyd)	-	UU	1.91	24.3	-	-	0.50	0	-	-	6	2	60	32
1	19.00	58	23	94 (hyd)	2.64	UC	1.89	22.0	-	-	0.68	0	-	-	2	4	61	33
3	19.00	59	24	95 (hyd)	2.65	UU	1.90	23.0	-	-	0.69	0	-	-	2	3	70	25
1	20.00	N	P	21 (hyd)	2.61	UU	1.75	25.3	-	-	0.15	30	-	-	-	79	21	-

Location: Uluberia Sub-Divisional Hospital, Dist-Howrah.

TEST RESULT SHEET

SHEET NO.- 6

SOILEX

						Unconfined/Traxial Compression							Consolidation		Grading			
B.H. No.	Depth of Sample in Metre	Liquid Limit	Plastic Limit	% Passing 75 micron	Specific Gravity	Type of Test	Bulk/Dry Density gm./c.c.	Water Content %	Lateral Pressure kg./cm2	Compressive Strength kg./cm2	Cohesion kg./cm2	Angle of Internal Friction Degree	Consolidation Pressure kg./cm2	Co-efficient of Volume decrease cm2/kg.	% Gravel	% Sand	% Silt	% Clay
2	20.00	60	25	96 (hyd)	-	UU UC	1.91	24.0	-	-	0.70 0.50	0	-	-	1	3	66	30
4	20.00	63	22	92 (hyd)	1.90	DS	1.92	29.1	-	-	0.40	20	-	-	-	8	62	30
5	20.00	52	21	97 (hyd)	-	UC	1.96	26.0	-	-	0.50	0	-	-	-	3	69	28
6	21.00	N	P	25	2.62	UU	1.74	26.3	-	-	0.12	28	-	-	-	75	25	-
3	22.00	N	P	47	-	UU	1.82	17.7	-	-	0.20	27	-	-	-	53	47	-
4	22.00	N	P	54	-	DS	1.67	31.2	-	-	0.10	20	-	-	-	54	46	-
1	24.00	60	26	94 (hyd)	-	UC	1.80	27.3	-	-	0.66	0	-	-	-	6	54	40
5	25.00	N	P	20 (hyd)	2.60	UU	1.78	26.2	-	-	0.10	28	-	-	-	80	20	-
2	26.00	N	P	22	-	UU	1.75	13.8	-	-	0.10	32	-	-	-	78	22	-
3	26.00	59	22	95 (hyd)	2.66	UC	1.82	34.5	-	-	0.50	0	-	-	-	5	67	28
4	26.00	52	21	95 (hyd)	1.80	DS	1.89	32.0	-	-	0.26	29	-	-	-	5	56	39
6	26.00	N	P	33 (hyd)		DS	1.69	32.3	-	-	0.15	27	-	-		67	16	17
4	28.00	47	19	94 (hyd)	1.84	DS	1.97	31.6	-	-	0.25	30	-	-		6	54	40
5	28.00	N	P	85 (hyd)	2.63	UU	1.92	24.2	-	-	0.20	0	-	-	-	15	66	19

Location: Uluberia Sub-Divisional Hospital, Dist-Howrah.

TEST RESULT SHEET

SHEET NO.- 7

SOILEX

						Unconfined/Traxial Compression							Consolidation		Grading			
B.H. No.	Depth of Sample In Metres	Liquid Limit	Plastic Limit	% Passing 75 micron	Specific Gravity	Type of Test	Bulk/Dry Density gm./c.c.	Water Content %	Lateral Pressure kg./cm2	Compressive Strength kg./cm2	Cohesion kg./cm2	Angle of Internal Friction Degrees	Consolidation Pressure kg./cm2	Co-efficient of Volume decrease cm2/kg.	% Gravel	% Sand	% Silt	% Clay
1	30.00	65	27	95 (hyd)	-	UU	1.84	28.7	-	-	0.65	0	-	-	-	5	55	40
4	30.00	69	27	93 (hyd)	2.66	UU UC	1.89	33.6	-	-	0.68	0	-	-	-	7	60	33
6	30.00	N	P	22 (hyd)	2.61	UU	1.79	25.1	-	-	0.05	29	-	-	-	78	22	-
2	31.00	60	28	94 (hyd)	2.60	UU	1.80	27.2	-	-	0.70	0	-	-	-	6	60	34
3	32.00	61	29	95 (hyd)	2.61	UU	1.82	28.1	-	-	0.75	0	-	-	-	5	62	33
4	32.00	40	18	85 (hyd)	1.81	DS	1.87	36.2	-	-	0.20	25	-	-	-	15	60	25
5	32.00	63	28	96 (hyd)	2.60	UU	1.80	28.0	-	-	0.72	0	-	-	-	4	66	30
1	34.00	64	27	95 (hyd)	2.01	UU	1.78	29.0	-	-	0.70	0	-	-	-	5	68	27
2	35.00	60	25	94 (hyd)	2.70	UU	1.75	28.0	-	-	0.65	0	-	-	-	6	64	30

Section 5.3
The Area Statements of the Hospital

Tertiary Healthcare Hospital in West Bengal using BRGF

(Tentative Area Programme of Super-Speciality Hospital)

BRGF Hospital - 5 Storeyed				
S.NO.	FACILITY	No. of Rooms	Area / Room (m²)	Total Area (m²)
1	ADMINISTRATION			
	Medical Supdt. (M.S.) room with toilet	1	20	20
	Dy./ Asst. Medical Supdt. Room with toilet	1	15	15
	P.S. to Medical Supdt./Dy. M.S./ Asst. M.S.	1	8	8
	Admn Officer and establishment	1	15	15
	Waiting Room	1	10	10
	Library cum conference room	1	40	40
	Nursing Officer's room with toilet	1	12	12
	Accounts Officer and office	2	12	24
	Purchase Officer and office	1	15	15
	Clerical Staff	2	10	20
	Reception cum enquiries	1	15	15
	Welfare/ Labour Officer	1	10	10
	Stationary/Records - office	1	15	15
	R&S office	1	20	20
	Security Officer and office	1	10	10
	Lavatory for staff (Separate for male & female)	2	10	20
	SUB TOTAL 1			269
2	HOSPITAL SERVICES			
A	MEDICAL RECORDS DEPTT			
	Medical Record Store	1	40	40
	Medical Records Officer	1	10	10
	Staff office	1	10	10
	TOTAL			60
B	CSSD			
	Bulk Storage	1	6	6
	Officer-in-charge	1	10	10
	Receipt and Issue Counter	1	5	5
	Deassembling and Decontamination	1	5	5
	Washing and cleaning	1	5	5
	Assembly and set packing room	1	10	10
	Autoclave Area	1	30	30
	ETO Room	1	12	12
	Sterile Store	1	10	10
	TOTAL			93
C	DIETARY UNIT			
	Reception/receiving/weighing Area	1	6	6

Prepared By:

Consultant Architect, WBMSCL

Approved By:

Director of Health and FW Department
Govt. of West Bengal

Tertiary Healthcare Hospital in West Bengal using BRGF

(Tentative Area Programme of Super-specialty Hospital)

BRGF Hospital - 5 Storeyed				
S.NO.	FACILITY	No. of Rooms	Area / Room (m^2)	Total Area (m^2)
	Preparation Area	1	5	5
	Cooking Area	1	40	40
	Therapeutic diet preparation and cooking area	1	5	5
	Dietitian with toilet	1	15	15
	Stewards and staff	1	10	10
	Trolley loading	1	3	3
	Walk in cold storage	1	6	6
	Dry ration storage	1	8	8
	Toilet	2	5	10
	Washing areas	1	3	3
	Garbage collection area	1	3	3
	TOTAL			112
D	LAUNDRY			
	Clean Clothes Storage area	1	6	6
	Issue Area	1	3	3
	Store	1	5	5
	Laundary Supervisor office	1	10	10
	TOTAL			24
E	HOSPITAL STORE			
	Receipt of stores (weighing, inspection, testing)	1	6	6
	Medical Store	1	30	30
	general and stationary Store	1	70	30
	Linen Store	1	30	30
	Furniture and Equipment Store	1	15	15
	Surgical Store	1	20	20
	office room with toilet	1	10	10
	TOTAL			131
F	ENGINEERING WORKSHOP			
	Office	1	10	10
	Mechanical area	1	10	10
	Electricial area	1	10	10
	TOTAL			30
	Area for Substation,	As per requirement		
	Area for Fire Fighting system, pump, diesel engine and controlling Panel			
	Area for Generator and Controlling A.M.F Panel			

Prepared by

Approved by

Director of Health and FW Department

BRGF Hospital - 5 Storeyed				
S.NO.	FACILITY	No. of Rooms	Area / Room (m^2)	Total Area (m^2)
	Area for Air handling Unit for ducting system for supply and return air			
G	COMMUNITY SERVICES			
	Chemist and Provision shop	1	20	20
	Canteen	1	40	40
	ATM	1	4	4
	TOTAL			64
H	MORTUARY			
	Walk in Cooler (to store)	1	24	24
	Body wash and Prayer room	1	6	6
	Staff room	1	10	10
	TOTAL			40
	SUB TOTAL - SERVICES			554
3	OPD			
	GENERAL			
	Entrance Hall with Enquiry Counter, Case Counter and Record Area	1	100.0	100.0
	Officer In-charge	1	10.0	10.0
	Nurse in-charge	1	10.0	10.0
	Sanitary Inspector Room	1	10.0	10.0
	Lavatories separately for Males & Females (common for patients and staff)	2	40.0	80.0
	MEDICAL CLINIC			
	Consultation and Examination Room of MO and specialist	2	10.0	20.0
	Cardiographic Examination	1	10.0	10.0
	Waiting	1	30.0	30.0
	SURGICAL CLINIC			
	Consultation and Examination Room of MO and specialist	2	10.0	20.0
	Treatment and Dressing M/F	2	10.0	20.0
	Minor Surgery and Treatment Room	1	30.0	30.0
	Waiting	1	20.0	20.0
	ORTHOPAEDIC CLINIC			
	Consultation and Examination Room of MO and specialist	2	10.0	20.0
	Plaster and Plaster cutting room	1	12.0	12.0
	Fracture and Treatment	1	12.0	12.0
	Waiting	1	20.0	20.0
	EYE CLINIC			

Prepared By:

Consultant Architect, WBHSCL

Sponsored By:

Director of Health and FW Department
Govt. of West Bengal

Tertiary Healthcare Hospital in West Bengal using BRGF

(Tentative Area Programme of Super speciality Hospital)

BRGF Hospital - 5 Storeyed				
S.NO.	FACILITY	No. of Rooms	Area / Room (m^2)	Total Area (m^2)
	Consultation and Examination Room of MO and specialist	2	15.0	30.0
	Refraction room	2	12.0	24.0
	Minor Surgery and Treatment Room	1	20.0	20.0
	Orthoptic-cum-Tonography	1	20.0	20.0
	Waiting	1	15.0	15.0
*	ENT CLINIC - Tertiary Care Clinics			
	Consultation and Examination Room of MO and specialist	4	10.0	40.0
	Endoscopy room	2	25.0	50.0
	Recovery room - 2 bed with toilet	1	30.0	30.0
	Treatment room	1	15.0	15.0
	Audiometry Room	1	15.0	15.0
	Audiometry Room	1	15.0	15.0
	Electronystagmography	1	15.0	15.0
	Waiting	1	20.0	20.0
	DEPARTMENTAL OFFICE			
	HOD Room with toilet	1	18.0	18.0
	Specialist Room with Toilet	2	15.0	30.0
	Office	1	10.0	10.0
	Meeting Room cum Library	1	20.0	20.0
	DENTAL CLINIC			
	Consultation and Examination Room of MO and specialist	2	12.0	24.0
	Dental Hygienist Room	1	10.0	10.0
	Dental Workshop	1	12.0	12.0
	Waiting	1	15.0	15.0
	OBSTETRIC AND GYNAECOLOGICAL CLINIC			
	Consultation and Examination Room of MO and specialist	2	10.0	20.0
	Treatment and Dressing	1	20.0	20.0
	Toilet-cum-Changing Room	1	5.0	5.0
	Family welfare clinic	1	10.0	10.0
	Waiting	1	30.0	30.0
	PAEDIATRIC CLINIC			
	Consultation and Examination Room of MO and specialist	2	10.0	20.0
	Immunization Room	1	10.0	10.0
	Waiting	1	20.0	20.0
	SKIN & STD CLINIC			
	Consultation and Examination Room of MO and specialist	1	10.0	10.0
	Treatment room	1	15.0	15.0
	Waiting	1	10.0	10.0
	CHEST & RESPIRATORY MEDICINE CLINIC			

Prepared by

Consultant (Civil), WEMSCL

Approved by

Director of Health and FW Department
Govt. of West Bengal

Tertiary Healthcare Hospital in West Bengal using BRGF

(Tentative Area Programme of Super-speciality Hospital)

BRGF Hospital - 5 Storeyed				
S.NO.	FACILITY	No. of Rooms	Area / Room (m^2)	Total Area (m^2)
	Consultation and Examination Room or MO and specialist	2	10.0	20.0
	Bronchoscopy room	1	30.0	30.0
	DOTS Clinic	1	15.0	15.0
	Waiting room	1	10.0	10.0
	AYUSH CLINIC			
	Consultation and Examination Room or MO and specialist	5	10.0	50.0
	Dispensary	1	10.0	10.0
	Procedure Treatment Room	2	10.0	20.0
	Waiting room	1	15.0	15.0
	SUPPORTING FACILITIES			
	Central Injection Room	1	10.0	10.0
	Specimen Collection Room	1	10.0	10.0
	Social Worker Room	1	10.0	10.0
	SUB TOTAL OPD			1242.0
4	ACCIDENT AND EMERGENCY DEPARTMENT - 10 Beds			
	Entry Lobby with Reception	1	30.0	30.0
	DOCTORS' DUTY ROOM WITH TOILET	1	15.0	15.0
	TRIAGE AREA	1	30.0	30.0
	EXAMINATION and RESUSCITATION - 4 beds	4	7.0	28.0
	OBSERVATION WARD - 6 beds with toilet	6	7.0	42.0
	NURSES' STATION WITH TOILET	1	5.0	5.0
	BROUGHT IN DEAD ROOM	1	8.0	8.0
	ECG ROOM	1	8.0	8.0
	Dressing room	1	8.0	8.0
	Minor OT	1	20.0	20.0
	Plaster Room	1	15.0	15.0
	OPERATION THEATRE UNIT			
	Operation Theatre	1	40.0	40.0
	Instrument Sterilisation	1	6.0	6.0
	Scrub Up/Change	1	5.0	5.0
	Dirty Wash	1	5.0	5.0
	Post op recovery room - 2 beds	2	7.0	14.0
	STORES	1	6.0	6.0
	SLUICE ROOM AND JANITOR CLOSET	1	3.0	3.0
	SUB TOTAL EMERGENCY			288.0
5	LABORATORY MEDICINE DEPARTMENT			
	RECEPTION AND SPECIMEN COLLECTION/ DISTRIBUTION	1	10.0	10.0

Prepared by:

Consultant Architect, WBHSCL

Approved by:

Director of Health and FW Department
Govt. of West Bengal

Tertiary Healthcare Hospital in West Bengal using BRGF

(Tentative Area Programme of Super-speciality Hospital)

BRGF Hospital - 5 Storeyed				
S.NO.	FACILITY	No. of Rooms	Area / Room (m^2)	Total Area (m^2)
	Doctor's room WITH TOILET	2	15.0	30.0
	OFFICE AND RECORD	1	6.0	6.0
	STORES	1	5.0	5.0
	BIOCHEMISTRY	1	7.0	7.0
	MICROBIOLOGY	1	7.0	7.0
	Histopathology	1	7.0	7.0
	Clinical Pathology and Heamotology	1	7.0	7.0
	Histology and Cytology	1	7.0	7.0
	WASHING AND STERILIZING AREA	1	5.0	5.0
	SEROLOGY LABORATORY	1	7.0	7.0
	SPECIMEN DISPOSAL AND SLUICE ROOM	1	2.0	2.0
	Blood Bank	1	110.0	110.0
	SUB TOTAL LABORATORY			**210.0**
6	**RADIOLOGY DEPARTMENT**			
	Reception Registration with Waiting Area and Toilet	1	40.0	40.0
	C T Scan with control room	1	40.0	40.0
	Radiography and Fluoroscopy 500 mA	1	25.0	25.0
	Radiography and Fluoroscopy 300 mA	1	25.0	25.0
	Film Developing and Processing Area	1	10.0	10.0
	Ultrasonography	2	10.0	20.0
	Stores	1	10.0	10.0
	Radiologist's Office with Toilet	1	15.0	15.0
	Technicians Room	1	6.0	6.0
	Office	1	8.0	8.0
	Records Room	1	5.0	5.0
	SUB TOTAL RADIOLOGY			**204.0**
7	**PHYSIOTHERAPY DEPARTMENT**			
	RECEPTION WITH WAITING AREA AND TOILETS	1	12.0	12.0
	PHYSICAL AND ELECTRIC THERAPY			
	Diatheramy	2	4.0	8.0
	Ultra Voilet	1	4.0	4.0
	Infra Red	1	4.0	4.0
	Radiant Heat	1	4.0	4.0
	Selective/ Combined Treatment	1	4.0	4.0
	Traction	1	4.0	4.0
	Wax Bath	1	4.0	4.0
	PHYSIOTHERAPIST OFFICE INCLUDING TOILET	1	10.0	10.0
	STORE	1	5.0	5.0

Prepared By:

Approved By:

Director of Health and FW Department
Govt. of West Bengal

Tertiary Healthcare Hospital in West Bengal using BRGF

(Tentative Area Programme of Super-speciality Hospital)

BRGF Hospital - 5 Storeyed				
S.NO.	FACILITY	No. of Rooms	Area / Room (m^2)	Total Area (m^2)
	SUBTOTAL PHYSIOTHERAPY			59.0
8	OPERATION THEATRE DEPARTMENT with 6 Preop and 6 Postop beds			
	O.T. RECEPTION BAY	1	4.0	4.0
	OFFICER IN-CHARGE OF O.T	1	10.0	10.0
	DOCTORS' CHANGE ROOM	2	2.0	4.0
	NURSES CHANGE ROOM	1	2.0	2.0
	TECHNICIAN CHANGE ROOM	1	2.0	2.0
	CLASS IV STAFF CHANGE ROOM	1	2.0	2.0
	STERILE STORAGE AREA	1	6.0	6.0
	Scrub Up	1	3.0	3.0
	PRE-OPERATIVE ROOM - 6 beds, WITH TOILET	6	6.0	36.0
	RECOVERY ROOM - 6 beds	6	7.0	42.0
	Doctors lounge with pantry	1	10.0	10.0
	Operation Theatres (Major)	4	40.0	160.0
	Endoscopy Room	1	20.0	20.0
	DIRTY UTILITY	1	3.0	3.0
	SUB TOTAL OT			304.0
9	DELIVERY SUITE - with 12 Beds			
	RECEPTION AND ADMISSION WITH WAITING AREA	1	10.0	10.0
	EXAMINATION WITH TOILET - 4 beds	4	7.0	28.0
	Preparation Room - 3 beds	3	7.0	21.0
	DOCTOR'S CHANGE ROOM	1	2.0	2.0
	NURSES' CHANGE ROOM	1	2.0	2.0
	CLASS IV STAFF CHANGE ROOM	1	2.0	2.0
	TECHNICIAN CHANGE ROOM	1	2.0	2.0
	STERILE STORAGE AREA	1	3.0	3.0
	RECOVERY ROOM - 2 beds	2	7.0	14.0
	LABOUR ROOM - 3 tables/beds	3	15.0	45.0
	DELIVERY ROOM - 2 tables	2	15.0	30.0
	OT Maternity (Major)	1	40.0	40.0
	SCRUB UP	1	3.0	3.0
	DIRTY UTILITY	1	3.0	3.0
	SUB TOTAL			205.0
10	IN-PATIENT DEPARTMENT			
	WARDS	Beds		
1	Male Medical	30	6	180

Prepared By:

Approved by:

Director of Health and FW Department
Govt. of West Bengal

Tertiary Healthcare Hospital in West Bengal using BRGF

(Tentative Area Programme of Super-speciality Hospital)

BRGF Hospital - 5 Storeyed				
S.NO.	FACILITY	No. of Rooms	Area / Room (m^2)	Total Area (m^2)
2	Female Medical	30	6	180
3	Respiratory medicine	4	6	24
4	Male Surgical	20	6	120
5	Female Surgical	20	6	120
6	Ante natal	20	6	120
7	Post natal	20	6	120
8	Post partum	20	6	120
9	Paediatric	20	6	120
10	Opthalmology	10	6	60
11	ENT	20	6	120
12	Isolation	8	6	48
13	Burns	2	6	12
14	Neonatal Nursery	12	6	72
15	Separate Diarrhoea word for pediatric are required	20	6	120
	TOTAL WARD BEDS	256		
	DOCTOR ON DUTY ROOM with toilet	4	15	60
	NURSE ON DUTY	4	10	40
	DU	4	3	12
	CU	4	3	12
	Staff toilet	4	4	16
	Medicine Store	4	10	40
	WARD PANTRY	4	6	24
	WARD TOILET	4	40	160
	SUB TOTAL WARD			1900
11	INTENSIVE CARE AREA - 10 Beds			
	I.C.U. Medicine	5	8	40
	I.C.U. Surgery	5	8	40
	DOCTOR ON DUTY with toilet	1	15	15
	NURSE ON DUTY	1	10	10
	Store	1	6	6
	TOILET	1	5	5
	CHANGE ROOM	1	3	3
	DU	1	3	3
	SUB TOTAL ICU'S			122
	TOTAL			5357.0

Prepared By:

01.11.13

Approved By:

Director of Health and FW Department
Govt. of West Bengal

Tertiary Healthcare Hospital in West Bengal using BRGF

(Tentative Area Programme of Super-speciality Hospital)

BRGF Hospital - 5 Storeyed				
S.NO.	FACILITY	No. of Rooms	Area / Room (m^2)	Total Area (m^2)
	ADDING 40% FOR WALLS, CIRCULATION, WAITING LOBBIES, CORES, STAIRWELLS, AHU'S, ELECTRICAL ROOMS ETC.		40%	2142.8
	Grand Total with Circulation			7499.8
*	This will vary from Hospital to Hospital			
NOTE	*These area is indicative and should not be limited to these requirements. The Architect should use his own knowledge & experience to propose the best possible design.*			

Prepared By:

31-1-13

Consultant Architect, WBMSCL

Approved By:

Director of Health and FW Department
Govt. of West Bengal

Section 5.4
Schedule of Finishes

Standard Schedule of Finishes for Tertiary Healthcare Hospitals at different places in West Bengal under BRGF scheme

Sl. #	Particular	Flooring	Skirting / Dado	Wall	Ceiling	Remarks
A			General			
1	Entry Steps	Tread & Riser: 18 mm thick Kota stone in single piece (polished) upto 2500 mm / in three piece with bull nosed edges	100 mm high Kota Stone skirting: Kota Stone 18 mm thick in single piece upto 2500 mm / in three piece	Water proof plaster and textured Paint on external façade	Water proof plaster and textured Paint on external façade	S S Railing & Handrail
2	Ramp	18 mm thick single piece Kota Stone upto 2500 mm / in two pieces	100 mm high Kota Stone skirting	Stretcher Guard	Water proof plaster and textured Paint on external façade	S S Railing & Handrail
3	Entrance Lobby	18 mm thick Granite stone (polished) laid in pattern 600 mm x 600 mm (min)	Min. 2100 mm High Granite stone (polished) cladding to match door frame	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 150 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling.	Gypsum Board / Gypsum Tiles with Aluminium Grid ceiling. 2-3 coats of Distemper on true ceiling	
4	All Corridors at Ground Floor	18 mm thick Granite stone (polished) laid in pattern	Min. 2100 mm high Granite stone (polished) cladding to match door frame	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 150 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling.	Gypsum Board / Gypsum Tiles with Aluminium Grid ceiling. 2-3 coats of Distemper on true ceiling	
	All Corridors at Upper Floor	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm (min)	Min. 2100 mm high full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm			
5	Staircase (Main)	Tread & Riser: 18 mm thick Granite stone (polished) single piece upto 2500 mm / in three pieces	100 mm high, 18 mm thick Granite stone (polished) single piece upto 2500 mm / in three piece	Plastic emulsion paint with a coat of primer over Wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	S S Railing & Handrail
	Staircase (Fire Escape)	Tread & Riser: 18 mm thick Kota stone in single piece upto 2500 mm / in two pieces (polished)	100 mm high, 18 mm thick kota stone (polished) propose skirting			M S Railing & Handrail
6	Lift Lobby at Ground Floor	18 mm thick Granite stone (polished) laid in pattern, 600 mm x 600 mm (min)	Min. 2100 mm high, 18 mm thick Granite stone (polished) cladding to match door frame	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 150 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling.	Gypsum Board / Gypsum Tiles with Aluminium Grid ceiling. 2-3 coats of Distemper on true ceiling	
	Lift Lobby at Upper Floor	Full body joint-free vitrified tiles mirror polished 600 mm x 600 mm	Min. 2100 mm high full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm			
7	General Toilets, Sluice, D.U.	18 mm thick Kota stone in single piece (polished) upto 2500 mm	Upto drop Ceiling - full body joint-free Vitrified tiles	Distemper with a coat of primer over Cement Plaster and wall	Gypsum Board / Gypsum Tiles with Aluminium Grid	

Prepared By:

25-11-13

Consultant Architect, WBMSCL

Approved By:

B. Vatpas 25/11/13

Director of Health Services
& ex-officio Secretary
Government of West Bengal

		(as per site condition)	mirror polished 300 mm x 600 mm	putty	ceiling 2-3 coats of Distemper on true ceiling	
8	Mortuary Cooler (Ground Floor) – Air Condition	18 mm thick Kota stone (polished) – 600 mm x 600 mm (min)	100 mm high Kota stone (polished) skirting	Distemper with a coat of primer over Cement Plaster and wall putty	Gypsum Board / Gypsum Tiles with Aluminium Grid ceiling 2-3 coats of Distemper on true ceiling	
	Body Wash	18 mm thick Kota stone (polished) – 600 mm x 600 mm (min)	2120 mm high 300 mm x 450 ceramic tile	Distemper with a coat of primer over Cement Plaster and wall putty	Distemper with a coat of primer over Cement Plaster and wall putty	
	Office, Lobby	18 mm thick Kota stone (polished) – 600 mm x 600 mm (min)	100 mm High Kota stone skirting	Distemper with a coat of primer over Cement Plaster and wall putty	Distemper with a coat of primer over Cement Plaster and wall putty	
9	Kitchen	18 mm thick Kota stone (polished) – 600 mm x 600 mm (min)	2120 mm high 300 mm x 450 ceramic tile	Distemper with a coat of primer over Cement Plaster and wall putty	Distemper with a coat of primer over Cement Plaster and wall putty	
10	Roof Terrace	Precast Cement Concrete tile 22-25 mm of approved shade over waterproofing treatment as per spec			Protective high class Acrylic Emulsion exterior paint – Glossy / Mat / Textured over Water proof primer	
11	Gas Manifold	18 mm thick Kota stone (polished) – 600 mm x 600 mm (min)	100 mm high Kota stone skirting	Distemper with a coat of primer over Cement Plaster and wall putty	Distemper with a coat of primer over Cement Plaster and wall putty	
12	Engineering Offices	18 mm thick Kota stone (polished) 600 mm x 600 mm (min)	100 mm high Kota stone skirting	Distemper with a coat of primer over Cement Plaster and wall putty	Distemper with a coat of primer over Cement Plaster and wall putty	
13	Registration / Cashier Room / OPD Record	Full body joint free Vitrified tiles mirror polished 600 mm x 600 mm	2100 mm high full body joint free Vitrified tiles mirror polished 300 mm x 600 mm	Distemper with a coat of primer over Cement Plaster and wall putty	Distemper with a coat of primer over Cement Plaster and wall putty	
14	Store (All Stores)	18 mm thick Kota stone (polished) – 600 mm x 600 mm (min)	100 mm high 300 mm x 450 ceramic tile	Distemper with a coat of primer over Cement Plaster and wall putty	Distemper with a coat of primer over Cement Plaster and wall putty	
15	Switch Room, Electrical Room, LPS Room	18 mm thick Kota stone (polished) – 600 mm x 600 mm (min)	100 mm high Kota stone skirting	Distemper with a coat of primer over Cement Plaster and wall putty	Distemper with a coat of primer over Cement Plaster and wall putty	

Prepared By:

Consultant Architect, WBMSCL

Approved By:

Director of Health Services
& ex-officio Secretary
Government of West Bengal

Sl. #	Particular	Flooring	Skirting / Dado	Wall	Ceiling	Remarks
B			Emergency (Ground Floor)			
1	Entrance Lobby	18 mm thick Granite stone (polished) laid in pattern 600 mm x 600 mm. (min)	2100 mm high Granite cladding to match door frame	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 100 mm above false ceiling. Distemper over Cement Plaster above upto true ceiling	Gypsum Board / Gypsum tiles with Aluminium Grid ceiling. 2-3 coats of Distemper on true ceiling	
2	Emergency OT – Air Condition	18 mm thick Granite stone (polished) slab of 2400 mm x 1200 mm (min) – Light Colour Granite	Min. 2100 mm high, 18 mm thick Granite stone (polished) cladding upto 100 mm above false ceiling	Distemper over Cement Plaster above upto true ceiling	55 Ceiling with 40 mm Pelf above	
3	Minor Operation Theatre & Scrub – Air Condition	18 mm thick Granite stone (polished) slab of 2400 mm x 1200 mm (min)	18 mm Granite upto 100 mm above false ceiling	Distemper over Cement Plaster above upto true ceiling	55 Ceiling with 40 mm Pelf above	
4	Nurse Station	Full body joint-free Vitrified tiles mirror polished 600 mm x 300 mm.	100 mm high full body joint free Vitrified tiles mirror polished 300 mm. x 600 mm	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	
5	Doctor Room, Nurse's Change	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	100 mm high full body joint-free vitrified tiles mirror polished 300 mm x 600 mm	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	
6	Observation Room	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	100 mm. high full body joint-free Vitrified tiles mirror polished 300 mm x 600 mm	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	
7	Plaster Room	18 mm thick Granite stone (polished) slab in pattern 600 mm x 600 mm (min)	Granite (polished) cladding upto Window sill level	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	
8	Triage	Full body joint free Vitrified tiles mirror polished 600 mm x 600 mm	Full body joint-free (polished) Vitrified tiles upto Window sill level	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	
9	Instrument & Linen Store	18 mm Thick Kota stone (polished) – 600 mm x 600 mm (min)	Kota stone (polished) upto Window sill level	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	
10	Sterile Store	18 mm thick Granite stone (polished) laid in pattern 600 mm x 600 mm (min)	2100 mm high, 18 mm thick Granite stone (polished) cladding to match door frame	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	
11	Brought-in-Dead Room – Air Condition	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	2100 mm high full body joint-free Vitrified tiles mirror polished 300 mm x 600 mm	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	
12	Police on Duty Room	Full body Vitrified tiles mirror polished 600 mm x 600 mm x 10 mm	100 mm high full body joint-free Vitrified tiles mirror polished	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	

Prepared By:

Consultant Architect, WBHSCL

Approved By:

Director of Health Services
& ex-officio Secretary
Government of West Bengal

Sl. #	Particular	Flooring	Skirting / Dado	Wall	Ceiling	Remarks
C			Radiology (Ground Floor)			
1	MR Room – **Air Condition**	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	Full body joint free Vitrified tiles (polished) upto **Window sill level**	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 100 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling	**Gypsum Board / Gypsum Tiles** with Aluminum Grid ceiling. 2-3 coats of Distemper on true ceiling	
2	Chemist	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	100 mm high full body joint-free vitrified tiles mirror polished	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	
3	CT Scan – **Air Condition**	18 mm thick Kota stone (polished) – 600 mm x 300 mm (min)	Full body joint-free Vitrified tiles (polished) upto **Window sill level**	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 100 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling	**Gypsum Board / Gypsum Tiles** with Aluminum Grid ceiling. 2-3 coats of Distemper on true ceiling	
4	Radiologist Office / Technician Room	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	100 mm high full body joint-free vitrified tiles mirror polished	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	
5	Radiography and Fluoroscopy 500 MA – **Air Condition**	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	2100 mm High full body joint-free Vitrified tiles mirror polished 300 mm x 600 mm	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 100 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling	**Gypsum Board / Gypsum Tiles** with Aluminum Grid ceiling. 2-3 coats of Distemper on true ceiling	
6	Ultrasonography – **Air Condition**	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	Full body joint free Vitrified tiles (polished) upto **Window sill level**	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 100 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling	**Gypsum Board / Gypsum Tiles** with Aluminum Grid ceiling. 2-3 coats of Distemper on true ceiling	
7	PACS	Full body joint free Vitrified tiles mirror polished 600 mm x 600 mm	100 mm high full body joint-free Vitrified tiles mirror polished	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 100 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling	**Gypsum Board / Gypsum Tiles** with Aluminum Grid ceiling. 2-3 coats of Distemper on true ceiling	
8	ECG – **Air Condition**	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	100 mm high full body joint free Vitrified tiles mirror polished	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 100 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling	**Gypsum Board / Gypsum Tiles** with Aluminum Grid ceiling. 2-3 coats of Distemper on true ceiling	

Prepared By:

Consultant-Architect, WBMSCL

Approved By:

Director of Health Services
& ex officio Secretary
Government of West Bengal

Sl. No	Particular	Flooring	Skirting / Dado	Wall	Ceiling	Remarks
1	All Rooms (Consultation Room, Specialist, Office	Full body joint free Vitrified tiles mirror polished 600 mm x 600 mm	2100 mm high full body joint free Vitrified tiles mirror polished	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	
2	HOD, Meeting Room	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	100 mm high full body joint free Vitrified tiles mirror polished	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 300 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling	Gypsum Board / Gypsum Tiles with Aluminum Grid ceiling. 2-3 coats of Distemper on true ceiling	
3	Minor Surgery Room (Air Condition)	18 mm thick Granite stone (polished) laid in pattern 600 mm x 600 mm (min) – Light Colour Granite	2100 mm high, 18 mm thick Granite stone (polished) cladding to match door frame	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 300 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling	Gypsum Board / Gypsum Tiles with Aluminum Grid ceiling. 2-3 coats of Distemper on true ceiling	
4	Treatment & Dressing Room, Orthopedic cum Tonography, Refraction Room, Audiometry Room, BERA, Laser Room, Waiting Lobby	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	Full body joint-free Vitrified tiles (polished) upto Window sill level	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 300 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling	Gypsum Board / Gypsum Tiles with Aluminum Grid ceiling. 2-3 coats of Distemper on true ceiling	
5	Plaster Room, Family Welfare Clinic, Immunization Room, DOTS, Bronchoscopy Room	Full body joint free Vitrified tiles mirror polished 600 mm x 600 mm	Full body joint-free Vitrified tiles (polished) upto Window sill level	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	

Prepared By:

Consultant Architect, WBMSCL

Approved By:

Director of Health Services
& ex-officio Secretary
Government of West Bengal

Sl. #	Particular	Flooring	Skirting / Dado	Wall	Ceiling	Remarks
E			[illegible] Condition			
1	Change Rooms, Nurses Duty, OT Office, Office, Trolley boy	Full body joint-free Vitrified tiles matt polished 600 mm x 600 mm	Full body joint-free Vitrified tiles (polished) upto Window sill level	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 100 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling	Gypsum Board / Gypsum Tiles with Aluminium Grid ceiling. 2-3 coats of Distemper on true ceiling	
2	Operation Theatre (4 Nos. for 5 storied) & Scrub	18 mm thick Granite stone (polished) laid in pattern 600 mm x 600 mm (min) – Light Colour Granite	Min. 2100 mm high, 18 mm thick Granite stone (polished) cladding upto 100 mm above false ceiling	Distemper over Cement Plaster above upto true ceiling	SS ceiling with 40 mm Puff above	
3	Operation Theatre (12 Nos. for 10 Storied)	18 mm thick Granite stone (polished) laid in pattern 600 mm x 600 mm (min) Light Colour Granite	Min. 2100 mm high, 18 mm thick Granite stone (polished) cladding upto 100 mm above false ceiling	Distemper over Cement Plaster above upto true ceiling	SS ceiling with 40 mm Puff above	
4	Pre Operative, Recovery Room, Corridor, Endoscopy	18 mm thick Granite stone (polished) laid in pattern 600 mm x 600 mm (min)	Min. 2100 mm high, 18 mm thick Granite stone (polished) cladding upto 100 mm above false ceiling	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 100 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling	Gypsum Board / Gypsum Tiles with Aluminium Grid ceiling. 2-3 coats of Distemper on true ceiling	
5	Sterile Store, Instrument & Linen Store, Utility, Gas Cylinder Gas	18 mm thick Kota stone (polished) – 600 mm x 600 mm (min)	Kota stone (polished) upto Window sill level	Distemper over Cement Plaster	Distemper over Cement Plaster	

Prepared By:

Consultant Architect, WBMSCL

Approved By:

Director of Health Services
& ex-officio Secretary
Government of West Bengal

Sl. #	Particular	Flooring	Skirting / Dado	Wall	Ceiling	Remarks
F				Delivery		
1	OT – Air Condition	18 mm thick Granite stone (polished) laid in pattern 600 mm x 600 mm (min)	Min. 2100 mm high 18 mm thick Granite stone (polished) cladding upto 100 mm above false ceiling	Distemper over Cement Plaster above upto true ceiling	SS ceiling with 10 mm PUF above	
2	Delivery Room, Child Birth	18 mm thick Granite stone (polished) laid in pattern 600 mm x 600 mm (min)	Min. 2100 mm high 18 mm thick Granite stone (polished) cladding upto 100 mm above false ceiling	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 100 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling	Aluminium ceiling	
3	Labour Room (Air Condition) Examination Recovery Eclampsia (Air Condition)	Full body joint free Vitrified tiles mirror polished 600 mm x 600 mm	2200 mm high full body joint-free Vitrified tiles mirror polished	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 100 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling	Gypsum Board / Gypsum Tiles with Aluminium Grid ceiling. 2-3 coats of Distemper on true ceiling	
4	Sterile Store, Instrumentation & Linen Store, Utility	18 mm thick Kota stone (polished – 600 mm x 600 mm (min)	Kota stone (polished) upto Window sill level	Distemper over Cement Plaster	Distemper over Cement Plaster	
5	Doctor's change, Nurse's change	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	100 mm high full body joint-free Vitrified tiles mirror polished	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	

Sl. #	Particular	Flooring	Skirting / Dado	Wall	Ceiling	Remarks
G				Ward Type (1st Floor)		
1	All rooms, Wards, Nurse Station	Full body joint free Vitrified tiles mirror polished 600 mm x 600 mm	2100 mm high full body joint-free Vitrified tiles mirror polished	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	
2	NICU, PICU, Burn & Dialysis Ward – Air Condition	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	2100 mm high full body joint-free Vitrified tiles mirror polished	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	
3	Doctor on Duty, Nurse on Duty	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	100 mm high full body joint-free Vitrified tiles mirror polished	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	

Prepared By:

Consultant Architect, WBMSCL 23.11.17

Approved By:

Director of Health Services
& ex-officio Secretary
Government of West Bengal

Sl. #	Particular	Flooring	Skirting / Dado	Wall	Ceiling	Remarks
H			Blood Bank Ground Floor - Air Condition			
1	Blood Bank, All rooms, Serology Lab	Full body joint free Vitrified tiles mirror polished 600 mm x 600 mm	2100 mm high full body joint-free Vitrified tiles mirror polished	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Gypsum Board / Gypsum Tiles with Aluminium Grid ceiling. 2-3 coats of Distemper on true ceiling	

Sl. #	Particular	Flooring	Skirting / Dado	Wall	Ceiling	Remarks
I			ICU & SCBU - Air Condition			
1	ICU & SCBU, Dialysis, Nurses' Station, ITU Surgery, ITU Medicine	18 mm thick Granite stone (polished) laid in pattern 600 mm x 600 mm (min)	Min. 2100 mm high, 18 mm thick Granite stone (polished) cladding to match door frame	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 200 mm above drop ceiling. Distemper over Cement Plaster Above upto true ceiling	Gypsum Board / Gypsum Tiles with Aluminium Grid ceiling. 2-3 coats of Distemper on true ceiling	
2	Doctor on Duty, Nurse on duty, Change Room	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	100 mm high full body joint-free vitrified tiles mirror polished	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 200 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling	Gypsum Board / Gypsum Tiles with Aluminium Grid ceiling. 2-3 coats of Distemper on true ceiling	
3	Equipment, Stores	18 mm thick Kota stone (polished) – 600 mm x 300 mm (min)	100 mm high Kota stone	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster	

Sl. #	Particular	Flooring	Skirting / Dado	Wall	Ceiling	Remarks
J			SCBU			
1	All Rooms	18 mm thick Kota stone (polished) – 600 mm x 600 mm (min)	100 mm high Kota stone	Distemper with a coat of primer over Cement Plaster and wall putty	Distemper with a coat of primer over Cement Plaster and wall putty	

Sl. #	Particular	Flooring	Skirting / Dado	Wall	Ceiling	Remarks
K			Laundry			
1	All Rooms	18 mm thick Kota stone (polished) – 600 mm x 600 mm (min)	100 mm high Kota stone	Distemper with a coat of primer over Cement Plaster and wall putty	Distemper with a coat of primer over Cement Plaster and wall putty	

Prepared By:
29.11.13.
Consultant Architect, WBMSCL

Approved By:
Director of Health Services
& ex-officio Secretary
Government of West Bengal

Sl. #	Particular	Flooring	Skirting / Dado	Wall	Ceiling	Remarks
L			Administration			
1	Corridor, Waiting, Reception	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	2100 mm high full body joint-free Vitrified tiles mirror polished	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 100 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling.	Gypsum Board / Gypsum Tiles with Aluminum Grid ceiling 2-3 coats of Distemper on true ceiling	
2	Medical Superintendent, RS, Asst. Medical Superintendent, Video Conference, Server Room	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	100 mm high full body joint-free Vitrified tiles mirror polished	Plastic emulsion paint with a coat of primer over wall putty over Cement plaster, upto 100 mm above drop ceiling. Distemper over Cement Plaster above upto true ceiling	Gypsum Board / Gypsum Tiles with Aluminum Grid ceiling 2-3 coats of Distemper on true ceiling	
3	Purchase Officer, Security Officer, Accounts Officer, Admin. Officer, RIS Office, Labour Office, Clerical Staff, Nursing Officer	Full body joint-free Vitrified tiles mirror polished 600 mm x 600 mm	100 mm high full body joint-free Vitrified tiles mirror polished	Distemper with a coat of primer over Cement Plaster and wall putty	Distemper with a coat of primer over Cement Plaster and wall putty	
4	Conference / Library	Wooden Laminate	Wooden paneling upto false ceiling	Wooden paneling upto false ceiling	Gypsum Board / Gypsum Tiles with Aluminum Grid ceiling 2-3 coats of Distemper on true ceiling	
5	Record Room, Store Room	18 mm thick Kota stone (polished) – 600 mm x 600 mm (min)	100 mm high Kota stone	Distemper with a coat of primer over Cement Plaster and wall putty	Distemper with a coat of primer over Cement Plaster and wall putty	

M		Door
1	Fire Escape	Fire Door as per approved by ISI
2	Administrative Area	Machine made decorative Flush door as per approval
3	General	Non-decorative Flush door
4	All Toilets	Fiber glass door
5	WC, Bath	Non-decorative Flush door / PU Door
6	Operation Theatre	Hermetically sealed Sliding door
7	Lift Lobby	Fire Door as per approved by ISI
8	Main Entrance	Decorative paneled wooden door + collapsible gate
9	ICU	PU door
10	AHU / Electrical	Fire door
11	X-Ray / CT	Lead line door
12	MRI	As / Company specifications

Prepared By:

Consultant Architect, WBMSCL

Approved By:

Director of Health Services
& ex-officio Secretary
Government of West Bengal

N						
	Window					
1	Al External Window	Aluminium sliding window with M.S. grill				
a	Window sill (External and Internal) – 250 mm / 125 mm wide	Granite				

Sl. #	Particular	Flooring			Ceiling	Remarks
O	**External Development**					
1	Porch, Queing Area, Footpath	60 mm Paver Block			Tubular section with Polycarbonate sheets	
2	Plinth Protection	Kota stone (polished)				
3	Parking Area	Bitumen				
4	External Roads / Carriage way	Bitumen				
5	Kerb stone	PCC M20 Precast Block				

Sl. #	Particular	Flooring		Wall	Remarks
P	**External Facade**				
1	Wall Area (upto two storey, Upper Floor)	Paver Block as per ISI Specification.		Protective high class Acrylic Emulsion exterior paint Glossy / Mat / textured over Water proof plaster	

Sl. #	Compound Wall			Remarks
Q	**External Development**			
1	Front	Column with MS Jali with light fixture		
2	Side and Rear	Brick wall with Coil at 10' C/C and Barbed wire with light fixture		5'6" High + Barbed wire

Prepared By:

Consultant Architect, WBMSCL

Approved By:

Director of Health Services
& ex-officio Secretary
Government of West Bengal

Section 5.5
Scope & Specification of Civil Works

Sec 5.5 Scope & Specification of Civil Works

1. Introduction to the project

West Bengal Medical Services Corporation Ltd (WBMSCL), a Wholly Owned State Govt. Undertaking under Health & Family Welfare Department of Govt. of West Bengal is poised to execute construction of 6-Super Specialty Hospital on Turnkey Basis (Planning, Design & Execution) across the State of West Bengal in a time-bound way. Though all the upcoming Hospital are located inside the premises of existing Medical College / Hospital at city, district, sub-division & rural areas, these upcoming Hospital will function on stand-alone basis both from points of administration and delivery of service to the users. But, in some of these ear-marked sites, the existing utility services viz, water line, sewerage line, electric line & substation, gas pipe line and other under & over ground structures may invite some hindrance. Intending bidder must carry out site-survey in detail and gather such precise information to the extent possible and take into account all of them before quoting the respective 'price' of individual Package. Contractor must at the time of execution of the construction ensure seamless running of existing hospital and see the safety of all stakeholders of the running hospital according to standard industry practice of construction. And since the construction will take place inside the premises of running hospital, any sort of pollution, be it sound, air or anything else related to clean environment have to be minimized to the extent possible by deploying modern mechanical plants & equipments. Assistance of latest mechanical equipments will not only minimize the eventual pollution but also warrant the overall project less labor intensive resulting in time of completion of the project quicker and in a predictable way.

The project will be done on Turnkey Basis (Planning, Design & Execution) and the Contractor will be responsible for shortfall of any technical propriety and of upholding prevailing standard of Code of Practice according to NBC 2005 and all other relevant IS-Code on the way to accomplish the work according to Employer's requirement. Approval of Engineer of employer at any stage of planning, design and construction of the project will not absolve the ingrained responsibility of the Contractor to execute the construction flawless and at par excellence and, if any aspect contrary to this owning up of responsibility is glaring, the Contractor will be held liable for such gross deviation.

The Project is scheduled to be completed within a period of 15 months from the date of notification of award.

2. SCOPE OF WORK

I. The project is broadly divided into three segments.
II. Construction of hospital building
III. Supply, installation and training of medical equipment
IV. Supply of general and hospital furniture

3. GENERAL

Planning and Preparation of Concept plan, Structural design compatible with respective findings of

Geotechnical Investigation & construction of Multi-storied Frame-structured Buildings and allied works like Sanitary & Plumbing, Electrical installation, fire detection & fighting, IBMS, CCTV, PA system, HVAC, Lift etc. on turnkey basis. The tentative ground coverage available for each floor of the upcoming Super-specialty hospital shall be about **1600 sqm** and where coverage is not available around this figure, customization of Architectural Plan in consultation with Engineer / Architect of employer will require depending on the shape and size of available land. Average Height of building per floor is **3.60m** and plinth height is **0.60 m** from formation level.

A. Site Plan

Site Plans for 06 different locations along with proposed indicative plan of Super Speciality Hospital on this plan are shown in **Sec 5.2**

B. Different Medical facilities (+ its approx. area)

The tentative allocation of different departments / facilities along with approx. required floor area in the proposed Super Specialty Hospital which is subject to addition and / or alteration in consultation with WBMSCL at the time of preparation and finalization of Concept Plan is shown in **Sec 5.3**

C. Existing Services & Utilities

a) The existing services and utilities shall be diverted with proper liaison and approval of WBMSCL. The services and utilities which cannot be diverted but require supporting, proper supporting shall be done so that they are not damaged along their branches. Precautions to be taken while handling the services and utilities are mentioned as under:

b) Services and Utilities shall not be damaged at any cost. If due to some or the other reason mishap occurs, it should be rectified immediately by the contractor at his own cost under intimation of WBMSCL.

c) The Contractor shall take care so that the ongoing activities are not disturbed in any manner whatsoever by the activities of the Contractor during the execution of the work. The above instructions are only indicative, other precautions which are specified from time to time by the WBMSCL shall be followed by the successful Tenderer at all times.

4. SCOPE OF WORK

The scope of work required for completion of the Project on a turnkey basis shall include the following:

A. CONCEPT PLANNING :

1. Preparation of the Concept Plan of upcoming super specialty hospital after incorporation of various facilities as per tentative floor plan given below subject to applicable bye-laws and approval from WBMSCL. It shall include:

I. Site surveys and soil investigations as per requirements.

II. Preparation of site layout plan for super specialty hospital.

III. Development of Building concept design/plans based on functional analysis and workflow analysis including preparation of space programming, design concept, concept for all services, interiors and exteriors, finishes etc

IV. Obtaining approval of WBMSCL for the concept plan and conceptual drawings

v. L-1 bidder may be asked to substantiate their quoted price by detailed estimate based on PWD SOR (WB) for scheduled items and based on market rate for non-scheduled items.

vi. Preparation and submission of drawings for statutory approvals and obtaining approvals / permits of the Statutory / local / Government agencies

vii. Submission of concept plan document inclusive of site survey report, soil investigation report, cost estimates and approved drawings by all statutory authorities.

B. DETAILED DESIGN AND CONSTRUCTION

1. Detailed design engineering including architectural design, structural designs & drawings along with complete services of electrical, mechanical, bio-medical etc – viz; DG set, water supply, sanitary & plumbing, fire detection, fire alarm & fire fighting, HVAC, networking, drainage, waste management system, sewage treatment plant, electrical sub-station, land scalping, parking etc in accordance with detailed Plan & Design approved by WBMSCL and in accordance with functional requirement of hospital.
2. Obtaining structural design & drawing, concept architectural design duly approved by the academic institutions as recommended by the Employer or by any structural and architectural firm having a minimum 20 years of experience in respective field and which is empanelled & registered under any metropolitan corporation body in India. This approval from academic institutions / any metropolitan corporation body is required only for intended bidder who does not have their own in-house Structural Design wing. But those who have their exclusive full-fledged in-house Structural Design wing is exempted from obtaining approval from any academic institutions / metropolitan corporation body of India.
3. Site clearance, relocation of existing utility services, including demolition of the existing services if required.
4. Construction of foundation and substructure as per approved concept plan including erection of boundary wall and area development (the enclosed area within the boundary wall to be developed may for the purpose of bidding be considered as at least 1 acre).
5. Construction of approach roads, boundary walls, pathways, parking, drainage and landscaping etc.
6. Assurance of quality aspect as per NBC 2005 & all relevant IS-Code & enforcement of energy conservation as per ECBC Code 2010
7. Efficient Project Management to ensure completion of project as per stipulated timeline.
8. Obtaining all the essential clearance /certificates/ NOCs from various local /statutory authorities and furnishing them to WBMSCL as part of completion / occupancy readiness of the hospital building.
9. Submission of the completion (i.e. 'as-built') drawings and other related documents in hard copy. A soft copy in Auto CAD or other similar software shall also be submitted.
10. Clearance of site before handing over of the facilities complete in all respect
11. Making good of defect (if any) during Defects Liability Period of 3 (three) years from the date of handing over

C. CONSTRUCTION OF SERVICE FACILITIES ALONG WITH ASSOCIATED INFRASTRUCTURE.

Besides the scope of work referred at Sl. No. 'A' & 'B' above, the construction of Building for Services along with associated infrastructure shall include the following along with other utilities required for smooth functioning of super specialty hospital complying all statutory regulations:

1. Fire Fighting, fire Detection & fire alarm system with required underground & overhead fire water tanks, firefighting pumps, equipment, panels, ring mains, fire & smoke detectors, fire alarm panels, PA System etc. complete including construction of Pump room.
2. HVAC System for complete block as specified in scope of Electrical work.

3. Internal Electricals with all fittings & fixtures, DBs & Panels etc.
4. LAN Network, EPABX & Telephone Network System and Centralized UPS System etc.
5. External Electricals with Street lighting around super specialty hospital, DG Set including AMF Panel etc. complete
6. Water supply system including underground storage tanks, connection with existing water
7. Construction and connection of waste, sewer & storm water services with existing lines, if any & Sewage Treatment Plant.
8. Shifting of existing utilities in the area and dismantling of existing encumbrance (viz. buildings, service infrastructure etc.) along with disposal of debris according to direction of WBMSCL.
9. All approach roads & pathways inside premises of super specialty hospital
10. Landscaping and Horticulture at entrance and around super specialty hospital as per approved Concept Plan.

N.B. Scope of work cited above is indicative only. Agencies will submit progressively comprehensive and compatible service facilities design & report, subject to approval of WBMSCL, to run the super specialty Hospital smoothly

5. Design Requirements for Building & Services

Introduction:

This Specification defines the service and accommodation outputs that WBMSCL requires the Contractor to provide in respect of the new facilities for super specialty hospital. These are only indicative and the Contractor shall be responsible for the suitability and adequacy of the design and specifications to ensure that on completion the facilities become fully functional. Detailed Architectural Plan, Structural design & drawing, specifications both for Civil & Electrical works, Fire detection and fighting works etc. along with the price-bid are sought from Tenderers for implementation of the Project.

Project Objectives

The overall project objective is to develop the following:

- Planning & Setting up of new Super-specialty Hospital along with all required associated services, infrastructure, to make it fully functional.

Required Outcome

- A design that will inspire and fulfill the requirement of all who use it day to day and will make a positive statement to the Community as a whole
- Building design fabrics & materials, systems and services that are consistent with the latest architectural style and quality of similar facilities both of public and private sectors.
- Furniture and fittings that provide a safe, comfortable and welcoming environment and encourage and enable all members of the community to use the facility.
- Use of materials consistent with the government's policies on environment, sustainability of natural resource and accordance of ECBC 2010.
- The facilities shall have clear signage giving name and directional details enabling visitors, service users, staff and the emergency services, to easily locate the required destinations (internally and externally).

Designs

The Design Specification is to be intended to provide a clear understanding of the building design standards that the Employer wishes to achieve. While the employer is keen to see innovation, it is equally

conscious that basic standards of design including three dimentional and dynamic structural analysis with the help of latest software for this specific purpose be adhered in letter and spirit.

Contractors shall outline the means by which they will ensure design quality and the design objectives, which will influence their scheme. This shall include details of how the Employer's objectives are to be achieved.

General Standards

The new facilities shall be completed in conformity with high standards of construction and specification.

The facilities shall be technically and functionally suitable to meet the Employer's objectives:

i. The Architectural finishes shall be of such quality that will ensure better hygienic conditions.

ii. The design of building shall ensure control of noise due to walking, movement of trolleys and banging of doors etc.

iii. The architectural design should take in to account the requirements of physically challenged patients.

iv. All the building material fitting and fixtures procured or to be used should be to the satisfaction of the Engineer of employer before being used for the works intended to.

v. All sanitary/ water supply fixture and fittings shall be of approved make of WBMSCL confirming to IS specifications.

vi. There should be separate inlets for hot and cold water in the building.

vii. The design should provide for underground & overhead water tanks of adequate capacity with necessary pumping arrangement for both portable and firefighting requirements along with construction of pump room of require size & shape.

viii. The design should incorporate fire fighting system with electrical/ hydrants, sprinklers, fire extinguishers and fire alarm system in accordance with the relevant rules and regulations of fire fighting and other statutory authorities.

ix. Lighting should confirm to IS 4347 Code of practice for Hospital Lighting. All electrical system, fixtures, fittings etc. should confirm to PWD / CPWD specifications, latest IS code etc.

x. The planning should include landscaping and horticulture to increase the comfort & hospitality conditions inside the building. The contractor shall develop parking, approach roads and other service requirements meant for the Super Specialty Hospital.

xi. Provision should be made for internal and external signage's, display boards, public address system in the target area / zone.

xii. Furnishings in the room should be complete in all respect including communication networking, telephone connection, power points etc.

xiii. The block constructed should have power back up systems for emergency services.

xiv. Mechanical services shall be designed and installed with provisions to contain acceptable noise and the vibration generated by moving plant and equipment in the line of prevailing standard.

xv All moving plant, machinery and apparatus be statically and dynamically balanced at manufacturer's work and mandatory certificate need to be procured to this effect from concerned authority.

xvi. All aspects of Bio Medical Waste (Management & Handling) Rules 1998 with Subsequent amendments, if any, issued by the Ministry of Environment and Forest, Government of India should be addressed in the provision for Waste Management.

6. Statutory, Industry and Local Standards

The following standards shall apply unless otherwise stated:

- Standards set out in National Building Code of India 2005
- Relevant Development Control Rules/Planning Act/Development Act/Municipal Act/any other applicable statutes and local by-laws
- National Electrical Code, 1985
- Indian Electricity Act 2003
- Bio Medical Waste (Management & Handling) Rules 1998
- Requirements of the local Water Supply Company, Electricity Supply Company/Department
- Requirements of the Pollution Control Board, Fire department and Aviation authorities, if applicable
- ECBC Code 2010 to conform aspect of environment and energy conservation
- All other IS Special publication read with relevant IS Code

7. REQUIREMENTS OF VARIOUS SEGMENTS

7.1.1 Provision for the following shall be made.

i) The building shall be designed according to prevailing regulations & standards. However the developer shall be responsible for the adequacy, suitability & sufficiency of the design.

ii) The bidder shall provide all the required services of adequate capacity to meet the requirements of NBC, NEC and other relevant IS-Code for smooth functioning of Super Specialty Hospital.

iii) The building shall be air-conditioned and provided with DG back up as stated in Scope & Specification of Electrical works.

iv) The project shall be designed according to best practices and constructed at par with the prevailing standards and equipped with latest equipments at the time of commissioning. But so far as utilization of plan area is concerned endeavor is to be there to accommodate 300 bed of (G+4)-building using about 80000 sq ft area and during this process of plan area utilization for different facilities at different floor Tentative Area program vide "Annexure-III" is to be followed.

v) Adequate parking area for cars, ambulance & two wheelers shall be provided.

8. Safety and security

a. Attention should be given to balancing readily accessible and visible external access points to the facility with the ability to control and secure all access points in the event of an emergency. Factors such as adequate exterior lighting in parking area and entry points to the facility, and appropriate reception/security services are essential to ensuring a safe environment.

b. Since the strict control of access to a medical facility is neither possible nor appropriate, security and safety within the facility should be achieved through the design of integrated zone for a particular medical department by circulation paths and functional relationship between sub-units.

c. Provisions for securing the personal belongings of staff, visitors, and patients/residents should be taken care of.

d. The physical environment should be developed to support and sustain the overall safety and security norms and protocols of the institution. Safety and security monitoring, when in force, should respect privacy and dignity of the patient and the hospital staff.

9. Finishes

a. The selection of a color palette should be based upon many factors, including the building population, anticipated behavior in the space, time of encounter and level of stress. The color palette selected should be suitable and appropriate for the specific environment, taking into account the specific activities conducted in that environment.
b. Finishes and color palettes should respond to the geographic location of the health care facility, taking into account climate and light, regional responses to color, and the cultural characteristics of the community served.
c. The effect on patients/residents/staff/visitors of materials, colors, textures, and patterns shall be considered in the overall planning and design of the facility. Maintenance and convenience of Sustainable shall also be considered while selecting these sort of items.

10. Documents to be submitted with design

The Bidder shall submit with his design all the documents and the references used in the design. The Bidder shall also submit 6 (six) sets of copies of the following:

a. Concept plan document with site surveys, soil investigation report for the complete new proposed Super Specialty Hospital.
b. Detailed structural design and drawings, architectural drawings, design & drawing of service component *inter alia* other allied items to be constructed.
c. Standards and specifications being followed in the design and for materials to be used in a consolidated statement of fact.
d. Different Laboratory & Field Tests to be carried out at site & referred laboratories .
e. Site safety plan
f. Quality plan as per ISO: 9001:2000 & relevant particulars.
g. Design Basis Report showing data & relevant particulars.
h. Requirements for any foundation, structure, plants or services etc which the contractor feels shall be accessed in order to proceed with implementation of the projects.

The Contractor shall submit to the Employer all Design Data, together with the relevant Design Certificates issued. In the event that a re-submission of Design Basis report is required, such re-submission shall be made as soon as practicable after the receipt of the relevant statement of objections. All submissions of Design Basis report shall include 6 (six) copies.

11. Quality Control

The Contractor must ensure that the works conform to the quality standards up to the satisfaction of the Employer. The contractor shall submit his quality enforcement plan for monitoring. The works, plant and materials shall be subject to tests from time to time as per best practices in the industry. Wherever mentioned in the Contract, the tests must be carried out at the Contractor's expense. The materials, fitting & fixtures shall be procured from reputed make & vendors approved by the WBMSCL. The Contractor must also supply samples of such material to the Engineer of WBMSCL for approval and they must carry out the laboratory & field tests as and when required by the Engineer of WBMSCL and / or in conformity with relevant IS-Code.

11. SPECIFICATIONS OF FINISHING ITEMS

Specification of finishing items both for internal & external civil works will conform to the **Sec 5.4** of this document.

12. STRUCTURAL SYSTEM

12.1 DESIGN PHILOSOPHY

- 3-D analysis and dynamic analysis of all the building structures will be carried out using latest versions of modern software packages such as S A F E , E T A B S , STAAD Pro / $V_{8iselectseries}$ and the results of the analysis shall be used for designing the various elements. All designs shall strictly conform to the standards specified in National Building Code 2005 & other relevant IS-Code. At the time of earthquake analysis, wall panel filled in by brick wall ought to be considered. Use of mechanical coupler / device for joint of reinforcement will not be allowed. Grade of steel reinforcement is Fe500D and Grade of concrete is M25 & M30.
- The employer reserves the right to conduct third party design validation by their P roof C onsultant and the successful bidder shall provide all data and carry out all modifications that may be suggested by the this party so appointed. A suitable representative of the bidder will assist at the time of checking of structural design & drawings by Proof Consultant for necessary clarification and for providing required data and statements to them.
- Intending bidders shall conduct site surveys and soil investigations on their own, and shall be responsible for accuracy and the adequacy of the design.
- Overhead tank of adequate capacity for the purpose of drinking water and fire fighting shall be located at terrace

12.2 MISCELLANEOUS STRUCTURES

- Air-conditioning Plant, UG sump, Pump Room, DG sets etc and other allied item of works as stated in Scope & Specification of Electrical works.

12.3 DESIGN METHODOLOGY

- All R.C.C. structures shall be designed according to Limit State Method specified in IS: 456 – 2000 and it shall be in conformity with all relevant IS –Code & NBC 2005.

13. PUBLIC HEALTH ENGINEERING

13.1 SCOPE OF WORK

- Sanitary Fixtures and CP Fittings
- Internal Domestic Water Supply Systems
- Internal hot water and RO water supply system
- Internal Sanitary & Roof Drainage Systems
- External Water Supply, Sewerage & Storm water Drainage Systems
- Water Treatment Plant
- Sewage Treatment Plant
- Rain water harvesting systems

13.2 WATER SUPPLY SYSTEM

i. External water supply is to be designed based on total water requirement for the individual building and internal water supply on Effective Fixture Unit basis. All water supply lines are to designed based on Indian Standards and Manuals .

ii. Design Standards
   - CPHEEO: 1999 – Manual on water supply and treatment
   - CPHEEO: 1993 – Manual on sewage and sewage treatment
   - SP 35: 1987 – Handbook on water supply and Drainage
   - NBC 2005
   - UPC – India: 2011
   - Relevant Indian Standards

iii. The source of water supply for the proposed buildings shall be Bore wells. The Bore wells will be installed inside the identified land of the proposed hospital. 2(two) bore wells with adequate yield capacity shall be at each site.

iv. Water requirement per day of hospital taking into account no of additional bed, water demand of Mortuary, Kitchen, OPDs, Pathology Lab & laundry etc. is fixed at 2,50,000 litres per day. Overhead Tank (OHT) and Underground Tank (UGT) will be designed accordingly.

v. UGT shall be of capacity 350m^3 including requirement of fire-fighting water and OHT shall be of capacity 100m^3.

vi. Submersible pump will be used for pumping raw water from bore well to UGT and monobloc pumps for pumping water from UGT to OHT of the building. Capacity of pumps will be determined based on standard practice and stipulation of relevant IS-code .

vii. The water treatment plant (WTP) need to be in place to treat the raw water from the bore well. The capacity of pressure sand filter shall be suitably determined. The location of WTP is proposed in the pump room.
The RO plant shall be located in the terrace of building and has a feed from the Building OHT. The treated RO water shall be stored in a separate HDPE tank.

viii. Domestic water supply distribution from OHT shall be formed, as a loop / branch network by gravity.

ix. Medium grade G.I. pipes shall conform to IS 1239:2004(Part1) (Reaffirmed 2010) & (Part 2) (Reaffirmed 2011) for cold water supply in terrace and vertical.

x. Capacity of the RO water shall be 700 lph for drinking purpose and for supply to the OT'sscrub , sterile areas and laboratories.

xi. The Hot water shall be supplied to all the bath in hospital .Solar water heater (refer Scope of Electrical work) of suitable design capacity and in conformity to ECBC 2010 shall be placed on roof terrace. Electric water heater shall also be fitted at all bath as standby arrangement.

xii. Water from the bore wells shall be pumped to the UGT from bore well by submersible pumps .The raw water in UGT shall be suitably treated before pumping it up in OHT of building.

xiii. Heavy grade GI pipes conforming to IS 1239: 2004(Part1) (Reaffirmed 2010) & (Part 2) (Reaffirmed 2011) shall be used for external water supply distribution. Water meter shall be provided for bore well water supply, RO water supply, STP treated water supply lines.

xiv. Sanitary fixtures and CP-fittings shall be of standard and approved make and shall be according to best industry practice.

13.3 SEWERAGE SYSTEM

i. Diameter of vertical stacks for soil pipes and waste pipes will be determined according to demand of fixture units. Sewer lines are to be designed for running partially full with a maximum depth of sewage equal to half depth of the sewer diameter. All necessary appurtenances like gully trap, manholes etc. will be provided for the efficient functioning of the sewerage system.

ii. Soil and wastewater from the water closets and toilets will be collected separately. Soil pipes will be connected to manholes and waste pipes to gully trap and then to manholes. Minimum diameter of soil pipe is 100 mm and waste pipe is 75 mm.

iii. Cast Iron pipes with drip seal joint conforming to IS 1729:2002 (Reaffirmed 2007) shall be used for internal sewerage pipes.

iv. All building manholes will be interconnected for carrying sewage finally to the Sewage Treatment Plant (STP).The process of STP operation will be Moving bed Bio-reactor.Provision of Soak pit in absence of open sewer line adjacent to proposed site will also be made for absorption of treated water.

v. MBBR process shall be considered for sewage treatment. The capacity of STP for hospital building will be determined based on daily domestic demand of water @2,50, 000 litres per day.

vi. Rain water harvesting i.e. collection of rainwater runoff from the rooftops are to be properly designed. Roof water from building shall be taken through rain water pipes and connected to recharge pit. The excess from the recharge pits shall be connected to existing drain by gravity.

vii. Suitable arrangement of watering landscape and arboriculture will be made. In absentia of necessity for irrigation, Soak-pit of adequate capacity will take care of treated water.

viii. Solid waste generated in the hospital shall be collected separately, according to the category of wastes and sent to disposal facility. The waste management room shall be in place to store different categories of waste.

14. LIST OF APPROVED MAKES / VENDORS

Sl. No.	Materials	Manufacturers / Agencies
1	Batch Mix Concrete (BMC) / Ready Mix Concrete (RMC)	The contractor to install his own computerized batching plant of suitable capacity and arrange for Transit Mixers, pumps etc. as per approval of Engineer – In- Charge Or The RMC shall be procured from the source as approved by Engineer – in Charge from Lafarge/ACC/Ambuja
2	Ordinary Portland Cement (Minimum 43 Grade)/ Portland Puzzolona Cement	ACC / Ambuja / Lafarge/Ultratech
3	Reinforcement/ Structural Steel (Each LOT shall accompany manufacturer's Test Certificate)	SAIL, TISCO, RINL
4	Stainless Steel sink	Parryware,/Prestige/Kingstone
5	White Cement	Birla White/ Grasim
6	Sand	Sand conforming to BIS with due approval
7	Bricks, Stones slabs, Lime, Neeru Stone aggregate	Sample to get approved before use
8	Vitrified Tiles	Johnson, Kajaria,Nitco
9	Flush doors	'KIT- Ply' brand or equivalent but equivalency is subject to approval of WBMSCL
10	Fire doors	Godrej/Shaktimet/Navaire
11	Stainless Steel Fittings	Godrej/ Hunter Douglas(Luxalon)
12	Hydraulic floor Spring	Everite, Garnish, Hardwyn
13	Aluminium Extruded Sections	Indalco / Hindalco / Jindal
14	Aluminium Fabricators	M/s. International glass House, M/s. AGV Alfa Lab Ltd.,M/s. Consolidated Engg. Company / M/s. Ajit (India) Pvt. Ltd./ Calco / Al karma
15	Paints, Distempers	ICI, Berger, Asian
16	Glazing	Float Glass of Modiguard ,Saint Gobain, Asahi India safety Glass Ltd
17	Water proofing Works	As approved by E-In-C

18	Hydraulic Door Closers	Hardwyn, Everite, Garnish
19	Water Proofing Cement Paint	Showcem India, ICI, Nerolac
20	Ceramic Glazed Floor Tiles	Kajaria, Johnson/Nitco
21	Super plasticizer	SIKA, BASF, Hindcon chemical, Fosroc
22	Epoxy Flooring	Fosroc/BASF/Cico/Sika Pidilite
23	False Ceiling (a) Mineral Fibre (b) Metal	a. Armstrong , Nitoco, Daiken b. Nittobo/Armstrong/Durlum/Hunter Douglas(Luxalon)
24	Cast Iron Pipe and Fittings (Soil Pipes)	BIC / Neer/SKF/RIF
25	RCC Pipes	Indian Hume Pipe / Pragati Concrete Udyog /ISI Marked Pipes, Spun Pipe Co.,Sementia
26	Stoneware Pipes & Fittings Cast	Dalmia/ Parry/ Perfect / Burn / SKF/ R.K/Hind/ Anand (Conforming to ISI)
27	Cast Iron Pressure Pipes & Fittings	Electrosteel/Neco
28	GI Pipes (ISI marked)	Jindal / Tata / SAIL
29	GI Fittings (ISI marked)	'R' Brand KS/UNIK
30	Gunmetal Valves & Fittings	Premier/Leader/Zoloto/Sant/AUDCO
31	CI Sluice Valves, Check valves	IVC (Calcutta) Kirloskar/ Upadyaya/Zoloto
32	CP Brass Sanitary and water supply Fittings	Jaguar/Essess/CERA/Parryware
33	Vitreous China Sanitary ware	Parryware/Cera /Hindware
34	WC Seats & Covers	Commander/Diplomat/Admiral
35	Curtain/Wall/Structural Glazing	Specialist Agency to be employed with Prior Approval of E-In-C
36	Plywood Products, Parcticle Boards & Veneers	Greenply /Century /Kitply /Novopan/ Greenply/Sylvan
37	Adhesive	Pidilite, Araldite
38	Plastic Laminates	Formica, Greenlam, Bakelite HYLAM,Century,Sylvan
39	Powder Coatings	Berger/Nerocoat/Jenson & Nicholson

40	Tile Joint Filler	Bal Adhesives & Grouts,"ROFFE" Rainbow Tile Mate, Silicon Sealnet of GE Bayer Silicon/"Zentrival FM" of MC-Bauchemie (India) P Ltd
41	Resin Bonded Glass Wool	Crown Fibre Glass/Rock lloyd
42	M.S. Pipe	Jindal / TATA
43	Water Proofing	Fosroc / Sika / Cico
44	Silicon Sealant	GE Bayer Silicone, SIKA, Pidilite
45	Anchor Fastener	Hilti, Bosch
46	Formwork Release Agent	Fosroc, MBT, MC Baucheme CICO, ADO Conmat
47	EPOXY	FOSROC. SIKA Qualcrete, Aradlite MBT
48	Water proofing System	CICO, FOSROC, SIKA
49	Stainless Steel Sinks	Parryware,/Prestige/Kingstone
50	CP Waste, Spreaders for Urinals	Jaguar / Essess
51	Sensor Operated Auto Flushing System Urinals	Jaquar / AOS-Robo/U-tec/Angash/Euronics
52	SFRC Manhole Covers	KK/SK Precast Concrete/ Advent concreteovision/ Daya Concrete
53	UPVC Pipes/Fittings	Supreme/Prince/ Finolex
54	Mirror	Atul / Modifloat/Saint Gobain/Golden Fish
55	Flush Valves	Gem/ Jaquar / Marc
56	Polyethylene Water storage Tank	Sintex / Rotex / Rotomac plus
57	Floor Mounted EWC	Commander/Hindware / Johnson / Parryware / Bestolite/ Jaquar
58	R.O. System	Ion Exchange/Sterling India Ltd. / Pentair water /CSMCRI, Bhav Nagar, Gujrat
59	Geyser	Spherehot / Racold / Venus / Voltas / Usha Lexus / Almonard / Bajaj
60	Hand Drier	Kopal / Utech Systems / Blue Circle (India) Pvt. Ltd. / Euronics Automat
61	Paver blocks	UniStone Products (India) Pvt. Ltd/Hidustan Tiles.
62	Wall Putty	Birla,JK

15. Laboratory Equipment for testing of building materials at site (Indicative only)

All necessary equipment for conducting necessary tests shall be provided at the site laboratory by the Contractor at his own cost.

Sl. No.	Equipments	Quantity
1	Cube testing machine	2 Nos.
2	Slump Cone	6 Nos.
3	Tensile Briquette testing machine	2 Nos.
4	Vicats apparatus with Desk Pot	2 Nos.
5	Megger & earth resistance tester	4 Nos.
6	Pumps and pressure gauges for hydraulic testing of pipes	4 Nos.
7	Weighing scale platform type 100 kg capacity	4 Nos.
8	Graduated glass cylinder	As per requirement
9	Sets of sieves for coarse aggregate [40,20,10,4.75 mm]	4 Nos.
10	Sets of sieves for fine aggregate [4.75; 2.36, 18; 600; 300 & 150 micron	4 Nos.
11	Core cutter for soil compaction with accessories	2 Nos.
12	Cube moulds size 150mm x 150mm x 150mm	18 Nos.
13	Cube moulds size 150mm x 150mm x 150mm	90 Nos.
14	Moisture content rapid moisture meter standard	4 Nos.
15	Hot Air Oven Tem. Range 500C to 3000C	2 Nos.
16	Electronic balance 600g x 0.01g. 10lg and 50kg	3 Nos.
17	Physical balance weight up to 5kg	1 Nos.
18	Digital thermometer up to 1500 C	2 Nos.
19	Poker Thermometer (Concrete Road) 00C to 500 & 1500C	2 Nos.
20	Measuring Jars 100ml, 200ml, 500ml	2 Nos. set of each size.

21	Gauging trowels 100mm & 200mm with wooden handle	4 Nos.
22	Spatula 100mm & 200mm with long blade wooden handle	2 Nos. set of each size.
23	Vernire callipers 12” and 6” sizes	2 Nos. each
24	Digital PH motor least count 01mm	1 No.
25	Digital Micrometer least count .01mm	1 No.
26	Digital paint thickness meter for steel 500 micron range	2 Nos.
27	GI tray 600 x 450 x 50mm, 450x300x40mm, 300xc250x40mm	2 Nos.
28	Electric Morter mixer 0.25 Cum capacity	1 No.
29	Rebound hammer test Digital rebound hammer	1 No.
30	Screw gauge 0.1mm – 10mm, least count 0.05	2 Nos.
31	Water testing Kit	2 Nos.
32	Aggregate impact value testing machine with blow counter	As per requirement
33	Crushing value apparatus	As per requirement
34	Thickness gauge for measuring flakiness index	As per requirement
35	Elongation gauge	As per requirement
36	Measuring Cylinder 3,5,10 & 15 litre Cylinder	As per requirement
37	Pycnometer	2 Nos.
38	Motorized Sieve shaker	2 Nos.

Any other equipment for laboratory tests at site will be the way it is outlined in relevant IS-Code and / or as directed by the Engineer. Quality control engineer shall monitor collection of Sample and conducting regular testing at site maintaining propriety and the very best standard followed in industry of construction. Tests which are inconvenient to be conducted at site can be done in referred Laboratory as and when required.

All relevant IS Codes, special publications as per latest amendment/edition, Latest edition of WB PWD SOR, WB PW(Road)D SOR and CPWD SOR shall be made available at site by the contractor at his own cost.

16. Mandatory laboratory test for civil construction at site (Indicative only)

Material	Test	Relevant IS-code of testing	Field laboratory test	Minimum quantity of material work for carrying out test	Frequency of testing
Sand	a. Silt Content	IS: 2386 Part- I	Field	20 cum	Every 20 cum or part thereof or more frequency as decided by the Engineer- in- charge.
	b. Partical size distribution	IS. 2386 Part-1	Field	20 cum	Every 20 cum or part thereof or more frequency as decided by the Engineer- in- charge.
	C. Bulking of sand	IS. 2386 Part-III	Field	20 cum	------ do-----
Stone Aggregate	a. Percentage of soft or deleterious material	IS 2306 Part-II	Generally visual inspection / laboratory test where required by the Engineer-in Charge or so specified.	-	As required by Engineer-in Charge
	b. Partical size distribution	IS 2386 Part -I	Field	45 cum	For every 45 cum or part thereof or as decided by the Engineer in charge
	c. 10% Fine value	IS 2386 Part- IV	Laboratory	45 Cum	Initial test and subsequent test as and when required by Engineer in charge.
	d. Aggregate impact value of loss Angles abrasion value	IS 2386 Part - IV	Laboratory	45 Cum	As above
Cement concrete or reinforced cement concrete (not leaner	Slump Test	IS 1199	Field	15 cum	15 cum or part thereof or more frequency as required by engineer in charge

than M-15)					
Reinforced cement concrete	Compressive Strength Test	IS 456	Field	15 cum in slab, 5 cum on columns	15 cum or part thereof, or more frequency as required by Engineer in charge
Steel	a. Tensile strength	IS 1608	Laboratory	20 tonne	Every 20 tonne of part thereof confirming to IS 1786-1985
	b. Bend test	IS 1599	--do--	--do--	--do--
Cement	a. Initial and final setting time by Vicat apparatus	IS 403	Field	10 tonne	IS 4031-1988
	b. Test for determination of consistency				
Timber	a. Moisture contents	IS : 11215	(by moisture rates Field/ Laboratory test in case of dispute as required by Engineer-in-charge)	1 Cum	Every one cum or part thereof
Flush Door	1. Emersion Test	IS : 2191 & 22021	Laboratory	20 Shutters	As per sampling and testing specified in clause 9.8.3
Aluminum door or windows fitting	Thickness of anodic coating	IS : 1948	---------- do ----------	It the cost of fitting exceeds Rs. 3000/-	Rs. 5000/- or part there of required by the Engineer-in-charge
Mortic locks	Testing of Spring		---------- do ----------	50 Nos.	100 of part thereof
Terrace tiles	1. Transverse strength 2. Water absorption 3. Abrasion	IS : 1237	---------- do ----------	2000 Nos.	2000 Tiles or part thereof
White	1. Water absorption 2. Crazing test	Laboratory	3000 Nos	3000 Nos	Part there of

glazed	3. Impact strength test				
	Compressive strength of cement				
Bricks	Testing of bricks	IS : 1077	Laboratory/Field	Brick Designation	for every 1000 Bricks or part the
a. Dimensions b. water absorption &	IS : 3485	Laboratory	100 50,000 100 50,000	One test of sour of Manufacturer	
			75 190000.00 50 35		
	c. Compressive strength and dimensions	IS : 3595	Laboratory	50,000	for every 50,000 part manufacture
	b. Water absorption	IS : 3495	Laboratory	50, 000	One test for sour of manufacture
Marble	a. Moisture absorption	IS : 1130	Laboratory	cost of marble work Rs. 10,000/-	Rs. 10,000/- or thereof it require Engineer-in-charge.
	b. Mhos scale hardness				

Section 5.6
Scope and Specification of Electrical Works

Detailed design engineering complete Electrical and Mechanical Engineering services such as;

1. Power source from CESC Limited/WBSEDCL
2. Electrical Installation (both internal & External)
3. Load Calculation & Substation DESIGN
4. Backup Power source.
5. Fire Alarm, Fire Detection & Fighting System.
6. Vertical Transportation system
7. Heating, ventilation and air conditioning design (HVAC) and other mechanical systems
8. Video Conferencing.
9. Public Address system.
10. Water Supply System.
11. Computer Network including high speed internet service.
12. Mortuary Cooler.
13. Lightning Conductor installation.
14. Solar Water heating system.
15. Telecommunications Service
16. IBMS & IT
17. Electrical land scraping both internal and external installation.

Detailed Scope of Works: The scope of work will include but not necessarily be limited to the following.

1. Power Source from WBSEDCL / CESC & H.T overhead line.

a. The bidders shall investigate the existing electrical service/distribution system and determine whether sufficient capacity is available to accommodate the new loads. The Bidder shall inform the electric utility company of the new service requirements and additional loads. The contractor shall forward copies of all

correspondence and minutes of meetings to the employer with the utility company's representatives to regarding negotiations for new services or making changes to the existing services.

b. For new electrical service, the bidders shall coordinate requirements with the local utility service company (**WBSEDCL / CESC)** after carrying out all the required surveys. Prepare the Engineering designs of the service line in sufficient detail to ensure clarity and understanding by the WBMSC.

c. The detailed designs will, as a minimum, including construction drawings for H.T overhead line & details of H.T cables / A.C.S.R, poles, insulators etc. required , detailed cost estimates including supply of materials & erecting and testing of the H.T lines. Service charges etc. necessary calculations to determine and justify the engineering details.

2. Electrical Installation (both internal & external)

a. Preparation of necessary Single line diagram(SLD), Power Distribution etc. of all electrical installation for each floor as well as electrical conduit layout drawing of each room, corridor, verandas etc. as per requirement of the Super Specialty Hospital as per MCI norms.

b. Submit Detailed Project Report including preliminary drawings to the WBMSC in respect of internal & external electrification considering all electrical requirements of all electrical loads such as luminaries , fans , electrically operated Medical equipments & instruments required for the hospital, different types of O.T, lifts , HVAC, Generator etc. with distribution panels, distribution boxes showing their actual positions in drawings for incorporating suggested changes, additions and alterations and secure approval of the WBMSC.

3. Load Calculation including loads of Medical equipment for preparation of Substation Design.

a. Calculating electrical loads of all items such as luminaries ,fans ,compound lights, lifts, HVAC, water supply system etc. and medical equipments and detailed design of substation incl. Transformer H.T & L.T gear, L.T panel Earthing etc. and details drawing showing actual position of different items earth pits etc. in the drawings. A preliminary load calculation of both 5 storied building and 10 storied are incorporated in this concept design of Substation according to the approved area of super Specialist Hospital.

4. Backup Power source & uninterrupted power source.

a. To calculate the electrical loads to be supplied from Acoustic control Diesel generator & loads to be supplied from UPS and submit detailed design and drawings of supply & installation of silent generator and UPS to facilitate the works of super specialty Hospital. A preliminary load calculation of both 5 storied building and 10 storied are incorporated in this concept design of Generator.

5. Fire Detection, Fire Alarm & Fighting System.

a. To submit Detailed design & drawings of fire detection, fire alarm & fighting system. The design and installation of a hydraulically calculated automatic wet riser and hydrant system to complete and ready for operation for all portions of Building. The microprocessor controlling system with Zonal controlling arrangement floor vise of the total system are to be ensured. Auto start fire hydrant pumps and jockey pump etc as required are to be designed. SLD

of the total distribution system of Fire alarm, intelligent fire & smoke detection, public address system, control wiring etc shall be required. The drawing and design for actual position of sprinkler system, smoke & heat detectors, MCP (manual call points) Hooter, Addressable Automatic control Panel & zonal controlling panels, Fire extinguishers, Valve, hose pipe etc should be shown in the SLD.

b. The drawing for accommodation of Electrical Control and Mechanical equipment rooms in all the floors, EPABX, elevator machine rooms, elevator pits, and linen chutes etc. Addressable Automatic control Panel room must be indicated on the drawings.

6. Vertical Transportation system.

a. Identifying elevator system options for Developers in order to create the most efficient transportation solution for a specific building.
b. Designing elevator systems traffic studies, component specifications, and providing blueprint drawings.
c. Submit detailed design and drawings of elevator system showing actual position of machine room, elevator pits & its wiring, cage size suitable for use of patients, Doctors and Nurses and for fire lift.

7. HVAC System

a. Design drawing of energy efficient HVAC system showing actual position of each component in the blue print like Air handling unit, location of Outdoor Air Intakes and Exhaust, Ducting, Air flow control damper, fire damper and machine room if required etc

8. Video Conferencing

a. Design a HD video conferencing system suitable for real-time interactive communication. Actual position each component like Definition Video Conferencing Codec, Eagle Eye 1080 Camera and license, Microphone array, presentation sharing to remote sites, Infrared Remote control & standard cables should be shown in the drawings.

9. Public Address system.

The bidder should design a efficient **public address system** (**PA system**) showing exact position of each component like microphone, amplifier and loudspeakers in the blue print.

10. Water Supply System

The bidder should design a efficient water supply system showing exact position of each component like type & size of pump, pump room, pump motor, electrical panel, service line etc. in the blue print.

11. Computer Network, Data Centre including high speed internet service.

The bidder should design a efficient computer network including a Data Centre with networking for storage of electronic copies of all documents created from admission to discharge of a patient with electronic reports, usually clinical testing or billing information, into a single electronic folder to reduce labour, eliminate lost files and 'Loose sheets,' improve access to authorized users, increase security and provide documentation for claims more quickly showing exact position of each component in the blue print.

12. Mortuary Cooler

a. The bidder should design a suitable, energy efficient mortuary cooler as per MCI Norms.

13. Lightning Conductor installation.

The bidder should design a suitable lightning conductor to save the installation from lightning. Drawing should show the actual location of air terminal, earth pits etc.

14. Solar Water heating system

The bidder should design a suitable capacity solar water heating system showing actual position of different component like collector, cold water tank, hot water distribution etc. in the blue print.

15. Telecommunications service

The bidder should design a suitable capacity telecommunication / EPABX system showing actual position of all equipment such as telephone with intercom for the use of Drs, nurses on duties floor wise in the blue print.

16. IBMS & IT:

The objective of this report is to give an overview of services designed for the proposed Hospital. The scope of our design is in the areas of:

Local Area Network (LAN)
Wireless Network Access
Telephone
Closed Circuit Television (CCTV)
Access Control
Servers & Data Storage
Data Security

Broad concept of services:

The services systems for the project have to be conceptualized based on existing experience and acceptable international design standards. Effort shall be made to conceal all services and still provide access to these for accommodating changes in the future. Conservation of energy, optimization of resources, eco-friendliness and state of the art technology shall be the key factors in the design concept to ensure least downtime and reduce maintenance problems. Every effort shall be made to design, layout and install equipment in locations that will tend to encourage routine preventive maintenance by providing easy access for operation personnel. Manual isolation will be provided to enable servicing, expansion or renovation of any part of the system without interrupting the services in adjacent areas.

17. Electrical land scaping both internal and external illumination.

Special lighting fixture with color LED lighting may be used in the portico, waiting areas etc for beautification.

Special light fixtures such as bollard, post top lanterns, path/road lights with octagonal steel pole etc. shall be used to illuminate landscaping areas & internal roads.

1.0 Short Specification to all Services.

The electrical system of this super specialty hospital building and other service areas is proposed to be designed on the basis of National Building Code for such a project giving due consideration to aspects of safety, liability and no interruption in the functions of essential services in the hospital.

Following are the major guidelines followed while designing the electrification and other facility works:

S.L.No.	STANDARDS (Codes of Practice / Guide)	TITLES
1	IS : 732 – 1989 Revision - 3	Code of practice for Electrical Wiring Installation
2	IS : 8061 – 1976	Code of practice for design, installation and maintenance of service lines up to and including 650 Volts.
3	IS : 4347 – 1967	Code of practice for hospital lighting.
4	IS : 10118 (Part – 2) – 1982	Code of practice for selection, installation and maintenance of switchgear and control gear.
5	IS : 10118 (Part 1,2 & 3) – 1985	Code of practice for selection, installation and maintenance of Transformers.
6	IS : 3043 – 1987	Code of practice for Earthing.
7	IS : 694 -1990 (Third Revision)	PVC insulated wires for working voltages up to and including 1100 V.
8	IS : 9537(Part – 2) - 1981 (Amendment - 2)	Conduits for Electrical installations: Rigid steel conduit.
9	IS : 1554 - 1988	PVC insulated heavy-duty cables.
10	IS : 7098 - 1985	High voltage XLPE cable
11	Indian Electricity Rules	

2.0 ELECTRICAL SYSTEM

Entire system is conceived as per the latest standards, guidelines of local Electrical Authority i.e. West Bengal State Electricity Distribution company Limited (WBSEDCL)/CESC Ltd and relevant Indian Electricity rules.

2.1 The normal power supply to the hospital premises shall be available from WBSEDCL at 11 KV and fault level is 350 MVA. The 11 KV Power supply from WBSEDCL will be upto the indoor type 11 KV VCB/Switchgear of the client Suitable capacity of HT cable shall be used to connect to. Transformers as per established loads to step down the voltage level at 433 V. Transformers shall be indoor/ outdoor, Oil type and with 'ON LOAD' circuit Tap changers. The transformers shall share the total electrical load of the hospital complex. The Supply Authority's power supply cable shall enter to the substation building through adequate size of G.I./ RCC heavy duty pipe or PCC ducting where necessary with long radius bend and inspection chambers of suitable size at regular interval as per requirement.

The following equipments shall be accommodated in the substation building:

1) Supplier's Metering Panel
2) 11 KV Distribution board
3) 11/0.433 KV Oil type Transformer of required capacity
4) Two nos. as required capacity in KVA DG set (including AMF Panel) with auxiliaries for supply of emergent power in case of main power failure.
5) Battery and charger.
6) APFC Panel
7) Main L.T. Panel (Normal and Emergency)

The Transformers shall be protected on the HT side of the consumer, by 11 KV Circuit Breakers i.e. VCB (Vacuum Circuit Breaker) with necessary metering and protection.

2.2 Low Voltage Distribution System

LT power from the secondary sides of the transformers shall be brought through suitable size of LT cables to the Main panel in L.T. Room and from this room to the electrical room at the ground floor of main hospital building. The power supply cable shall enter to the building through RCC/GI heavy duty pipe with long radius bend and inspection chamber of suitable size at regular interval, as per requirements in the electrical room to accommodate Sub LT panel & distribution boards.

The Main L.T. panel shall have Air Circuit Breaker (ACB) as Incomers and bus couplers with 50KA short circuit rating and adequately rated Aluminum bus bars of 50 KA short circuit withstand capacity. All outgoings shall be protected with MCCBs of 25 KA to 35 KA short circuit rating as per requirement instead of conventional switch fuse unit for better operation and maintenance.

2.3 Power Distribution Scheme

Entire system is conceived as per the latest standards, guidelines of local Electrical Authority and relevant Electricity rules.

The Circuit Breakers in Main LT Panel shall be electromechanically interlocked to achieve the conditions mentioned above.

From Main LT panel outgoing feeders, suitable size XLPE cables shall be used to feed power to different distribution boards to cater the various type of electrical loads ie. Bio-medical equipment's, indoor lighting & power points, Lifts, A.C, fire fighting pumps, external lighting etc.

2.4 ELECTRICAL LOAD

(a) Probable Electrical load is estimated for proposed 5 storeyed super specialty hospital building, Service buildings are as under:

Sl. Nos.	**Location**	**AREA (m^2) / Nos. UNITS**	**LOAD IN for light ,fan, 6 amps plug & power plug etc KW/Sqm.**	**CONNECTED LOAD IN KW**	**MD IN KW**	**Maximum demand factor**

1)	HOSPITAL Load for light, fan, normal power plug and power plug	7499.8	0.06 KW	449.98 KW	314.98 KW	0.7
2)	MEDICAL EQUIPMENTS LOAD					
i	X-RAY			80.00 KW	40.00 KW	0.5
ii	RADIO GRAPHY & FLUOROSCOPY (300ma)			21.00 KW	21.00 KW	1
iii	RADIO GRAPHY & FLUOROSCOPY (500ma)			21.00 KW	21.00 KW	1
iv	ENDOSCOPY			5.00 KW	5.00 KW	1
v	AUDEOMETERY			4.00 KW	4.00 KW	1
vi	LAUNDARY EQUIPMENTS			50.00 KW	25.00 KW	0.5
vii	ANALYSER EQUIPMENTS			15 KW	15 KW	1
viii	DIALYSIS EQUIPMENTS (5 Bedded)			25 KW	25 KW	1
ix	KITCHEN EQUIPMENTS			20.00 KW	20.00 KW	1
x	CSSD			30.00 KW	15.00 KW	0.5
3)	LIFTS	4	10.00 KW	40.00 KW	40.00 KW	1
4)	W/S PUMPS			15.00 KW	15.00 KW	1
5)	STP			20.00 KW	20.00 KW	1
6)	EXTERNAL LIGHTING			25.00 KW	25.00 KW	1
7)	FIRE JOCKY PUMP			10.00 KW	10.00 KW	1
8)	A/C LOAD			180.16 KW	108.09 KW	0.6
9)	WATER TREATMENT PUMP			7.5 KW	7.5 KW	1
10)	FIRE PUMP			50 KW	50 KW	1
11)	AUTOCLAVE			50 KW	50 KW	1
	TOTAL			**1118.64**	**831.57**	
Considering Diversity Factor at 80%					**665.25**	
TOTAL				say	**665**	
Maximum Load Demand in KVA (0.80 Power Factor)					**831.25 KVA**	
Add. 20% Future Load					**166.25 KVA**	
TOTAL					**997.50 KVA**	
Transformer loading 85%					**1173.52 KVA**	

Calculation of DG set capacity for 5 storeyed building

Sl. No.	Load description	Emergency load (KW)
1	Lights , fans, light & power plug(50%)	225
2	Medical equipment (50%)	135
3	Lift 4 Nos. @ 10 KW 50 % of the total load	20
4	Domestic water pump	15
5	Fire Pump	50
6	HVAC (Plant Room) 50 % of the load	90.08
7	STP Pump	20
8	Jockey pump	10
	Total	565.08 KW
	Applying 0.8 power factor of load	706.35 KVA
	Loading the DG set at 90 % or keeping 10 % as spare capacity.	784.83 KVA
	TOTAL Say	785 KVA

2.5 DISTRIBUTION BOARDS

All lighting and power distribution boards shall be phase segregated double door type, consisting Miniature circuit breakers (MCBs) of 10 KA rating and Earth leakage Circuit breakers (ELCBs) of 30 mA sensitivity and SPD for medical equipment.

All Distribution Boards shall be three phase incoming and single-phase outgoing type. Main incomer shall have a TPN MCB and one double pole ELCB to each of the three outgoing phase bus bars. This prevents the other two phases get tripped OFF in case one phase has the earth fault.

2.5.1 Lighting and small power installation

The lighting and small power installation shall be done with multi strand FRLSH, PVC insulated copper conductor wires laid in concealed in slab/wall in heavy gauge PVC Conduit / M.S. ERW (Medium Protection and Heavy mechanical stress) black conduits of 20 mm. to 40 mm. dia. as per requirement to be laid in open area and above false ceiling

Wiring shall be done with following size of flexible multi - strand Copper conductors.

1) Main Lighting Circuit between DB & Switch board. - 2 x 2.5 sq.mm. + 1 x1.5 sq.mm.(E)
2) 6 Amp. Independent point - 2 x 2.5 sq.mm. + 1 x1.5 sq.mm.(E)
3) 6 Amp. Socket on Sw./ board - 2 x 2.5 sq.mm. + 1 x1.5 sq.mm.(E)
4) 6/16 Amp. Power socket (1^{st} point) - 2 x 4 sq.mm. + 1 x 4sq.mm.(E)
5) 6/16 Amp. Power socket (2^{nd} point) - 2 x 2.5 sq.mm. + 1 x 2.5 sq.mm.(E)
6) 32 A. TPN outlet - 4 x 6 sq.mm. + 1 x 6 sq.mm. (E)
7) 40 A.TPN outlet - 4 x 10 sq.mm. + 1 x 10 sq.mm. (E)
8) 63 A.TPN outlet - 4 x 16 sq.mm. + 1 x 16 sq.mm. (E)

The light sub-circuits shall be designed within the permissible limit of 800 watts or 10 points per circuit. The design basis of circuits shall be limited to a voltage drop of 5% max.

Load balancing shall be carried out in three-phase circuit only. The overall load balancing including single phase & three phase circuits in main panel shall be considered as per the connected load. The colour band of PVC copper wire both in single phase and three phase distribution should be maintained in all the installation for phase balancing.

3.0 POWER FACTOR IMPROVEMENT USING CAPACITORS

Generally the Supply Authority supplies power at a power factor of 0.8 and the p.f. drops even more at the consumer end depending upon the nature of the load. Therefore the Supply Authority insists that the load power factor do not fall below a level of 0.95 at the consumer end. To keep the Power Factor constant at and above the permitted level, suitable number of capacitor banks of different KVAR rating has to be connected to the load side of the main LT panel. Suitable capacity of (APFCR) automatic Power Factor correction Relay and other auxiliaries will be built in to achieve the automation in this respect.

4.0 ILLUMINATION

Illumination design shall be done with relevant guidelines laid down in National Building Code & IS: 4347 - 1967.

Generally the light fixtures shall be with high frequency electronic ballast and energy efficient fluorescent (T5) / compact fluorescent lamps with daylight or warm daylight ambience and decorative GLS / CFL / MH / LED fittings in the special areas taking into account the aesthetic part as well.

a) Offices, doctor's room, small halls, dispensaries, laboratories etc. shall be provided with surface/ recess mounted mirror optics / box type general purpose fluorescent fittings.

b) All washbasins shall be provided with fluorescent/ CFL mirror lights.

c) Staircases, storerooms etc shall be provided with general box type fluorescent/CFL fittings.

d) General lighting in Operation Theatre shall be provided with S urface / Recess mounted mirror optics light fixtures having low glare index.

e) All wards shall be provided with surface / recess mounted fluorescent (T5) fittings.

f) Internal road areas shall be provided with post top lantern / street light poles with metal halide / sodium vapour/LED fittings.

g) Entrance / corridor / lobby etc. shall be provided with circular / square type CFL / fluorescent fittings.

4.1 ILLUMINATION LEVEL

LOCATION	Illumination Level (LUX)
Reception & waiting rooms	200
General wards & beds	100 – 150
Operation Theatre – General- Operation Table	300 +Special Lighting
Consulting Rooms	200
Radiology Department	150
Casualty and OPD	150
Dispensaries	300
ICCU / ICU	300
Dining Rooms	150
Laundries (washing, drying, sorting, ironing etc.)	200
Kitchen	200
Cash Counters	200
Surgeries – General- Chairs	300 +Special Lighting
Stairs & corridors	100
Substation & Electrical Rooms	200
Toilets	100
X- Ray room	200
ECG room	300
Pharmacy	300
Clinics	200
Doctors / Nurse room	200

Gymnasium	200
Entrance	150
Area / Street Lighting	30 - 40

4.2 EXTERNAL LIGHTING

The external lighting system consist a main feeder pillar and required numbers of sub feeder pillars in which adequate number of outlets shall be provided for further distribution to street light poles and landscape lighting.

To propose non-conventional energy like Solar Power to be used for area illumination during the non-monsoon season. During monsoon, due to non-activity of solar panel, alternative power shall be fed to the main external feeder pillar from LT panel.

At road crossings, underground XLPE / PVC armoured cable shall run in RCC Pipe/PCC Trench of suitable sizes, to feed power to various poles..

Special light fixtures such as bollard, post top lanterns, path lights etc. shall be used to illuminate landscaping areas & internal roads.

5.0 SWITCHES AND SOCKETS

All switches and sockets shall be Piano type to facilitate compatibility of the modern trends. Industrial socket will also be provided where required.

6.0 EMERGENCY POWER SUPPLY

Apart from the normal power supply alternative source of power supply is required as emergency supply for the following electrical loads, which are to be marked as emergency/ critical loads.

1. Lighting & power in OTs, SCBUs, ICUs, Pre & Post operation, delivery, nursery, emergency blood banks, laboratories, wards etc.- 100%
2. Light in service area like LT panel room, AHU room, A.C. Plant Room, substation, lift M/C room, staircase etc.- 100%
3. General wards, corridors, toilets, offices and other areas- 20 to 50%
4. EPABX/Fire panel
5. Sump pumps
6. Water pump
7. Jockey pump and Booster pump
8. Fire hydrant pump
9. Elevator
10. UPS etc.

7.0 UNINTURREPTED POWER SUPPLY (UPS)

UPS of required KVA capacity is to be installed in the UPS room/electrical room. Supply shall be given from UPS panels at ground floor to various floor DBs connected to medical equipment in OT, ICU, SCBU, Laboratory, Delivery Room, Exit Route, one point in each ward and telephone exchange etc. UPS panel shall be connected to LT panel through PVC armoured flexible cables and the UPS DBs shall be connected to UPS panel through PVC

insulated FRLS copper wire. Dedicated ON LINE/OFF LINE UPS shall be at least 30 minutes back up time.

8.0 VISUAL DISPLAY SYSTEM

Visual display units shall be installed at strategic locations especially in entry area, reception, OPD, emergency, impatient waiting halls to display health education programmes and general health awareness.

9.0 EARTHING

The entire earthing system shall be provided as per IS: 3043. The earthing system will be made extensively available throughout the building with each electrical panel and equipment earthed securely. Copper earthing ie. Copper plate earth electrodes and copper conductors shall be used for Medical equipment , O.T floor grid and neutral earthing of Transformers and DG sets. Each neutral will be connected to 2 different copper plate earthing stations.
GI plate Electrodes will be used for body earthing of transformers/ D.G.Sets / electrical panels and general earthing.
Pipe earthing shall be provided for street light poles/Feeder Pillar.

10.0 LIGHTNING PROTECTION

Due to hospital building, the lightning protection system should be ion emission type ie. Early Steamer. The device shall be installed at the topmost position of the building. G.I. strip shall be used as earth conductor and (as per NFC code) will be laid from the terminal of the Prevention through the outer surface of the building and duly terminated into earthing station.

11.0 FIRE DETECTION AND ALARM

The Addressable Fire Detection and Alarm System shall cover various rooms of Hospital. The intelligent addressable microprocessor based shall be a software controlled automatic system and shall provide necessary programmed activities and various controls. The system shall consist of central processing units, various man machine interface module transmission system, microprocessor based fire alarm control panels, PC, Printer, Intelligent Addressable Automatic Sensors and interface unit, as applicable.

- Intelligent addressable type system only shall be offered.
- Intelligent addressable type detectors and bases for Standard Application shall be included.
- The Intelligent addressable type detectors shall be designed to detect one or more characteristics of smoke and heat during fire.
- All equipment and accessories shall be designed to operate successfully in Hospital atmosphere.
- The detector shall be suitable for Class – A wiring with return loop
- The detectors shall be plug-in type and shall have common Base

- The visual alarm LEDs in the detector shall be clearly visible from outside by a flashing light of sufficient brightness for healthiness condition.

- The detectors shall have provision for connecting repeat response indicator.

- Cross-zoning of detectors shall be done on software mode.

- All detectors shall have suitable degree of protection to ensure that they do not generate false alarms due to moisture, particularly in non-air conditioned spaces where high humid conditions may prevail.

Fire Alarm System (FAS) shall be provided to establish total control over the life safety services required in the Hospital Building.

The FAS provided shall be able to tie-up the following Mechanical, Electrical & Low Voltage Services into integrated system.

a. Air Handling Units
b. Staircase pressurization fans, Lift shafts and lobbies pressurization fans
c. Public Address System
d. Lifts & Escalator
e. Toilet Exhaust System
f. Smoke Evacuation System

The FAS system shall be capable of :

a. Setting smoke sensor sensitivity remotely to either high sensitivity manually or on a pre-programmed sequence i.e, occupied/unoccupied period. The FAS shall be able to recognize normal and alarm normal values that reveal trouble condition, and above normal values that indicate either a Fire alarm condition or the need of maintenance.

b. Read-out or address an actual space temperature at thermal detector points.
The operator shall also be able to adjust alarm and pre-alarm thresholds and other parameters for the smoke sensors.

c. Provide a maintenance / pre-alert alarm capability at smoke sensors to prevent the detectors from indicating a false alarm due to dust, dirt etc.

d. Provide alarm verification of individual smoke sensors. Systems that perform alarm verification a zone basis shall not be acceptable. Alarm verification shall be printed on the printer at the control station's printer to enhance system maintenance and identify possible problem areas.

e. Provide local numeric point address and LED display of the device and current condition of the point. Local annunciation shall not interfere with annunciation from the Fire Control System.

f. Provide outputs that are addressable, i.e., outputs shall have point address.
The operator shall be able to command such points manually or assign the points to logical

point groups (Software Zones) for pre-programmed operation.
In the event of fire alarm, but not in a fault condition, the following action shall be performed automatically.

a. The System Alarm LED on the fire alarm control panel (FACP) shall flash.
b. A local piezo-electric sounder shall be sounded.
c. The LCD display on the main fire alarm control panel shall indicate all information associated with Fire Alarm condition including the type of alarm point and its location within the premises.

12.1 SCOPE

The basic system requirement is as per National Building Code of India 2005 (Part 4 Fire and Life Safety).

12.2 CODES AND STANDARDS

NBC: National Building Code 2005, Part 4, Fire and Life Safety
TAC: TAC Protection Manual / 1998 (Guidance only)

Good Engineering Practices

IS-1239 / IS-3589	:	Specification for GI Pipes
IS-778/14846	:	Specifications for Gun Metal gate, globe, and check Values for water supply.
IS-814	:	Specifications for covered electrodes for metal arc welding of structural steel.
BS-5155	:	Specifications for C.I. butterfly valve.
IS-1641	:	Specifications for C.I. screwed fittings.
IS-903	:	Specifications for Branch pipes (long Pattern)
IS-3844	:	Code of practice for installation of internal Fire Hydrant in Multi storeyed building
IS-5290	:	Specifications for hydrant.
IS-903	:	Specifications for coupling double male double female instantaneous pattern for fire fighting.
IS-1879	:	Malleable iron fittings (Parts I to X)
IS-4853	:	Recommended practice for radiographic inspection of fusion welded butt joints in steel pipes.
IS-636	:	Synthetic, jacketed hose pipes.
IS-1520	:	Electrically operated multistage / multi outlet pump.
IS-5	:	Specification for painting

12.3 TYPE OF FIRE PROTECTION SYSTEMS RECOMMENDED:

The types of fire protection systems for the buildings and premises shall be as per National Building Code considering the height of the proposed buildings.

a. DESIGN CRITERIA

Fire protection system has been designed to meet the requirement / norms as laid down in provisional NOC from West Bengal Fire
Service Department. Apart from the above, guidelines of Indian Standards rules have to be considered in design from the point of good engineering.

For Sprinkler System to be provided, the design basis has been adopted as per the recommendation of applicable of TAC rule.

Portable fire Extinguishers have been envisaged for the overall complex for manual fighting against any outbreak of fire during the incipient stage.

b. DESIGN BASIS

The system has been envisaged with pumps and pipeline for yard hydrant, wet riser & Sprinkler System.

Two numbers horizontal centrifugal main fire pump driven by electric motor, one number Jockey Pump shall be provided for the hydrant / wet riser / sprinkler system. One number Electric Motor driven pump of same capacity shall also be provided as common standby. Piping arrangement for the yard hydrant shall be laid in ring mains to facilitate the availability of adequate water at required pressure at all yard hydrant point and at all landing valves of wet riser system. Isolation is to be provided to ensure availability of the water supply as required near location of fire.

c. STANDARD / CODES

IS : 3844 1989	:	Code of practice for installation of Internal fire Hydrants in multistoried building
National Building Code	:	NBC Part - IV Rules for Automatic
Sprinkler Installation	:	Issued by Tariff Advisory Committee.

d. SYSTEN DESCRIPTION / WRITE UP

The proposed systems comprise of the following:

i) Hydrant / Wet Riser System ii) Sprinkler System
iii) Portable Fire Extinguisher

13. Design of ELEVATOR components, their installation and operation shall meet with :

IS Codes to be followed are:

IS: 14665-2000	Electric traction lifts.
Part-I	Guidelines for outline dimensions of passenger, goods, service and hospital lifts.
Part-II	Code of practice for installation, operation and maintenance.
Part-III	Section 1 - Passenger and goods lifts. Section 2 - Service lifts. Safety rules.

Part-IV	Section 1 Passenger and goods lifts. Section 2 Service lifts. Components. Section 1 Lift buffers.
IS: 15785-2007	Code of practice for Installation and maintenance of lift without conventional machine rooms.

Short specification:

Supply, erection, testing and commissioning of Bed cum passenger lift travelling from ground floor to top floors, stopping at all floors and all openings are on the same side only with AC variable voltage variable frequency micro-processor control, geared and equipped with Simplex full collective with/without attendant and ARD complete The scope includes liaison with lift inspector for submission of necessary Form and obtaining license to erect & operate the lift from the Lift Inspectorate & all cost to be included in quoted rate.

The lift car will be stainless steel with one hour fire rating, centre opening stainless steel sliding doors of 1000 mm (min) wide & 2100 mm high. Digital floor position and car position indicator in car and landings with intercom facilities, battery operated alarm bell, Automatic door operation with infra-red door detector and luminous feather tough/hall button, Fireman control switch and emergency light with charger, etc as described in the details specification

The lift car will be stainless steel with vision panel at landing, centre opening stainless steel sliding doors of 1000 mm (min) wide & 2100 mm high. Digital floor position and car position indicator in car and landings with intercom facilities, battery

14. <u>HVAC SYSTEM</u>

Reference Standards:

Following standard & guidelines shall be adopted while designing the HVAC System.

1. National Building Code of India (NBC 2005)
2. Energy Conservation Building Code (ECBC 2007)
3. ASHRAE Hand Books.
   - ♣ Fundamentals 2009
   - ♣ HVAC Systems and Equipment 2008
   - ♣ HVAC Applications 2007
   - ♣ Refrigeration 2006
   - ♣ HVAC Design Guidelines for Hospital & Clinics - ASHRAE
4. Duct construction standards as per relevant BIS codes & SMACNA standards.
5. Air filters as per ASHRAE 52.1-1992 and 52.2-2007
6. Indoor Air quality as per ASHRAE 62.1-2007
7. Motors, Cabling, Wiring and accessories as per BIS codes.
8. National Electric Codes (NEC)
9. ANSI/ASHRAE/IESNA standard 90.1-2009: Energy standard for building except low rise residential buildings.
10. ASHRAE standard 55: Thermal Comfort.

The specification is required to cover the design, manufacture, testing and delivery, duly for site, for complete Air- conditioning Work.

Critical areas like O.T, ITU, ICCU, PICU, NICU, SNCU rooms are considered to be sensitive

areas needing careful control of temperature, humidity, and fresh air quantity, filtration of air and control of pressure so as to avoid contamination from other sources. Critical areas should be kept available for use any time. The units may be running intermittently. OT I TU, ICCU, PICU, NICU, SNCU shall be air conditioning with 3-stage filtration with terminal HEPA filter through laminar flow. Inline booster fans are to be used.

15 IBMS & I.T

15.1 SCOPE OF WORK

The objective of this report is to give an overview of services designed for the proposed Hospital. The scope of design is in the areas of:

Local Area Network (LAN)
Wireless Network Access
Telephone &
Closed Circuit Television (CCTV) and
Access Control
Servers & Data Storage
Conservation of Energy

15.2 BROAD CONCEPT OF SERVICES:

The services systems for the project have been conceptualized based on past experience and acceptable international design standards. Effort shall be made to conceal all services and still provide access to these for accommodating changes in the future. Conservation of energy, optimization of resources, eco-friendliness and state of the art technology shall be the key factors in the design concept to ensure least downtime and reduce maintenance problems.

Every effort shall be made to design, layout and install equipment in locations that will tend to encourage routine preventive maintenance by providing easy access for operation personnel. Manual isolation will be provided to enable servicing, expansion or renovation of any part of the system without interrupting the services in adjacent areas.

15.3 METHODOLOGY OF LAN / TEL DESIGN FOR WB TERTIARY HOSPITAL

Primarily, it would be considered all the hospital as one unit. Then the connectivity solution becomes easier to understand. An important factor in the connectivity is linking of each hospital to the **S**tate **W**ide **A**rea **N**etwork (SWAN). This makes it imperative that the data and voice (computer and phone) connections are IP based.

Therefore, each hospital will have an IP Exchange. This does not mean that normal phone calls are not possible. With the SWAN infrastructure in place, it means that the hospital can call each other without incurring any recurring expenses. In fact the hospitals may call any office or administration connected to the SWAN without incurring subscriber charges.

Another advantage of an IP network is the great decrease in the local infrastructure costs. Since there will be only one IP network; a separate phone line infrastructure will not be

necessary.

15.4 THE IP INFRASTRUCTURE

⇒ Each hospital will have a Fiber Optic Backbone

⇒ Each floor will have the termination / computer points connected to switches placed in Network Enclosures on each floor

⇒ These Enclosures will be in turn connected to the Fiber Optic Backbone

⇒ The Backbone will be terminated / originated from the Server Room / Data Centre of each hospital

⇒ The Server Room / Data Centre will have the provision for locating the following equipment in individual Network Enclosures Servers Switches Passive Components

⇒ E P A B X : Adequate Backup for Points and Power need to be provided

15.5 THE END POINT INFRASTRUCTURE

The End Pont Infrastructure begins at the end of the points provided by the IP Infrastructure. These may consist of the following equipments:

⇒ Servers – For HMIS and Email and Internet

⇒ Terminals – For accessing the HMIS

⇒ Printers and other accessories may also be part of this as well

These are some of the basic points on which the whole IT Infrastructure will grow on.

16. LAN

16.1 OBJECTIVE

The objective shall be to provide infrastructure provisions for LAN and telecommunication backbone within each room or occupied area for data and voice transmission.

Ethernet is standardized as IEEE 802.3. The combination of the twisted pair versions of Ethernet for connecting end systems to the network, along with the fiber optic versions for site backbones, is the most widespread wired LAN technology.

16.2 SYSTEM DESCRIPTION

LAN points will be provided on a need basis. It will be structured with

- Rack Mounted Layer 2 Switches & Core Switches.
- Cat#6e Mounting Chords.

- Cat#6e Patch Panels.
- Cat#6e Horizontal Cables.
- Cat#6e Input / Output Point (Box).
- Cat#6e Patch Chords to the NIC of the PC.

The switches will have uplink ports as and where necessary. The cabling termination will be done by IEEE 568B standards.

All points will be duly marked and numbered especially for future MAC (Moves, Additions & Changes)

These cables shall run in dedicated low voltage conduits, away from electrical cables, to avoid any electromagnetic interference.

The following shall be used for carrying wires / cable: -

- UPVC conduits wherever the conduit runs exposed in ceiling or chased in wall.
- HDPE conduits for external, underground laying of OFC
- GI cable trays or cable ladders for carrying multi-conductor cables.

17. CLOSED CIRCUIT TELEVISION SYSTEM (CCTV)

The requirements of security system vary as per client requirement along with its geographical location. Scope of this report highlights security system for Common areas only.

The security system proposed for Common area is very minimum amount in the following form:

Closed Circuit TV System (CCTV)

Following spaces shall be provided with cameras:

- Main entrance
- Reception
- Lift Lobby

The security console shall be located in the centralized security room. This room shall have no windows. Ample space shall be provided to view monitors. Analog DVR based CCTV camera

system that shall give monitoring team flexibility in viewing the images from multiple locations. Care shall be taken to ensure that the number of displays per screen is limited so that "individuals" can be recognized when viewing the display in all areas.

Tertiary Healthcare Hospital in West Bengal using BRGF				
(Tentative AC Area of Super-speciality Hospital as per proposed by Consultant Architect & approved by Director of Health Service, Government of West Bengal).				
BRGF Hospital - 5 Storeyed				
S.NO.	**FACILITY**	**No. of Rooms**	**Area / Room (m^2)**	**Total Area (m^2)**
	MORTUARY			
1	walk in cooler	1	24	24
	ACCIDENT AND EMERGENCY DEPARTMENT-10 Beds.			
2	Emergency O.T	1	40	40
3	Minor O.T	1	20	20
4	E.C.G	1	8	8
5	Brought in Dead Room	1	8	8
	RADIOLOGY DEPARTMENT			
6	Radiography and Fluoroscopy 500 mA	1	25.0	25.0
7	Ultrasonography	2	10.0	20.0
	OPERATION THEATRE DEPARTMENT with 6 preop and 6 postop beds.			
8	O.T Reception bay	1	4	4
9	Officer-in-charge	1	10	10
10	Doctors' change room	2	2	4
11	Nurses' change room	1	2	2

12	Technicians' change room	1	2	2
13	Class iv staff change room	1	2	2
14	Sterile storage area	1	6	6
15	Pre-operative room	6	6	36
16	Recovery room	6	7	42
17	Doctors' lounge with pantry	1	10	10
18	Operation theatre (Major)	4	40	160
19	Endoscopy room	1	20	20
20	Scrub up	1	3	3
21	Dirty utility	1	3	3
	DELIVERY SUITE - with 12 Beds			
22	LABOUR ROOM	3	15.0	45.0
23	DELIVERY ROOM	2	15.0	30.0
24	OT Maternity (Major)	1	40.0	40.0
	OPD			
25	Minor Surgery and Treatment Room	1	30.0	30.0
	LABORATORY MEDICINE DEPARTMENT			
26	Doctor's room	2	12.0	24.0
27	Speciman Disposal and sluice room	1	2.0	2.0
28	BIOCHEMISTRY	1	7.0	7.0
29	MICROBIOLOGY	1	7.0	7.0
30	Histopathology	1	7.0	7.0
31	Clinical Pathology and Heamotology	1	7.0	7.0
32	Histology and Cytology	1	7.0	7.0
33	SEROLOGY LABORATORY	1	7.0	7.0
34	Blood Bank	1	110.0	110.0
	IN-PATIENT DEPARTMENT			
	WARDS	**Beds**		
35	Paediatric	20	6	120
36	Burns with ICU facilities	2	6	12
37	Neo Natal Nursery	12	6	72
38	Dialysis ward	6	6	36

	INTENSIVE CARE AREA - 10 Beds.			
39	I.C.U. Medicine	5	8	40
40	I.C.U. Surgery	5	8	40
41	Doctor on duty	1	12	12
42	Nurse on duty	1	10	10
43	Store	1	6	6
44	Change room	1	3	3
45	D.U	1	3	3
			Total Area	**1126**

Electrical specification

1.0 GENERAL

To provide a complete electrical system for the distribution of electric power from the point of supply (WBSEDCL), D.G.s to the utilization equipment, and described in these specifications. It will be the bidder's responsibility to work out the exact quantities with drawings as per area program & from work site, which trade provides said equipments, materials, tools and labour.

2.0 SCOPE

The bidder shall supply, install and commission along with requisite spare, maintenance tools and tackles the following equipments and system in the Building. The scope also covers the detailed engineering and calculations of the various equipments/system mentioned hereunder and the same shall be approved by the Owner /Architect prior to execution of the job.

1. 11 KV H.T. Switchgears.
2. Specification of Distribution Transformers
3. Specification of L.T panels and switchgears.
4. Specification for Lighting Protection system.
5. Specification for Capacitor Bank and Capacitor Control Panels.
6. A) Specification of HT cable (XLPE) (11KV)
   B) Specification of LT cables and Wire
7. Specification for Internal Electrical Works.
8. Specification for wiring.
9. Specification for D.G Set.
10. Specification for Intelligent Reporting Fire Detection System
11. Specification for PA System
12. Surveillance Closed Circuit Television (CCTV) System.
13. Specification for Conduiting and Wiring for Telephone System.
14. Specification for Nurse Call System.
15. Specification of Heat Ventilation & Air Conditioning System.
16. Specification of Signage.
17. Specification of Lift.
18. Specification of Pump Motor for Water Supply & Sweage. .
19. Specification of Mortuary Cooler.
20. Solar System
21. U.P.S System
22. Special Condition.

23. List of Approved Make.

This specification defines the basic guidelines to develop a suitable electrical system as necessary for the hospital complex. All data required in this regard shall be taken into consideration to develop a detailed engineering of the system.
Compliance with these specifications and/or approval of any of the Contractor's documents shall in no case relieve the Contractor of his contractual obligations.
All work to be performed and supplies shall be affected as a part of contract requires specific approval/review of Owner or his authorized representative. Major activities requiring approval/review shall include but not be limited to the following:
The engineering activities shall comprise the submission for approval of the following:

- ♣ Basic engineering documents e.g. overall single line diagram, area classification drawing, overall cable layout, testing, type test report, guaranteed particulars of all equipments and maintenance manuals.
- ♣ Quality assurance procedures.
- ♣ Field testing and commissioning procedures.
- ♣ Control and protection schemes.
- ♣ Load sharing and annunciation scheme,
- ♣ Preparation of power supply distribution drawing.

Bidder shall be responsible for:

- ♣ Detailed co-ordination with other services, shop drawings for various electrical layouts such as equipment layout, lighting layouts, cabling layouts, earthing and lightning protection layouts, including equipment installation and cable termination details etc. prior to start of work.
- ♣ Preparation of bill of materials for cabling, lighting, earthing and miscellaneous items etc.
- ♣ Cable schedule.
- ♣ Lighting/power panel schedule.
- ♣ Interconnection drawing.
- ♣ Protection co-ordination drawings/tables for complete power system.
- ♣ Shop inspection and testing procedures.
- ♣ Field testing and commissioning procedures.
- ♣ Preparation of as built drawings for all services.

Bidder shall also be responsible for:

- ♣ Any other work/activity which is not listed above however is necessary for completeness of electrical system.

3.0 CODES & STANDARDS

The design engineering manufacturing and the installation shall be in accordance with established codes, sound engineering, practices, and specifications and shall conform to the statutory regulations applicable in the country. Contractor shall obtain all approvals from statutory authorities' e.g. Electrical inspector, pollution control boards, WBSEDCL /CESC as applicable before commissioning of electrical/DGs.

- ♣ Indian Electricity Act.
- ♣ Indian Electricity Rules.
- ♣ Factory Act.
- ♣ Pollution Control Act.

IS-732 : Code of practice for electrical wiring installation system voltage not exceeding 650V.
IS-3043 : Earthing.
IS-2309 : Code of practice for the protection of buildings and allied structure against Lightning
IS-7689 : Guide for control of undesirable static electricity.

IS-3716 : Insulation co-ordination application guide.
IS-8130 : Conductors for insulated electrical cables and flexible cords.
IS-5831 : PVC insulation and sheath of electric cables.
IS-3975 : Mild steel wire, strips & tapes for armouring cable.
IS-3961 : Current rating of cables
IS-694 : PVC insulated (heavy duty) electric cables for working. Voltage up to and including 1100 volts.
IS-424- 1475 (F-3) : Power cable flexibility test.
IEC-439/IS-7098 : Specification for cross linked polyethylene insulated PVC sheathed cable for working voltage up to 1.1 KV.
IS-1554 : PVC insulated cables up to 1100 volts.
IS-10810: Test procedures for cables.
IS-6121: Cable glands.
IS-10418: Cable drums.
IEC-754(1) : FRLS PVC insulated cable.
ASTM-D-2863 : Standard method for measuring minimum oxygen concentration to support candle-like combustion of plastic (oxygen index).
ASTM-D-2843 : Standard test method for measuring the density of smoke from burning or decomposition.
ASTM E-662/IEC 754(A)
Standard test method for specific optical density of smoke generated by solid materials.
IEEE-383: Standard for type test class-IE, electric cables, field splicers and connections for power generation station.
IS 13947/IEC 947 : Air circuit breaker/moulded case circuit breaker.
IS-8623: Specification for factory built assemblies of switch gear and control gear for voltage upto and including 1000vac/1200vdc
IS 1018: Switchgear and control gear selection/installation and maintenance
IS-1248 :Direct acting indicating analogue electrical measuring instruments and testing accessories.
IS-13779: Digital measuring instruments and testing accessories.
IS-3156 : Voltage transformer
IS-2705: Current transformer for metering and protection with classification burden and insulation.
IS -2147 : Degree of protection provided by enclosures for low voltage.
PART 1,11,111 Switchgear and control gear
IS-3427 : Metal enclosed switchgear and controlgear
BS-162 : Safety clearance
IS-3202 : Code of practise for climate proofing of electrical equipment.
IS-375 : Marking and arrangement for switchgear, busbars, main connections and auxiliary wiring.
IS-722 : Ac electric meters
IS-3231 : Electrical relays for power system protection.
IEC-255 : Electrical Relays
IS-5082 : Electrolytic copper/aluminium bus bars
IS-2834 : Capacitors
IS-2713 : Steel tubular pole
IS-335 : Specification for insulating oil
IS-3837 : Specifications for accessories for rigid steel conduit for electrical wiring.
IS-2026&335 : Distribution transformer
(PART I,II,III)GI/STEEL /PVC conduit pipe for electrical wiring.
IS-2274 : Code of practise for electrical wiring installation system voltages exceeding 650 volts.
IS-6665 : Code of practise for industrial lighting
IS-3646 : Interior insulation part 1&2

IS-1944 : Code of practise for lighting of public through fares.
IS-7752 : Guide for improvement of power factor consumers installation.
IS-13346 : General requirement for electrical for explosive gas atmosphere.
IS-13408 : Code of practise for the selection, installation and maintenance of electrical apparatus for use in potentially explosive atmospheres
IS-12360 : Voltage and frequency for ac transmission & distribution system.
IS-5572 : Classification of hazardous area for electrical installations.
IS-5571 : Guide for selection of electrical equipment for hazardous area.
IS-4201 : Application guide for Current Transformer
IS-4146 : Application guide for Voltage Transformer
IS-10028: Code of practise for installation and maintenance of transformer
IS-8478 : Application guide for on load tap changer
IS-10561: Application guide for power transformer
IS-1646 : Code of practise for fire safety of buildings electrical installation
IS-3034 : Code of practise for fire safety of industrial building-electrical generating and distribution station
IP-30 : National electrical code (NEC) BIS publication.
IS-4722 : Rotating electrical machines.
IS-4889 : Method of determination of efficiency of rotating electrical machines.
IS-325 : Three phase induction motors.
IS-4729 : Measurement and evaluation of vibration of rotating electrical machines.
IS-900 : Installation and maintenance of induction motors.
IS-4029 : Air break switches.
IS-2208-9224 : HRC cartridge fuses.
IS-2959 : Contactors.
IS-9537 : Rigid steel conduit.
IS-1030-1982 : Specification for carbon steel castings for general engineering purpose.
IS-1601/ BS-649 : Performance& testing of Internal Combustion (IC) engines for general purpose.
AIEE-606(1959) : Recommended specification for speed governing of I.C. engine generator units.
BS-5514/IS-3046 8528(Part-2): Reciprocating IC engine driven A.C. generators.
Any other standard may be followed provided it is equivalent or more stringent than the standards specified above.
In case of any deviation /conflict of this specification with the codes & standards, the following order of precedence shall govern.

a) Specification, particular specification if any, and drawings.
b) Indian regulations/codes and standards.

4.0 SITE CONDITIONS

i)	Design ambient	50 Deg.C. maximum 2 Deg. C. minimum
ii)	Relative Humidity	85% maximum
iii)	Site environment	Normal

5.0 DESIGN CRITERIA

a) Electrical Details of Incoming Supply

a)	Supply Voltage	11 KV or 6 KV as applicable
b)	Neutral Earthing	Solid Earthing
c)	Voltage Regulation	$\pm$ 10%
d)	Frequency Regulations	$\pm$ 3%

e)	Combined	± 10%

b) L.T. Power Distribution System

a)	Voltage	415 V / 240 V
b)	Frequency	50 Hz
c)	Neutral Earthing	Grounded
d)	Short Circuit Fault withstand Capacity	10 KA - 65 KA (1 Sec)

c) Source of Power Supply

a)	Voltage	415 V / 240 V
b)	Source	Mains/D.G. Set

d) Control Supply for Electrical System

The various supply voltage to be used in the control panels for main equipments are:

i)	Spring Charge Motor	230 Volt A/C
ii)	Closing/Trip Coil	24 V DC / 230V AC
iii)	Alarm/Indication/Relay	24 V DC/ 230 V AC
iv)	Heaters	230 V AC

A	POWER SUPPLY LOAD CONTROL/DISTRIBUTION PANEL.	433 V TPN / 240 V 1 phase A.C.
B	PAINTING OF PANEL.	Powder coating of approved shade.
C	PAINTING OF CABLE TRAY AND STRUCTURE STEEL.	Powder coated of approved shade.

6.0 CABLE DETAILS

A	INTERNAL WIRING.	Copper conductor PVC insulated 1.1 KV grade as called for
B	POWER CABLES (L.T.).	XLPE insulated Al. Armoured Cable
C	11 KV	Aluminium conductor XLPE insulated armoured cable.
D	GROUNDING CONDUCTOR.	Copper/G.I. strip as called for
E	LIGHTNING CONDUCTOR.	ESE Type as per NFC Code

7.0 ACCURACY CLASS OF METER

	a) Revenue Meters	Class-0.5 or as per WBSEDCL approved.

	b) Ammeter Voltmeter and Other Instrument.	Class – I Digital Analogue

1. 11 KV H.T. SWITCHGEARS

This specification covers the 'General Requirements' for the design, manufacture, supply performance, inspection, testing and commissioning including supply of indoor type high voltage switch boards upto 11 KV including necessary termination, cabling, bus work required for satisfactory operation .
Specific requirements shall be in accordance with single line diagram/specification/data sheet. In case of conflicting requirement between the Technical Data and General Specification the former shall prevail.
The technical parameters of switchgear equipments, transformers etc. shall be submitted by the Contractor for approval by the employer.
This specification shall cover 11 KV and Single Panel as well as 3 Panel Board.

1.1 STANDARDS

All equipment, material and components shall comply with the requirements of the latest editions of Indian Standards with updated amendments. Standards and Regulations applicable in the area where equipment is to be installed shall also be followed.
The equipment offered complying with other standards, these standards shall be equal to or superior to those specified and full details of the differences shall be furnished along with the tender.
Some of the relevant Indian and British Standards are listed below:
IS 13947 - A.C. Circuit Breakers (Relevant Parts/SCC)
IS 13941 - High voltage Circuit Breaker (Relevant Parts/SCC)
IS13118 - Gas insulated Switchgear
IS 3427 - Metal enclosed Switchgear & Control Gear
BS 162 - Safety Clearances
IS 2705 - Current Transformers (Parts 1 to 4)
IS 3156 - Voltage Transformers (Parts 1 to 4)
IS 3202 - Code of Practice for climate proofing of electrical equipment
IS 375 - Marking & Arrangement for Switchgear Bus Bars, main connections and auxiliary wiring.
IS 722 - A.C. Electric Meters
IS 1248 - Direct acting Electrical Indicating Instruments
IS 3231 - Electrical Relays for Power System Protection
IS 2544 - Epoxy Cast Resin Insulators
IS 5082 - Electrolytic Copper and Aluminium
IS 5792 - High Voltage HRC fuses
IEC 60694- High Voltage Switchgear
IEC 60947- High voltage Circuit Breaker
IEC 60056- Gas insulated Switchgear
IEC 60298- Metal Enclosed High Voltage Switchgear

1.2 DETAIL OF DESIGN

a. CONSTRUCTION

The switch boards shall be cubicle type, suitable for indoor/outdoor installation, floor mounting and free standing. The design shall be totally enclosed, dust - tight, dam proof and vermin proof offering degree of protection not less than IP-42 for Indoor Application & IP-54 for Outdoor application.
Separate segregated compartments shall be provided for circuit breakers, bus bars, cable box, voltage transformers, wire ways, relays, and instrument and control devices. Switchgear cubicles/ modules shall be provided with hinged doors in front with facility for padlocking door handles.
Vent openings shall be covered with grills so arranged that hot gases cannot be discharged through them in a manner that can injure the operating personnel. These vent openings shall be vermin proof.

All the High Voltage compartments i.e. Circuit Breaker, Bus Bar, and Cable Compartments shall be separated from each other by metallic partitions in line with IEC-600298. These compartments must have pressure relief flaps for exit of gas due to internal arc to ensure operators safety. All the HV design must ensure conformity to IEC-600298 and must be Type tested for Internal Arc Test. The supplier shall submit Type Test report from CPRI or other independent agency to prove the above.
All panels shall be of same height, width and depth. Panels shall be bolted together to form a continuous flush front switch board, suitable for front of board operation.
The switchgear cubicles shall be rigid and robust in design and construction, fabricated out of CRCA sheet steel. Cubicles shall be made from rigid welded structural frames made of structural steel sections or of pressed/formed sheet steel of not less than 2mm thickness. The frames shall be enclosed by sheet steel of at least 2mm thickness, smoothly finished, leveled and free from flaws. Stiffeners shall be provided wherever necessary. Height of the operating handle, push button etc. shall be restricted between 300 mm to 2000 mm from the finish floor level. Fixing screws and nuts shall be used. Self-tapping screws shall not be used in the construction.
All doors, panels, removable covers shall be provided with non deteriorating (neoprene) gaskets all around the perimeter.
All doors shall be removable and supported by concealed type hinges. The hinges shall be strong and braced to ensure freedom from sagging, bending and general distortion of panel or hinged part.
Floor mounted cubicles with minimum 75 mm high channel and 5 mm thick channel base frame. Approx 200 mm-blank space between the floor of the switchboard and bottom most units shall be provided. The total height of the cubicle shall not exceed 2400mm.

b. Each site requires 1 (one) 11KV substation.

c. BUSBARS & BUSBAR CHAMBER

Three phase bus bars shall be of high conductivity electrolytic copper as stated in B.O.Q. The bus bars shall be air insulated and housed in a separate compartment, which segregated from all other compartments, in case of Vacuum Circuit Breaker. In case of Gas Insulated Circuit Breaker the Bus Bars shall be housed in separate SF6 gas filled stainless steel tank. Current density of **Cu. Bus-Bar** shall not exceed 1.5 Amps / mm^2
Bus bars & bus bar connections shall be of uniform cross section shall be suitable for carrying rated current continuously and short circuit current for specified duration without overheating. The bus bars connections shall be adequately supported on insulators to withstand dynamic stresses due to short circuit current specified. Normal operating temperature for bus bars shall be 85 Deg. C. Short circuit rating of the bus bars shall be 35 KA for 1 sec.

All bus bar joints and bus tap joints shall be silver or tin plated. Joints shall be bolted type and shall be insulated. Spring/Lock washers shall be provided to ensure good contact the joints.
Direct access to accidental contact with bus bars and primary connections shall be avoided by providing shrouds. All apertures and slots shall be protected by barriers to prevent accidental shorting of bus bars. To provide a tight seal between cubicles, bushings or insulating panels shall be provided for bus bars crossing from one cubicle into another.
All insulating materials used shall be non-hygroscopic and shall be treated for preventing fungus growth. Surface of insulators shall be highly glazed and treated with silicone compounds to minimize accumulation of dust, condensation and tracking.

d. CIRCUIT BREAKERS

The circuit breakers shall be Triple Pole double break type and the Insulation and Arc interruption medium shall be either Vacuum or SF6 gas medium. The Breaker shall be enclosed in a sealed Vacuum Tank or SF6 gas filled Stainless Tank. A pressure relief device along with Manometer shall be provided with the Tank in case of SF6 CB to release and monitor any excessive pressure and for testing purpose.
The circuit breakers shall be of horizontal draw out construction with horizontal/vertical isolation. The circuit breaker including its operating mechanism shall be mounted on a wheeled carriage moving on

guides, designed to align correctly and allow easy movement on the circuit breaker. There shall be three discrete positions viz. Service, Test and Isolated. Locking facility in all three positions shall be available. Position indicator shall be provided on the panel to indicate the position of the circuit breaker. Test position shall offer testing of circuit breaker operation/interlocks without energizing the power circuit.
Circuit breakers shall have stored energy spring mechanism charged by manually operated handle as well as electrically operated mechanism. The closing mechanism of the circuit breakers shall be Motor operated, spring charged with a provision for manual charging.
The operating mechanism shall be mechanically and electrically trip free and non-pumping. Anti-pumping feature may be built in or separate anti-pumping relay may be provided. In case spring charged mechanism, spring charged indication shall be provided.
Local manual trip device shall be provided on the operating mechanism. The trip device shall be suitable for front operation and positive mechanical 'ON-OFF' indication shall be provided.
Main contacts of circuit breaker shall have ample area and adequate contact pressure to carry the rated and short time current without excessive temperature rise. The contacts shall be adjustable for wear and easily replaceable. Main contacts shall open before and close after the arcing contacts when these are provided. Arcing contacts shall be easily accessible for inspection and replacement in case of VCB.
Each breaker shall normally be provided with auxiliary contacts of 6 NO+6NC directly operated from breaker operating mechanism. These contacts shall be in addition to these used in circuit breaker internal wiring. These contacts shall be rated for 10 Amps at 240V AC and 20 Amp (inductive breaking) at 220V D.C. If more breaker auxiliary contacts are required latching relay shall be used to multiply the contacts.
Shunt trip coil as called for shall be provided for tripping the circuit breaker. The trip coil/s shall operate satisfactorily between 50% - 110% of rated control voltage. Wattage of trip coils will be sufficiently high to prevent it from picking up or holding on with specified number of trip circuit supervisory indicating lamps wired in series.
It shall be possible to trip the breaker, in case of failure of control supply
Circuit breaker type duty and rating shall be submitted in Data Sheet by the Contractor.
Circuit breakers of similar rating shall be interchangeable.

e. CURRENT TRANSFORMERS

Current transformers shall be of ratio, burden (shall be worked out by panel supplier), class/accuracy.
Current transformers shall conform to latest edition to relevant standards. Current transformers shall be epoxy resin cast with bar Primary or ring type.
CT core laminations shall be of high grade silicon steel. The design and construction shall be sufficiently robust to withstand thermal and dynamic stresses due to the maximum short circuit current of the circuit.
The current transformer shall preferably be capable of being left open circuited on the secondary side with primary carrying rated full load current, without overheating or damage. Short time current rating and rated withstand time shall be same as corresponding C.B.
Secondary terminals of CT shall be brought out to a terminal block which will be easily accessible for testing and external connections. Facility shall be provided for short circuiting and earthing of CT secondary leads through a removable and accessible link with provision for attaching test link.
Rating plate details and terminal markings shall be according to the latest edition of relevant Indian Standard specification.
Current transformers (core) shall be used for metering and protection. Each CT shall be provided with rating plate indicating: Name and Make, Serial number, Transformer Ratio, Rated burden, Rated voltage and Accuracy class.

f. POTENTIAL TRANSFORMERS

Potential Transformers shall conform to latest edition of "IS-3156 (Part I, II & III) as applicable relevant standards.
Potential transformers shall be dry, cast epoxy resin type. The PTs shall be of single phase construction.
The PT shall be capable of operating continuously at 110% of the rated voltage without any damage.
When star - star connection is required in non-effectively or ungrounded system, the PTs shall be suitable for continuous operation with a persistent phase to ground fault.

Maximum temperature rise of the transformer at rated burden and with rated primary voltage and frequency shall not exceed 40 Deg.C above an ambient of 45 Deg.C.
The PT's shall be fixed at rear bottom / top of the panel as called for. An interlock or automatic shutters shall be provided to prevent access to live HV parts when PT is withdrawn.
HRC Fuses shall be provided both primary & secondary side. It shall be possible to replace PT fuses easily without having to de-energize the main bus bars. Prospective interrupting current rating of the fuses shall be same as the system fault level.
Voltage transformer ratio, output and class shall be specified and shall be stated in data sheet by the Vendor/Contractor. Nameplate as per relevant standards shall be provided on the PT.

g. PROTECTIVE RELAYS

Relays type and numbers shall be in accordance with the protective scheme required.
Relays shall be digital microprocessor based or analogue type, as called for in BOQ. It shall be enclosed in rectangular shaped cases, suitable for flush mounting only, dust tight covers projecting from the front cover panel. The case shall be dust tight, damp proof and tropicalised. The relays shall be either self-powered or a 24V DC Power-pack of suitable capacity with charging device shall be provided within the HT panel.
Relays shall be accessible for setting from the front. Access to setting devices shall be possible only after removal of front cover.
Protective relays shall be drawing out type. Where it is not possible to provide protective relays of the draw out pattern, fixed type relays with facilities for plugging in a portable test plug shall be provided. Necessary test plugs shall be furnished along with the relays.
Relays shall be provided with positive action self reset type with indicator. The indicator/s shall be visible from the front.
Relays conform to relevant standards in all respects. Relays shall be provided with minimum two pairs of self or hand reset type contacts as specified. Auxiliary relays shall have the number of NO and NC contacts as required and shall be in data sheet by the Vendor / Contractor.

h. SAFETY/PROTECTION INTERLOCKS/FEATURES

Following interlocks and features shall be incorporated for equipment protection and personnel safety under mal-operation. No deviations on these interlocks and safety features are allowed. These interlocks and safety features shall be fail-safe, positive and fool-proof.

a) It shall not be possible to plug-in or isolate a closed circuit breaker. An attempt to do so shall trip the breaker. (In case of breakers with vertical isolation, this will apply to raising and lowering). There shall be a positive locking facility to prevent closing of circuit unless it is in Service or Test position.

b) Closing and opening operations shall be possible only in discrete, well defined Test and Service positions and not in any position midway. An extension adapter cable with plugs and sockets shall be preferably be provided so that the closing and opening operation of the circuit breaker can be done in fully withdrawn position outside the cable.

c) Slow operation of circuit breakers shall be possible only in the circuit breaker in Test or Isolated position.

d) Isolating switches if provided shall be interlocked with respective circuit breakers to prevent them making or breaking the current.

e) 1 no. bus earthing truck shall be supplied with each panel to earth the outgoing cable of the VCB.

f) Automatic safety shutters for all openings which will lead to access to the live parts of the switchgear upon withdrawal or any operation the switchgear components/parts shall be provided, preferably with a padlocking facility.

g) Spring of motor operated spring charged mechanism shall not discharge until they are fully charged and charging means are fully disconnected.

h) Where key interlocking is employed, tripping of a closed circuit breaker shall not occur if any attempt is made to remove the trapped key from the mechanism.

i) Annunciation window shall be provided for winding temperature trip / alarm as required.

j) Any other interlocks which manufacturer may deem to be required for safety and specifically specified separately required for the system shall be included.

k) All terminals, connections which may be live and exposed for accidental contact shall be adequately shrouded.

l) Components within cubicles shall be properly labeled to facilitate testing.

i. EARTHING

The switch board shall be provided at the bottom throughout its entire length with an earth bus of copper of adequate size to carry the fault current for the duration same as short time rating of the circuit breaker. Earth bus shall have two earthing connection facility at its both ends of earthing conductor.

All non-current carrying metal parts, frames and equipment mounted in the switchboard shall be bonded to earth bus.

Earthing of moving carriage of draw out equipment shall be achieved by scraping earthing device. The earthing device shall maintain positive earth continuity in all Service Test and Isolated positions.

It shall be possible to connect each circuit or set of three phase bus bars to earth either through earthing trucks or through the circuit breakers.

One earthing trolley suitable for earthing of cables or bus bars and common for all circuit breakers of the same type/rating shall be provided.

j. INSTRUMENT & METERS

Electrical indicating instruments shall be digital type with zero adjustment, probe from outside the cover.

Multi function meter of CL 1.0 accuracy with RS 485 port shall be provided.

Instruments/meters shall be suitable for flush mounting on the panel with flanges protecting outside the panel.

All meters shall be industrial grade with accuracy of class 1.0 unless specifically indicated.

k. CONTROL WIRING

All wiring for control, protection, alarm, indicating circuits and remote tripping mechanism on all equipment shall be carried out with at least 650V grade, PVC insulated, stranded, copper, 2.5 Sq.mm conductors.

All wiring shall be run on the sides of the panels and shall be neatly bunched and cleated without affecting access to equipment mounted in the panel. Where wiring enters or passes through compartments containing HT apparatus then they shall be in earthed metallic conduits or ducts.

All wiring shall be taken to terminal blocks without joints or tees in their run.

All wiring shall be colour coded as follows:

Instrument Transformer AC circuit - Red, Yellow & Blue determined by the Phase with which the wire is associated.

AC Phase Wire	-	White
AC Neutral	-	Black
DC Circuits	-	Grey
Earth connections	-	Green

Engraved core identification ferrules, marked to correspond with the wiring diagram shall be fitted to each wire. Ferrules shall fit tightly on the wires, without falling off when wire is removed. Ferrules shall be of white colour with black lettering. Each wire shall be identified by letter to denote its function followed by a number to denote its identity at both ends.

All wiring for external connections shall be brought out to individual terminals on a readily accessible terminal block.

All unused auxiliary contacts of the circuit breaker and relays shall be wired upto terminal block.

I. FITTINGS AND ACCESSORIES

Indicating Lamps:

Neon type indicating lamps or LED indicators shall be provided everywhere except where low voltage filament type with series resistor called for.

Lamp covers shall be provided with interchangeable colored lenses of Perspex or equivalent unbreakable material. The lenses shall not discolor in course of time due to heat of the lamp.

Bulbs and lenses shall be interchangeable and replaceable from the front.

Following colors shall be used for the function indicated:

Red	-	Circuit Breaker 'ON'
Green	-	Circuit Breaker 'OFF'
White	-	Continuous trip supply supervision
Amber	-	Auto trip
Blue	-	Spring charged
R.Y.B	-	Potential indication
Green	-	Earth

Push Buttons:

All push buttons shall be push to actuate the contact type.

Start & Stop push buttons shall be colored green and red respectively. Reset push buttons shall be yellow in color and test push buttons shall be blue in color. All other push buttons shall be black in color. Emergency stop push buttons shall be lockable in the operated position, i.e. push to operate and key to release type. Push buttons for emergency stop shall be recessed/shrouded type to avoid accidental operation.

Control & Selector Switches:

Control and Selector switches shall be of rotary type, having enclosed contacts accessible only after removal of cover.

All control and selector switches for circuit breakers and instruments shall be mounted on the front of the panel. Control switches for space heater/s and control supplies shall be mounted inside the panel.

Circuit Breaker control switches shall be provided with pistol grip handles. Selector switches shall be provided with round, knurled handles. All handles shall be black in colour. Properly designated escutcheon plates clearly marked to show the operating positions shall be provided on all switches.

All other instruments and selector switches shall have stay put contacts.

Circuit breaker control switches shall normally have three positions close - Normal - Trip with spring return to normal position. Switch operating mechanism shall prevent the switch from being operated twice successively in the same direction. Circuit breaker control switch shall have one NO-NC contact along with other contacts as required.

Contacts of all control and selector switches shall be rated for 10 Amps at 240V AC or 20 Amps at 220V dc (inductive break). Switch for space heater supply and control voltage supply shall normally be two pole rated for 25A A.C.

Control Terminal Blocks:

Box - clamp type, 1100V grade line up terminals of minimum 2.5 Sq.mm size shall be provided. Connection to terminals shall be from front.

Not more than one wire on each side shall be connected on any terminal. Where duplication of terminals block/s is necessary, suitable solid bonding links shall be incorporated. Terminal blocks at different voltage shall be segregated into groups and distinctly labeled. Current transformer secondary leads shall be brought to terminal blocks having facility for short circuiting and grounding the secondary. Terminals shall be numbered for identification and grouped according to function. Engraved back on white PVC labels shall be provided on the terminal blocks describing the function of the circuit.

Separate terminal stems shall be provided for internal and external wiring.

Control terminal blocks shall be so located that control cables are fully segregated from power cables. Suitable insulated or earthed metal race ways shall be provided for control wiring. Separate undrilled removable gland plate shall be provided for the control cables at the bottom of each panel.

Minimum 10% of total number spare terminals shall be provided for future use.

Name Plates and Labels

One Name plate giving designation of the HV switchboard shall be affixed prominently on top of the switch board. Details of designation will be specified.

Labels giving following details shall be affixed on each feeder panel:

i) Feeder Name.
ii) Equipment reference no. & Description
iii) Rating (KVA/Amp.)

All components whether mounted inside or on the door shall be permanently and clearly labelled with reference number/letter or their function. Rating of fuse shall be part of fuse designation. Paper labels, stickers or labels fixed with adhesives are not acceptable. All labels shall be properly fixed by screws with provision to prevent distortion due to expansion.

All labels shall be non-corroding, preferably laminated plastic or rear engraved perspex with white letters on black background.

Labels for feeder panel designation fixed on front side shall be fitted with chrome paste, self tapping, and counter sunk head screws. These labels shall be of identical size to permit interchange.

Space Heaters:

Adequately rated anti-condensation space heaters shall be provided in each cubicle.

Space heater/s shall be trip type, rated with operation voltage of 240V, 50 Hz. AC supply.

Each space heater shall be complete with a 2P MCB, 10KA and a control thermostat.

The space heater shall be rated for maintaining the panel inside temperature 10 Deg.C above outside ambient temperature.

Cubicle Lighting:

Each cubicle shall be provided with interior lighting by means of CFL light fixture. An ON/OFF switch/door switch shall be provided. The lighting fixture shall be suitable for operation from a 240V single phase, 50 Hz. A.C. supplies.

Auxiliary Supply:

Auxiliary supply for control, indication, space heater etc. shall be made available at one point on the switch board. Vendor shall provide suitable auxiliary supply in the switch board.

Fuses:

All fuses in control, indication and metering circuit shall be HRC link type of approved make. Mounting of fuse fitting shall ensure adequate dissipation of heat generated and shall facilitate inspection and easy replacement of fuse.

Cable Termination:

The switch board panel shall be provided with separate compartment for cable termination complete with suitable cable end termination for XLPE insulated cables suitable for bottom entry. Cable and sealing box shall preferably be mounted inside the panel. Cable compartment doors shall be self–locking type, interlocked and shall have Arc withstand capability due to short circuit. The compartment shall be provided with cable testing facility in case of gas insulated medium. For XLPE cables adequate space and clearances shall be made for heat/cold shrinkable termination e.g. Raychem or cold flowing stress grading joints.

Two earthing terminals shall be provided in each panel in cable box/cabling chamber for earthing armour/screen.

Where more than one core is terminated on each phase, links suitably designed and properly supported shall be provided to avoid unnecessary bending of cable cores without decreasing the length of insulated cable tail. Electrical clearances which would normally be required when using one core per phase shall be maintained.

Where core balance type current transformers are provided on switchgear feeder circuit cable/s for earth fault protection sufficient space, clearance and support, mounting arrangement shall be provided for the CT.

Painting:

All steel work shall be pretreated in tanks and finally powder coated of approved shade of the levels not less than 100 microns.

1.3 TESTING & INSPECTION

Four copies of all test certificates and certificates shall be furnished. After completion of all work at the manufacturers works the switchboards shall be inspected and tested in presence of employer or his authorized representative. However, stage inspection may be carried out from time to time to check progress of work and workmanship. The following tests shall be carried out:

i) All routine tests specified in relevant Indian/British Standards shall be carried out on all circuit breakers.
ii) Test for protective relay operation by secondary injection method.
iii) Operation of all meters.
iv) Secondary wiring continuity test
v) Insulation test with 1000 Volts megger, before and after voltage test.
vi) HV test on secondary wiring and components on which such test is permissible (2 KV for one minute)
vii) Simulating external circuits for remote operation of breaker, remote indicating lights and other remote operations, if any.
viii) Measurement of power required for closing/trip coil of the breaker.
ix) Pick up and drop out voltages for shunt trip and closing coils.
x) CT Polarity test.
xi) Power frequency voltage withstand test.

Vendor shall provide all facilities such as power supply, testing instruments and apparatus required for carrying out the tests. Required copies of test certificates for all the tests carried out along with copies of type test certificates and certificates from Sub-Vendor for the components procured from them are to be submitted before dispatch of switch boards.

1.4 DRAWINGS AND INFORMATION

The Vendor shall furnish following drawings/documents in accordance with enclosed requirements:

i) General Arrangement drawing of the Switchboard, showing front view, plan, foundation plan, floor cut-outs/trenches for external cables

ii) Sectional drawings of the circuit breaker panels, showing general constructional features, mounting details of various devices, bus bars, current transformers, cable boxes, terminal boxes for control cables etc.
iii) Schematic and control wiring diagram for circuit breaker and protection including indicating devices, metering instruments, alarms, space heaters etc.
iv) Terminal plans showing terminal numbers, ferrules markings, device terminal numbers, function etc.
v) Relay wiring diagrams.
vi) Equipment List.
vii) Bus bar sizing calculations.

Vendor shall furnish required number of copies of above drawings for Purchaser's review, fabrication of switch boards shall start only after Purchaser's clearance for the same. After final review, required number of copies and reproducible shall be furnished as final certified drawings.

The information furnished shall include the following:

i) Technical literature giving complete information of the equipment.
ii) Erection, Operation and Maintenance Manual complete with all relevant information, drawings and literature for auxiliary equipment and accessories, characteristics curves for relays etc.
iii) A comprehensive spare parts catalogue.

1.5 TOOLS

One complete set of all special or non-standard tools required for installation, operation and maintenance of the switchboard shall be provided. The manufacturer shall provide a list of such tools individually priced with his quotation.

1.6 QUALITY ASSURANCE

Quality Assurance shall follow the requirements of employer as applicable.

Quality Assurance involvement will commence at enquiry and follow through to completion and acceptance thus ensuring total conformity to Purchaser's requirements.

2. SPECIFICATION OF DISTRIBUTION TRANSFORMER

2.1 OIL TYPE DISTRIBUTION TRANSFORMER

a. SCOPE:

11/0.433 KV Oil type Transformer of required capacity (for installation of oil type Transformer, No-Objection Certificate from Department of Fire & Emergency Services, Government of West Bengal and Directorate of Electricity, Government of West Bengal, shall be obtained prior to such installation). "

b. SYSTEM PARTICULARS:

The transformers shall be suitable for outdoor/indoor installation with following system particulars and should be suitable for service under fluctuations in supply voltage as permissible under Indian Electricity Act & Rules there under.

Nominal System Voltage	:	11Kv
Corresponding Highest System Voltage	:	12kV
Neutral earthing	:	Solidly earthed
Frequency	:	50 Hz with ±3 % Tolerance
Tappings of HV for HV Variations	:	+10% to -10% in step of 1.75 to 2.5% (with on load tap changer)
Losses	:	As per ECBC 2010

c. SERVICE CONDITIONS:

Equipment to be supplied against the specification shall be suitably design to work satisfactorily under following tropical conditions:-

Max. Ambient air temperature	:	50 Deg. C
Max. Relative humidity	:	100 %
Max. Wind pressure	:	150 kg/sq.m.
Max. Altitude above mean sea level	:	1000 mtrs.
Seismic level (Horizontal acceleration)	:	0.3 g.

d. DESIGN & CONSTRUCTION:

CORE:

The core shall be of high grade cold rolled grain oriented (C.R.G.O) annealed steel lamination, having low loss and good grain properties, coated with insulation, bolted together to the frames firmly to revent vibration or noise. All core clamping bolts shall be effectively insulated. The complete design of core must ensure permanency of the core losses with continuous working of the transformers.

Core insulation –A-Class grade insulation shall be used and make should be clearly stated in the offer along with test certificates.

The successful bidder shall be required to submit the manufacturer's test report showing the Watt Loss per kg and the thickness of the core plate, to ascertain the quality of Core materials.

The purchaser reserves the right to get tested at any Government recognized laboratory.

The transformer core shall not be saturated for any value of V/f ratio to the extent of 112.5% of the rated value of V/f ratio (i.e. 11000 / 50) (due to combined effect of voltage and frequency) up to 12.5% without injurious heating at full load conditions and will not get saturated. The bidder shall furnish necessary design data in support of this situation.

HT/LT CABLE BOXES:

Suitable arrangement for HV side box and LV side box shall be provided. The LV cable box shall be suitable for terminating the cables, which will approach the boxes vertically from the bottom. The cable box shall be suitable for being detached from the main body with suitable mounting arrangement.
The H. T. and L. T. cable box shall be fixed on the opposite sides.

TEST AND INSPECTION:

i. Routine Tests:

All transformers shall be subjected to the following routine tests at the manufacturer's works. The tests are to be carried out in accordance with the details specified in IS 2026 or as agreed upon between the purchaser and the manufacturer.
Measurement of winding resistance.
Ratio, polarity and phase relationship.
Impedance voltage.
Load losses.
No-load losses and No-load current.
Insulation resistance.
Induced over voltage withstand.
Separate source voltages withstand.
All the routine tests shall be conducted in the suppliers' laboratory at their cost.

ii. Type Tests:

In addition to routine test as above Impulse voltage Withstand test and Dynamic Short Circuit Test as under shall be successfully carried out at laboratories accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) in accordance with IS 2026/1977 as amended from time to time and technical specifications, within the last 5 (five) years prior to the date of offer. The bidder shall furnish the following type tests reports (along with General arrangement drawing, Rating and Diagram Plate and Internal Constructional drawing).

Impulse Voltage with stand Test on all three LV & HV phases chopped on tail.

Dynamic Short circuit Test.

The following balance type test should be carried at the manufacturer's works invariably in the presence of representative at the time of inspection from the first lot.

Temperature Rise Test

Unbalanced current test – unbalanced current should not be more than 2% of full load current.

iii. Submission Routine Test Certificate:

The manufacturer shall submit the routine test certificate along with documentary evidence for having paid the Excise Duty for the following raw materials viz. copper for conductors, insulating materials, core materials, bushings at the time of routine testing of the fully assembled transformer.

3.SPECIFICATION FOR L.T. PANELS & SWITCHGEARS

Medium voltage switch boards/distribution boards, the combination of both these and components shall conform to the equipments of the latest revision including amendments of the following codes and standards.

3.1 CODES & STANDARDS

The design, manufacture and performance of equipment shall comply with all the currently applicable statues, safety codes, relevant Bureau of Indian Standards (BIS), British Standards (B.S.), International Dutro Technical Commission (IEC) Publication, NEMA, IDE & DEMA standard as ammended upto date.

a)	IS:13947-	Air circuit breaker/moulded case circuit breaker.
		1993/IEC 60947-1989
b)	IS:3156	Voltage transformers.
c)	IS:2705	Current transformers for metering and protection with classification
	Part-I, II	burden and insulation.& III 1964
d)	IS:9224	Low voltage fuse and protection.
e)	IS:3231	Specification for electrical relays for power system protection.
f)	IS:8623	Specification for factory built assemblies of switchgear and control gear for voltage upto and including 1000-V AC/1200 V-DC.
g)	IS:4237	General requirements for switch gear and control gear for voltage not exceeding gear.
h)	IS:2147	Degree of protection provided by enclosures for low voltage switch gear and control gear.
i)	IS:1018	Switchgear and control gear selection/installation and maintenance.
j)	IS:1248	Direct acting electrical indicating instruments.
k)	IS:375	Arrangement for switchgear, bus bars, main connections, auxiliary wiring and marking.
l)	IS:2959	AC contactors for voltage not exceeding 1000V.
m)	IS:5578	Guide for marking of insulated conductors.
n)	IS:11050	Guide for forming system of marking and identification of conductors & apparatus terminal.
o)	IS:1248	Direct acting indicating analogue electrical measuring instruments and Testing accessories.
p)	IS:600	Code of practice for phosphating of iron & steel.

The board shall be metal enclosed single front, indoor, floor mounted, free standing type or wall mounting type. The panel shall be designed for a degree of protection of IP-55. However bus bar chamber shall have IP: 42 degree of protection incase bus bar rating exceed 1600 Amps. Keeping in view the operating height of the top switch 1750mm from finish floor. 400mm clear space shall be left throughout the panel at bottom. The cold rolled sheet steel will be of 2mm thick. The structure shall be mounted on a rigid base frame of folded sheet steel of minimum 3mm thickness and 50mm height.
All cutouts and covers shall be provided with synthetic rubber gaskets (preferably neoprene).
The panel shall be divided into distinct vertical sections each comprising of:

i) Complete enclosed bus bar compartment for running horizontal and vertical bus bars.
ii) Complete enclosed switchgear compartment one for each circuit for housing air circuit breaker, MCCB/MPCB with starters etc.
iii) Compartment for power and control cables of at least 300mm width covering entire height provided.
iv) The front of each compartment shall be provided with hinged single leaf door with locking facilities. Panel shall be provided with suitable lifting facilities. Isolators and MCCB/ACBs and accessories shall be of fixed / draw out type.

Each feeder shall have compartmentalized or non-compartmentalized for MCB feeders only. Ri-tall type with separate construction cable entry shall be from top/bottom (3mm thick gland plate with suitable numbers & sizes of knockout holes (as called for in schematic/ fabrication drawings) shall be provided.
The panel shall be provided with three phase buses & neutral bus bars of high conductivity electrolytic copper/Aluminium sections throughout the length of the panel & shall be adequately supported and braced to withstand the stressed due to the short circuit current of 35 KA rms. for 1 sec. Maximum temperature rise of bus bars and bus bar connection while carrying rated current shall not exceed 40 Deg.C over an ambient temperature of 50 Deg.C. The Current density of Bus Bar shall be 1.0 Amp/mm^2 for Aluminium and 1.5 Sq.mm/mm^2 for copper.
The minimum clearance in air between phases and between phases and earth for the entire run of the bus bar connections shall be 32mm minimum. Bus bars support insulators shall be made of non-hydroscopic non-combustible track resistant and high strength SMC or polyester fiberglass moulded material.
All bus bars shall be colour coded as per IS: 375.
Copper /G.I./Aluminium earth bus of suitable size shall be provided at the bottom of the panel throughout the length. Similarly suitable size of strip in each vertical section for earthing the individual equipment/accessories shall be provided and connected to main horizontal bus.
Sheet steel hinged lockable doors shall be interlocked with MCCB to prevent opening of the panel when MCCB is on position. Safety interlock with operating handle shall be provided.
Contactors shall be electromagnetic type with interrupted duty as per IS: 2959. The main contacts shall be of silver or silver alloy, provided with minimum 2 NO and 2 NC auxiliary contacts. The push button should be of shrouded type and each should be provided with 1 NO and 1 NC contact. Colour coding shall be as per IS: 6875 (Part-II).

ACB (IEC 60947-2; IS 13947)

The circuit breaker shall be of air break type in order to eliminate fire and explosion risk and shall comply with the IEC with a rupturing capacity of not less than 35 MVA at 415 volts or as specified elsewhere (The service short circuit breaking capacity shall be as specified and equal to the short circuit with stand value Ics = Icu). The breaker shall be provided with variable microprocessor based releases within built fault differentiation for integral over load, short circuit and earth fault & other protection, LED indication for type of fault, CT's for protection and measurement class and LCD display of curves and parameters. Electrical endurance without maintenance shall be greater than 2000 cycles.
Mechanical & electrical anti pumping devices shall be provided in breaker, as required.

The breaker shall have memory for logging history for type of fault, load, time & date and the Vendor shall mention in the data sheet for no. of loggings available in the breaker memory.
The breaker shall consist of a horizontal draw out pattern triple/four pole, fully interlocked, independent manual/motorized spring operated mechanism. The mechanism should be such that the circuit breaker is at all times free to open immediately. The trip coil is energized. Current carrying parts should be silver plated and suitable arcing contacts shall be provided to protect the main contact arc-chutes for each pole shall be provided and shall be lifted out for the inspection of main and arching contact.
Self-aligning cluster type isolating contacts shall be provided on breaker for interlocking protection metering and for any other purposes. The breaker should have 3 distinct positions - SERVICE/TEST/ISOLATED within the cubicle.
The ACB shall be with molded housing class II front fuse and shall be suitable for Isolation as per the annexure 7.1.2 in the standard.
Breaker shall be provided with automatic safety shutters to screen the main live contact when the breaker is withdrawn. The frame of the circuit breaker could be positively earthed when the breaker is racked into the cubicle.
The following safety arrangements shall be provided for the safety of the personnel to prevent mal-operation.

i) Interlock to prevent the truck from being withdrawn or replaced except in the fully isolated position.
ii) Interlock to prevent earth connection from being made by the earthing device except breaker is open.
iii) Interlock to prevent the breaker being closed unless it is fully raised.
iv) Interlock to prevent the breaker from being made alive without its rack in position.

3.2 MOULDED CASE CIRCUIT BREAKER (MCCB)

MCCB shall confirm to the latest IS13947-1993/IEC 60947. The Service Short Circuit Breaking Capacity (Ics at 415 VAC) should be as specified.
MCCB shall be Current Limiting and comprise of Quick Make – Quick Break switching mechanism & Double Break Contact system. The arc extinguishing device and the tripping unit contained in a compact, high strength, heat resistant, flame retardant, insulating molded case with high withstand capability against thermal and mechanical stresses.
The Service Short Circuit Breaking Capacity (Ics at 415 VAC) should be made and is the required minimum value for that feeders/ panel, however if the rating of feeder mentioned is not available, the contractor shall used next higher rating without any extra charges. The service short circuit breaking capacity shall be equal to ultimate breaking capacity of MCCB, i.e. Ics= 100%Icu
The handle position shall give positive indication of 'ON', 'OFF' or 'Tripped' thus qualifying to disconnection as per the IS/IEC indicating the true position of all the contacts. In case of 4 pole MCCB the neutral shall be defined and capable of offering protection upto full rating. The remote tripping coil should be of continuous duty.
The switch shall be normally a fixed control box type heavy-duty unit.

3.3 CONTACTORS

The contactors should comply with the latest IEC947-4 and the corresponding IS13947-4 standards. They shall have UL and CSA approval. The contactors should be rated for AC3 duty at 415V and 50Hz. The contacts should be fast closing and fast opening type. The making and breaking capacity values of the contactors should be as follows (as per IEC947-4):
The contactors should be capable of frequent switching and should operate without de-rating at 600C for AC3 applications. They should be climate proof as standard .The coil of the contactor should have class H insulation to support frequent switching.

The rated voltage of the contactor shall be equal or superior at 690 V, and rated insulation voltage shall be 690 V. The rated impulse voltage of the contactor should be 8 KV.

The contactor should be modular in design with minimum inventory requirements and built in mechanically interlocked 1NO 1NC auxiliary contact up to 32A. They should be suitable for the addition of auxiliary contacts and other electrical auxiliaries without any compromise on the performance or the operation of the contactors.

The control and power terminals should be at separate **layers preferably with colour coding (black for power and white for control**)

All contactors power connection will be **finger safe (IP2X)** as standard.

3.4 NAME PLATES & LABELS

i) Panel and all modules shall be provided with prominent engraved identification plates. The module identification designation. For single front switchboards, similar panel and board identification labels shall be provided at the rear also.

ii) All name plates shall be of non-rusting metal or 3-ply lamicold, with white engraved lettering on black background. Inscription and lettering sizes shall be subject to employer approval.

ii) Suitable stenticilled paint marks shall be provided inside the panel/module identification of all equipments in addition to the plastic sticker labels. These labels shall be partitioned so as to be clearly visible and shall have the device number, as mentioned in the module wiring design.

3.5 PAINTING

All steel work shall be pretreated in tanks and finally powder coated of approved shade.

3.6 WIRING

Control and protective wiring shall be done with copper conductor PVC insulated 1100 volts grade multi-stranded flexible wire of 2.5sq.mm cross section. The colour coding shall be as per latest edition of IS: 375.

Each wire shall be identified by plastic ferrule. All wire termination shall be made with type connection. Wire shall not be taped or spilled between terminal points.

Terminal blocks shall preferably by grouped according to circuit function and each terminal block group shall have at least 20% spare capacity.

Not more than one wire shall be connected to any terminal block. All doorframe of L.T. switchboard shall be earthed with bare braided copper wire.

3.7 TESTING & INSPECTION

After completion of all work at the manufacturer's works the switchboards shall be inspected and tested in presence of Purchaser's representative. However, stage inspection may be carried out from time to time to check progress of work and workmanship. The following tests shall be carried out:

i) All routine tests specified in relevant Indian/British Standards shall be carried out on all circuit breakers.

ii) Test for protective relay operation by primary or secondary injection method.

iii) Operation of all meters.

iv) Secondary wiring continuity test.

v) Insulation test with 1000 Volts megger, before and after voltage test.

vi) HV test on secondary wiring and components on which such test is permissible (2 KV for one minute)

vii) Simulating external circuits for remote operation of breaker, remote indicating lights and other remote operations, if any.

viii) Measurement of power required for closing/trip coil of the breaker.

ix) Pick up and drop out voltages for shunt trip and closing coils.

x) CT Polarity test.

Vendor shall provide all facilities such as power supply, testing instruments and apparatus required for carrying out the tests. Required copies of test certificates for all the tests carried out along with copies of

type test certificates and certificates from Sub-Vendor for the components procured from them are to be submitted before dispatch of switchboards.

3.8 DRAWINGS AND INFORMATION

The Vendor shall furnish following drawings/documents in accordance with enclosed requirements:

i) General Arrangement drawing of the Switchboard, showing front view, plan, foundation plan, floor cutouts/trenches for external cables and elevations, transport sections and weights.

ii) Sectional drawings of the circuit breaker panels, showing general constructional features, mounting details of various devices, bus bars, current transformers, cable boxes, terminal boxes for control cables etc.

iii) Schematic and control wiring diagram for circuit breaker and protection including indicating devices, metering instruments, alarms, space heaters etc.

iv) Terminal plans showing terminal numbers, ferrules markings, device terminal numbers, function etc.

v) Relay wiring diagrams.

vi) Equipment List.

Vendor shall furnish required number of copies of above drawings for Purchaser's review, fabrication of switch boards shall start only after Purchaser's clearance for the same. After final review, required number of copies and reproducible shall be furnished as final certified drawings.

The information furnished shall include the following:

i) Technical literature giving complete information of the equipment.

ii) Erection, Operation and Maintenance Manual complete with all relevant information, drawings and literature for auxiliary equipment and accessories, characteristics curves for relays etc.

3.9 DEVIATIONS

Deviation from specification must be stated in writing at the quotation stage.

In absence of such a statement, it will be assumed that the requirements of the specifications are met without exception.

3.10 EARTHING

All electrical equipment is to be earthed by connecting two earth tapes from the frame of the equipment to a main earth ring. The earthing ring will be connected via several earth electrodes. The cable armour will be earthed through cable glands. Earthing shall be in conformity with provision of rules 32, 61, 62, 67 & 68 of Indian Electricity Rules 1956 and as per IS-3843-1966.

The following shall be earthed:

1. Transformer & D.G. Set neutrals.
2. Transformer Housing.
3. H.T. Panels.
4. Non-current carrying metallic parts of electrical equipment such as switchgear, bus ducts, rising mains, panel boards, motor control centers, power panels, distribution boards, cable trays, metal conduits, welding sockets etc.
5. Generator & motor frames.
6. All fixtures, sockets outlets, fans, switch boxes and junction boxes etc. shall be earthed with PVC insulated copper wire as specified in item of work. The earth wires ends shall be connected with solder less bottle type copper lugs.
7. The third pin of Outlets on UPS shall be provided with separate PVC insulated Cu. Wire (green with yellow stripe) as Isolated ground earth wire apart from the earthing of box.

The earth connections shall be properly made. A small copper loop to bridge the top cover of the transformer and the tank shall be provided to avoid earth fault current passing through fastened bolts, when there is a lightning surge, high voltage surge or failure of bushings.

The shop drawing for earthing system shall be prepared by the contractor and be got approved by Owner/Architect. The work shall be done in accordance with approved drawings.
All earth electrodes shall be given to a depth sufficient to reach permanently moist soil. Their location shall be marked and approval taken from Engineer-in-Charge before excavation for the same.
The earth electrodes shall be tested for earth resistance by means of a standard earth test ohms meter. All tests shall take place during the dry months, preferably after a protected dry spell.
The resistance between earthing system and the general mass of earth shall not be greater than 2 ohm.
The earth loop resistance to any point in the electrical system shall not be in excess of 1 ohms in order to ensure satisfactory operation of protective devices.
The resistance to earth shall be measured at the following: -

a) At each electrical system ground or system neutral ground.
b) At one point on each grounding system used to ground electrical equipment enclosures.
c) At one point on each grounding system used to ground wiring system enclosures such as metal conduits and cable sheaths or armoured.

All earthing conductors shall be of high conductivity copper/ G.I. and shall protect against mechanical damage. The cross-sectional area of earth conductors shall not be smaller than half that of the largest current carrying conductor.

a. Pipe Earth Electrode

G.I. pipe shall be of medium class and of the size as per NBC,2005. G.I. Pipe electrode shall be cut tappered at bottom and provided with holes of 12mm dia drilled not less than 7.5cm from each other upto 2m of length from bottom. The electrode shall be burried in the ground vertically with its top not less than 20cm below ground level.

b. Plate Earth Electrode

The plate earth electrode shall consist of copper plate or G.I. plate as per item of work. The plate electrode shall be burried in ground with its faces vertical and top not less than 2.5m below Ground level. The plate shall be filled with charcoal dust and common salt filling, extending 15cm around it on all sides.
A watering pipe of medium class G.I pipe shall be provided. The top of the pipe shall be provided with a funnel and a G.I. mesh screen for watering the earth. In the case of pipe electrode a removable plug shall be provided. This will be housed in a masonry sump (with cement plastering) of not less than 40 cm square and 40 cm deep. A C.I. frame with hinged cover of 10mm thickness and locking arrangement shall be suitably provided over the sump. The earthing lead from electrode onwards shall be suitably protected from mechanical injury by a suitable dia medium class PVC/ HDPE pipe. The overlapping in G.I. strips in joints shall be rivetted with revets and welded in approved manner. The protection pipe within ground shall be burried at least 30 cm deep (to be increased to 60cm in case of road crossing and pavements). The portion within the building shall be recessed in walls and floors to adequate depth. In the case of plate earth electrode, two nos. 50mm x 6mm GI/Cu. Strip the earthing lead shall be securely bolted to the plate with two zinc passivated bolts, nuts, checknuts and washers. In case of pipe electrode, it shall be connected by means of a through bolt, nuts and washers and cable socket. Main earthing conductor is taken from the earth electrode with which the connection is to be made.
No earth pit shall be fixed within 2.5M of a wall of foundation. The location of the earth electrode will be such where the soil has reasonable chance of remaining moist. Effort shall be made to locate them in grass lawns or near flowerbeds or water taps. The distance between two earthing stations shall be at least 3.0 meters.

3.11 Testing and Commissioning

Testing and commissioning shall be done as per the programme/ instructions to be given by employer or authorised representative. All testing equipments necessary to carry out the tests shall be arranged by the Contractor.

Before the electrical system is made live, the Contractor shall carry out suitable tests to the satisfaction of employer or authorized representative that all equipment wiring and connections have been correctly done and are in good working condition and will operate as intended.
All tests shall be conducted in the presence of the Owner authorised representative by the Contractor and shall be notified one week before tests are to take place.
All measurements shall conform to establish minimum acceptable test values. Owner's Engineer reserves the right to approve all test results before circuit or equipments are energised for the first time.

4. Specification For Lightening Protection System

4.1 DIRECT LIGHTENING STRIKE PROTECTION SYSTEM: AIR TERMINALS

The direct lightening protection system should be based on advance technology Early Streamer Emission designed to intercept the lightening by anticipation an upward leader by corona effect before a lightning strike and safely convey the lightning current to earth through a known and preferred route.

The direct lightning protection system shall include components like Air termination equipment, Air terminal function test meter, transient Event Counter, mechanical support, down conductors, Surge protection and earthing system based on chemical earth pits to reduce the earth resistance.

The design of the components shall be proven with Indian conditions and traceable to field research, laboratory testing, real lightening test, fundamental analysis and statically levels of the lightening event

4.2 ESSENTIAL REQUIREMENTS

(a) A single Air Terminal must provide an umbrella protection against direct lightning strikes covering the entire area in question. The calculation of the protection radius must be based on the Rolling Sphere Theory methodology as per standards.

(b) The Air Terminal shall be non- radioactive and require no special licensing. The materials used shall be non corroding in all weather conditions i.e. rain, thunderstorm, snow, wind, dry, humid and chemical environments. It should have a central pick- up rod upper series of electrodes, Autonomous electric device generating the energy from the ambient condition through a set of 3 stelar cells environmentally protected NIMH rechargeable battery and triggering devices housed inside a weather proof stainless steel enclosure.

(c) The Air Terminal offered must not be any external source of power like peizo electric ceramics based transducer which requires wind to work.

(d) The Air Terminal should not be a static collector. It should be able to generate 35 kV to 4 kV at the tip when triggered.

(e) Tip should be capable of changing to reverse polarity using electronic triggering device based on sensing the type of lightning.

(f) The Air Terminal must be capable of handling multiple strokes of lightning currents and should be maintenance free after installation. However the functionality of the system should be measurable with a test meter. The test meter provided along with the Air-

Terminal should be able to check the functionality of the ESELC Air Terminal. Copy of technical details of the test meter must be attached with the offer.

(g) The Air Terminal must be tested in a high voltage laboratory in accordance with NFC-17-102 Appendix- C and a copy of test certificate to be attached with the offer.

(h) The Air Terminal offered must be tested in real lightning test condition by International Center for Lightning Research & Testing (ICLRT) or any Indian / International Research laboratory in the field of real lightning test using LRS and a copy of the test report must be attached with the offer. Or must be tested in the independent lab like KERI, BAZET, WUHANG, KARKOV….etc.

(i) The Air Terminal offered must be tested by Central Power Research Institute (CPRI) under min of 40 kA, 8/20 surge.

(j) A lightning strike recorder in a IP67 grade weather proof enclosure having 6 digit LCD with reset facility to be provided. Since mechanical type of counters is prone for frequent damages due to wear and tear the counter must be an electronic one.

(k) A good quality ISI mark PVC insulated flexible copper down conductor should be provided with suitable clamping/ saddling to convey the captured energy by the ESE Air Terminal to the grounding system to a maintenance free low impedance earth pit charged with chemical earth enhancing compound.

4.3 TECHNICAL SPECIFICATION

Air Terminal

I.	Type:	Early Streamer Emission (ESE) or controlled streamer emission Air Terminal
II.	Efficiency:	More than 98%
III.	Material used:	Chrome plated copper and stainless steel
IV.	Radius of Protection:	40 meters /53meters/79meterss/107 metres
V.	Constructional Details:	Central pick- up rods, upper and stelar cells with rechargeable battery for triggering device housed in a stainless steel weather proof and non corroding housing.
VI.	Triggering devices- type:	Electronic triggering device fitted inside the stainless steel housing.
VII.	Sensor- type:	Polarity rate of change of charge and quantity of charge Sensors arranged around the central pick- up rod internally

		connected with the triggering device for the fast sensing of atmosphere charge build up.
VIII.	Type of Fixing:	High mast fixed as required on base arrangement with Sound mechanical fittings & guying to take care of wind velocity of 150 Km/Hr.
IX.	Approvals/ Standards:	1. Tested in a high voltage laboratory conforming to NF C 17- 102 Appendix – C, and CPRI tested. 2. Tested in real lightning conditions or independent test labs.

Air Terminal Support

i.) The installation materials used should be non corrosive and long lasting.

ii.) The installation of the roof/ Tower should be at a height as indicated in PS clause 3.2 (VIII) from the finished roof level.

iii.) The support shall be securely bolted to the roof of the building to enable the air termination and mast system to withstand maximum locally recorded wind velocities.

Down Conductor

i.) Down conductor should be provided for each Air Termination as per ESE standard NFC 17 102 and should be connected to individual earth pits.

ii.) The down conductor should not be less than 55 Sq. mm.

iii.) Down conductor used should not be pure electrolytic copper cable with PVC insulation. Coaxial, Shielded down conductors are not acceptable.

iv.) In the final 3m to the ground and where it is exposed to human intervention, the down conductor shall be placed in a protective PVC pipe of 3mm minimum wall thickness so as to avoid mechanical damage and increase human safety.

v.) The down conductor shall be installed in accordance with the manufacturer's instruction and
should not subject to bends of less than 0.5 meters radius.

vi.) The down shall be secured to the structure/ building by approved metallic fastenings at least every 1 meters.

Specification of Down Conductor

i.)	Type:	PVC insulated, pure electric flexible copper.
ii.)	Make:	Suitable ISI mark with test certificate of the cable.
iii.)	Size:	Not less than 55 sQ.mm
iv.)	Insulation:	PVC insulation.
v.)	No. of down conductors: Per Air Terminal.	Two down conductors should be provided at the Sites were the structure height is more than 28 mtr or

		if the horizontal length of the down conductor is more than vertical length.
vi.)	Conductor material:	Pure electrolytic Copper.

Transient event counter:

i.)	Power Source:	Lithium NiMH battery 10 years life.
ii.)	Construction:	Polycarbonate enclosure, clear lid, IP65 rating.

Earthing

i.)	Type of grounding arrangements:	The copper earth electrode to be placed in a earth pit hole and connection to be made by stainless nuts and bolts/ bi metallic U clamps and quantity of eco friendly earth enhancing compound be used. The earth enhancing compound must be as suitable compound by CPRI by long term test.

ii.)	Dimension of earth electrode:	Suitable technically to achieve the earth resistance <05 ohms>.
iii.)	Material for earth rod:	Manufactured from high quality copper.

iv.)	Quantity of earth enhancing:	Min. 20 kg per earth pit.
v.)	Earth resistance:	Less than 02 ohms.
vi.)	Earth enhancing compound:	Must have (Ionic, Dispersion, Hygroscopic, Expansion, Diffusion and other long lasting components.) It should not contain cyanide; level of heavy metal should be in acceptable unit.

Air terminal test meter

a) A battery operated Air Terminal test meter should be provided with each active Air Terminal for the maintenance purpose.

b) The maintenance test meter should have the facility to check the Air Terminal for its functionality.

c) It should be able to test series of component & sequence and identify a fault air terminal.

d) In case of an Air Terminal is faulty the meter should indicate it with audio as well as visual alarm.

e) Separate indication should be provided for healthy air terminal, battery status, Defective Air Terminal as well as the status of cloud sensors and corona triggering terminals.

Installation of complete system

Complete Lightning protection system including air termination, down conductors, chemical earthing etc shall be installed strictly in accordance with laid down norms, procedure and

recommendations of manufacturers and by a qualified engineer/ representative of manufacturers only.

5. SPECIFICATION FOR CAPACITOR BANK & CAPACITOR CONTROL PANEL

Power factor correction capacitors shall conform in all respects to IS 2834-1964. The capacitors shall be suitable for 3 phases 415V at 50Hz. Frequency to form a bank of capacitors of desired capacity. All these units shall be connected in parallel by means of high conductivity electrolytic copper busbars of adequate current carrying capacity having S.C rating of 25 KA for 1 sec. Each capacitor bank shall be for PVC insulated aluminium conductor armoured cables. Two separate earthing terminals shall be provided for each bank for earth connection. The capacitor bank shall be housed indoor.

The capacitor bank shall be subject to routine tests as specified in relevant Indian Standard and the test certificate shall be furnished. The capacitor shall be suitable for indoor use up to 45 Deg. C over and above ambient temperature of 50degree C. The permissible overloads shall be as given below:

a) Voltage overload shall be 10% for continuous operation and 15% for 6 hours in a 24 hours cycle.
b) Current overloads 15% for continuous operation and 50% for 6 hours in a 24 hours cycle.
c) Overload of 30% continuously and 45% for 6 hours in a 24 hours cycle.

The capacitor banks shall be floor mounting type indoor housing using minimum floor space with protective guard or fencing. The capacitor bank shall be provided with 7% Detuned reactor filter to compensate third harmonics from being generated.

The insulation resistance between capacitor terminals and containers when test voltage of 500V A.C. is applied shall not be less than 50 mega ohms.

- Capacitor bank and switching equipments shall be housed in a cubicle having degree of protection IP-51 and constructed with sheet steel of minimum 2mm thickness.
- Capacitors shall be unit type having non-PCB, non-flammable non-toxic dielectric.
- Necessary discharge resistor shall be provided externally to reduce the terminal voltage to or less then 50V in 60 seconds of disconnection from supply.
- Testing shall be done as per applicable standards for shunt capacitors.

5.1 Capacitor Control Panel

The capacitor control panel shall general comprise of the following:

a) Automatic power factor correction relay.
b) Step controller with reversing motor.
c) Time delay and no-volt relays.
d) Protection MCCB / MCB.
e) Contactor (AC-3 duty) for individual capacitors of suitable rating.
f) Change over switch for either automatic operation or manual operation with push button control.
g) C.T.s with ammeter and selector switch
h) Voltmeter with selector switch.
i) Indicating lights RYB.

All the capacitors and contactors shall be interconnected with PVC insulated copper conductor wires of adequate size in a neat and acceptable manner. Three phases and neutral bus bar shall be provided in panel as required.

The above control gear, P.F. meter, Digital Microprocessor based P.F. correction relay, push button station etc. shall be housed in a sheet steel metal enclosure cubical type, free standing front operated with lockable doors. The panel shall be fabricated from MS sheet steel 2mm thick and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet steel

shall be seam-welded. The panel shall be totally enclosed design completely dust tight and vermin proof. Gaskets between all adjacent units and beneath all covers shall be used to render the joints effectively.
All sheet steel material used in the construction of capacitor control panel should have undergone a rigorous rust proofing process comprising Alkaline Degreasing, descaling in dilute sulphuric acid and recognised phosphating process. The steel work should then receive two coats of primer before applying final coat of epoxy paint of approved shade.

5.2 Quality Assurance

Quality Assurance shall follow the requirement of Employer. Q.A. documents as applicable.
Q.A. involvement will commence at enquiry and follow through to composition and acceptable thus ensuring total conformity to purchaser's requirement.

6.A. SPECIFICATION OF H.T. CABLE (XLPE) (11 KV)

The cross-linked polyethylene (XLPE) cable shall be aluminium conductor PVC outer sheath steel strip armoured over inner sheath construction. XLPE cable shall conform to testing in accordance with IS: 7098 (Part-I) 1977 and (Part-II) 1973. The screening shall be done on individual cover. The armouring applied over the common covering shall be flat steel wires. Each and every length of cable shall be subjected to routine test.
The termination and jointing techniques for XLPE cables shall be by using heat shrinkable or push on cable jointing kits.
While laying underground cables in ducts care should be taken so that any underground structures such as water pipes, sewerage lines etc. are not damaged. Any telephone or other cable coming in the way shall be properly protected as per instructions of the Engineer-in-charge. The H.T. cable shall be laid at least 900mm for cable upto 33 KV (E) below the ground level in a trench 450mm wide.
Insulation tests shall be done before and after laying of cables.

6.B SPECIFICATION OF L.T. CABLES & WIRE

a) Wires

The design manufacture, testing and supply of single core **FRLS PVC** insulated 1.1 KV grade multi-stranded twisted wires under this specification shall comply with latest edition of following standards.
IS : 3961 Current rating for cables.
IS: 5831 PVC insulation and sheath of electric cables.
IS : 694 PVC insulated cables for working voltage upto and including 1100 volts.
IEC: 754(i) FRLS PVC insulated cable.
Copper multi-stranded twisted conductor FRLS PVC insulated wires shall be used in conduit as per item of work.
The wires shall be colour coded R Y B, for phases, Black for neutral and Green for earth.
Progressive automatic in line indelible, legible and sequential marking of the length of cable in metres at every one metre shall be provided on the outer sheath of wire.

b) Cables

The design, manufacture, testing and supply of the cable under this specification shall comply with latest edition of following standards:

IS : 8130	Conductors for insulated electric cables and flexible cords.
IS: 7098	XLPE insulation and sheath of electric cables.
IS : 3975	Mild steel wires, strips and tapes for armouring cables.
IS : 7098	Current rating of cables.
IS: 7098	XLPE insulated (heavy duty) electric cables for working voltage upto and including 1100 volts.
IS: 424-1475	(F-3) Power cable-flammability test.

Specification for cross-linked polyethylene insulated XLPE sheathed cable for working voltage upto 1.1 KV.

Specification for XLPE insulated (heavy duty) electric cables for working voltages upto and including 1100 volts.

ASTM-D: 2863 Standard method for measuring the minimum oxygen concentration to support candle-like combustion of plastics (Oxygen Index).

ASTM-D: 2843 Standard test method for measuring the density of smoke from the burning or decomposition.

IEEE : 383 Standard for type of test Class-IE, Electric cables, feild splices and connections for power generation station.

ASTME: 662IEC:754(x) Standard test method for specific optical density of smoke generated by solid materials.

IS : 10418 Cable drums.

Testing of Cables

Cables shall be tested at factory as per requirement of IS: 7098 Part-I. The tests shall incorporate routine tests, type tests and acceptance tests. Prior to laying of cables, following tests shall be carried out:

i) Insulation test between phases and phase to earth for each length of cable before and after jointing.
   On completion of cable laying work, the following test shall be conducted in the presence of Architect/Owner.
ii) Insulation resistance test (Sectional and overall) 1000/5000V depending upon the voltage grade of cable.
iii) Continuity resistance test.
iv) Sheathing continuity test.
v) Earth test.

Laying of Cable

The cable drum shall be placed on jacks before unwinding the cable. Great care shall be exercised in laying cables to avoid forming links. At all changes in directions in horizontal & vertical places, the cable shall be bent with a radius of bend not less than 8 times the diameter of cable.

The cable of 1.1KV grade shall be laid not less than 760mm below ground level in a 460mm wide trench (throughout), where more than one cable is to be laid in the same trench; the width of the trench shall be increased.

In case the cables are laid in vertical formation due to unavoidable circumstance the depth per tier shall be increased by 200mm (minimum). Cable shall be laid in reasonably straight line, where a change in direction takes place a suitable cur-vature shall be i.e. either 12 times the dia meter of the cable or the radius of the bend shall not be less than twice the diameter of the cable drum or whichever is less. Minimum 3-meter long loop shall be provided at both sides of every straight through joint & 3 meters at each end of cable or as directed at site.

Greater care shall be exercised in handling the cable in order to avoid forming 'Kinks'. The cable drum shall in-verbally convey on wheels and the cable unrolled in right direction as indicated on the drum by the manufacturer. The cable shall be pulled over rollers in the trench steadily and uniformly without jerks and strains.

Where the cables are to be laid in ducts (pucca trenches) inside the building, they will have to be laid on MS rack/ on MS cable trays grouted in walls trenches. Cables sizing through floors shall be protected from mechanical damage by a steel channel to a height of one meter above the floor where cable pass through wall they shall be sleeved with PVC/steel conduit.

Where the cables are laid in open (in building) along walls, ceiling or above false ceiling, cable rack (ladder type) or cable tray shall be provided. The size of the cable tray or rack shall depend on the

number of cables to pass over that rack. Cable tray/rack shall be properly supported through wall/ceiling according to the site conditions. Cable laid on tray & riser shall be neatly dressed &clamped at an interval of 1000 mm & 750mm for horizontal & vertical cable run respectively either side at each bend of cable. All power cables shall be clamped individually & control cables shall be clamped in groups of three or four cables. Clamps for multicore cables shall be fabricated of 25x3 GI flats. Single core power cable shall be laid in trefoil formation & clamped with trefoil clamps made of PVC/fibre glass.

Cable openings in wall/floor shall be sealed by the contractor suitably by hession tape & bitumen compound or by any other proven to prevent ingress of water.

After the cables are laid, these shall be tested as per IS and the results submitted to Engineer and in case the results found unsatisfactory, all the repairing/ replacing of cables will be done by the contractor free of charge.

Fire Seal System

i) All the floor/wall opening provided for cable crossing shall be sealed by fire seal system.

ii) The fire proof sealing system shall fully comply with the requirements of relevant IS/BS: 476 Part-B. The fireproof seal system shall have minimum one hour fire resistance rating.

iii) The fire proof seal system shall be physically, chemically, thermally stable and shall be mechanically secured to the masonry concrete members. The system shall be completely gas and smoke tight, **ant rodent** and anti-termite.

iv) The material used in fireproof seal system shall be non-toxic and harmless to the working personnel.

v) Type of fireproof seal system shall be foaming type or **flame mastic** type compound or approved equivalent.

After laying and jointing work is completed, high voltage test should be applied to all cables to ensure that they have not been damaged during or after the laying operation and that there is not fault in the jointing.

Cables for use on low and medium voltage system (1.1KV grade cables) should withstand for 15 minutes a pressure of 3000V DC applied between conductors and also between each conductor and sheaths. In the absence of pressure testing facilities it is sufficient to test for one minute with a 1000V insulation tester In case the test results are unsatisfactory the cost replacements and extra work of removal & laying will be made good by the contractor.

Cable shall be installed so that separation shown in the table below are observed.

HV Cable (11 KV)	- HV Cable (11 KV)	50 mm
ELV & LV 230 V/433 V	- ELV & LV cable 230 V/433 V	Equal to the diameter of The bigger cable.
HV cables (11 KV)	- ELV & LV cables 230 V/433 V	300 mm
LV cables 433 V	- Telephone/Instrument cable	350 mm
All cables	- All hot pipe work	200 mm

CABLE TRAYS

a. **Ladder type Cable tray** – for Power Cables only

Cable trays shall be ladder type fabricated out of mild steel/slotted angles and flats of required width as per design. Bends shall be prefabricated. The cable tray shall be hot dip galvanized or primed and painted with powder coating as approved by Engineer in charge. The minimum weight of the zinc coating shall be 460 gm/sq.m and minimum thickness of coating shall not be less than 75 microns.

b. **Perforated Cable tray** – for Power Cables & Low current service both

The perforated cable trays are fabricated out of 1.6mm thick CRCA sheet steel having minimum 50mm depth, hot dip galvanized or epoxy coated of approved shade. Perforations are maximum 10mm spaced at maximum 20mm distance. The cables shall be tied with the cable tray with nylon strip/aluminium clamps/M.S. clamps as per requirements.

Suitable provision shall be made where a tray crosses expansion joints. The width of the tray shall allow for a suitable separation between cables the design shall allow for adequate bending radius for the sizes of cables. No sharp bend to be allowed in cable tray. Joints between sections shall be bolted.

The tray shall be suspended from the surface of the concrete slab by means of approved steel hangers spaced at a distance of not more than 125cms. Suitable bushes shall be provided where cables pass through apertures in the tray. Cables must be securely fixed to the tray with clamps or cable ties. In routing necessary barrier and spacing shall be maintained for cables of different voltages in case they lie side by side. Telephone cables shall cross the power cables only at about right angle and these two shall not run in close proximity. Full details of the tray shall be approved by the Site Engineer before fabrication. Earth continuity shall be maintained between each section of cable tray and each total run of tray shall be effectively bonded to the nearest earth continuity 0conductor. All nuts and bolts used shall be of galvanized steel.
Depending on the size of cable trays space of 20-33% has to be maintained for future expansion.
Cable tray is manufactured to comply with the specifications of National Electrical Code (NEC) and National Electrical Manufacturer's Association (NEMA).

. 7.SPECIFICATION FOR INTERNAL ELECTRICAL WORKS

7.1 Conducting (M.S Conduit)

All conduits shall be of heavy gauge solid drawn ERW welded manufactured out of 16 (1.6mm) gauge MS Sheet up to 32mm dia and of 14 (2 mm) gauge for sizes higher than this. Both inner and outer surfaces shall be smooth without burrs, dents and kinks. Conduits shall be black stove enameled inside and outside. The cross section of conduit shall be uniform throughout. The welding shall be uniform such that welded joints do not yield when subjected to flattening test. Welded joint shall not break when threaded or bent at an angle. Conduit shall conform to specifications of IS: 9537 (Part-II) and the capacity of conduits shall be in accordance with the standards and shall never be exceeded. The minimum size of the conduit shall be 20mm dia. Care shall be taken to ensure that all conduits are adequately protected while stored at site prior to erection and no damaged conduit shall be used.

7.2 PVC Conduit

All conduits shall be high impact rigid 2mm thickness PVC heavy duty type and shall comply with I.E.E. regulations for non-metallic conduit 2mm thick as per IS-9537/1983 (Part-III). All sections of conduit and relevant boxes shall be properly cleaned and glued by using epoxy resin glue and the proper connecting pieces. Inspection type conduit fittings such as inspection boxes, drawn boxes, fan boxes and outlet boxes shall be M.S. or otherwise mentioned. Conduit shall be terminated with adopter/PVC glands as required.

7.3 Accessories

Conduit accessories such as normal bends, unions, circular junction boxes and pull boxes, locknuts etc. shall be heavy gauge type and approved make. Conduit accessories shall conform in all respects to IS: 3837-1966 with latest amendment. Wherever several conduits are running together, adequately sized adoptable boxes common to all runs shall be used to avoid inserting inspection boxes in the individual run.
Conduits shall be laid before casting in the upper portion of a slab or otherwise, as may be instructed or in accordance with approved drawings, so as to conceal the entire run of conduits and ceiling outlet boxes. Vertical drops shall be buried in columns or walls. Wherever necessary, chases will be cut by the contractor with the help of chase cutting m/c or by hand. .
Separate conduit shall be used for:

1) Normal light, fan call bell
2) 16 A power outlets

3) Emergency Light Point
4) Fire alarm System
5) Computer Outlets
6) P.A System
7) Telephone system
8) TV Network
9) Or any other services not mentioned here.

Wiring for short extensions to outlets in hung ceiling or to vibrating equipments, motors etc. shall be installed in flexible conduits.

7.4 Switch Boxes

The switch boxes shall be zinc passivity & shall not be less than **18 SWG** thick. It will be so designed that accessories could be mounted on integral pedestals or on adjustable flat iron mounting straps with tapped holes by brass machine screw. Leaving ample space at the back and on the sides for accommodating wires and check nuts at conduit entries. These shall be attached to conduits by means of check nuts on either side of their walls. These shall be completely concealed leaving edges flush with wall surfaces. Earthing terminal inside box shall be provided.

Moulded plate switches screw less as specified in item of work shall be provided. No timber shall be used for any supports. Boxes, which come within concrete, shall be installed at the time of casting. Care shall be taken to fix the box rigidly so that its position is not shifted while concreting.

7.5 FANS(Star Rated), REGULATORS AND CLAMPS:

Ceiling fans:

Ceiling fans including their suspension shall conform to accept standards [8-2(23)] and to the following requirements:

a) Control of ceiling fan shall be through its own regulator as well as a switch in series.

b) All ceiling fans shall be wired with normal wiring to ceiling roses or to special connector boxes to which fan rod wires shall be connected and suspended from hooks or shackels with insulators between hooks and suspension rods. There shall be no joint in the suspension rod, but if joints are unavoidable then such joints shall be screwed to special couplers of 5 cm minimum length and both ends of the pipes shall touch together within the couplers, and shall in addition be secured by means of split pins; alternatively, the two pipes may be welded. The suspension rod shall be of adequate strength to withstand the dead and impact forces imposed on it. Suspension rods should preferably be procured along with the fan.

c) Fan clamps shall be of suitable design according to the nature of construction of ceiling on which these clamps are to be fitted. In all cases fan clamps shall be fabricated from new metal of suitable sizes and they shall be as close fitting as possible. Fan clamps for reinforced concrete roofs shall be buried with the casting and due care shall be taken that they shall serve the purpose. Fan clamps for wooden beams, shall be of suitable flat iron fixed on two sides of the beam and according to the size and section of the beam one or two mild steel bolts passing through the beam shall hold both flat irons together. Fan clamps for steel joints shall be fabricated from flat iron to fit rigidly to the bottom flange of the beam. Care shall be taken during fabrication that the metal does not crack while hammer to shape. Other fan clamps shall be made to suit the position, but in all cases care shall be taken to see that they are rigid and safe.

d) Canopies on top and bottom of suspension rods shall effectively conceal suspensions and connections to fan motors, respectively.

e) The lead in wire shall be of nominal cross sectional area not less than 1.5mm^2 copper and shall be protected from abrasion.

f) Unless otherwise specified, the clearance between the bottom most point of the ceiling fan and the floor shall be not less than 2.4m. The minimum clearance between the ceiling and the plane of the blades shall be not less than 300 mm.
g) Fan Speed Minimum Airflow Efficiency Requirement
Low Speed : 1,250 CFM, 155 CFM\watt
Medium Speed : 3,000 CFM, 100 CFM\watt
High Speed : 5,000 CFM, 75 CFM\watt

7.6 Exhaust Fans:

The Exhaust Fan is provided with capacitor, start and run induction motor of robust construction, totally enclosed, continuous rated type and specially designed for fan duty. Direction of rotation can be changed simply by interchanging connections of the stator windings. Conforms to I.S. Specifications No. 2612/1297 and is generally provided with class 'A' insulation; class 'E' insulation can be offered to meet special requirements. Fan motors have tow ball bearings adequately lubricated.
For fixing of an exhaust fan, a circular hole shall be provided in the wall to suit the size of the frame which shall be fixed by means of rag-bolts embedded in the wall. The hole shall be neatly plastered with cement and brought to the original finish of the wall. The exhaust fan shall be connected to exhaust fan point which shall b e wired as near to the hole as possible by means of a flexible cord, care being taken that the blades rotate in the proper direction. Louver shutter where required shall have to be installed

Fan Sweep	**Speed (R.P.M)**	**Power Input (Watts)**	**Current in Amps.**	**Current in Amps.**	**Sound Level**	**Air Displacement (in free air flow condition)**
			1 - Ph.	**3 - Ph.**		
			230 V.	**400 V.**		**C.F.M**
						m^3/h
230 mm (9")	1370	40	0.18		49	440/759
300 mm (12")	920	45	0.2		46	750/1270
	1420	82	0.38	0.18	Fairly Quiet	1120/1920
380 mm (15")	920	78	0.35	0.18	Quiet	1450/2460
450 mm (18")	720	90	0.40	0.2	Quiet	2000/3400
	920	132	0.60	0.30	Fairly Quiet	2550/4340

8. SPECIFICATION FOR WIRING

All the wiring installation shall be as per IS: 732 with latest amendment. FRLS PVC insulated copper conductor cables shall be used for sub-circuit runs from the distribution boards to the points and shall be pulled into conduits. They shall be twisted copper conductors with thermoplastic FRLS insulations of 660/1100 volts grade. Colour Code for wiring shall be followed:
Looping system of wiring shall not be used, wires shall not be jointed.. No reduction of strands is permitted at terminations. No wire smaller than 1.5 sq.mm shall be used. Wherever wiring is run

through turnings or raceways, the wires emerging from individual distributions shall be bunched together with cable straps at required regular intervals. Identification ferrules indicating the circuit and DB number shall be used for submains sub-circuit wiring. The ferrules shall be provided at both end of each sub-main and sub-circuit.

Where single-phase circuits are supplied from a three phase and a neutral distribution board, no conduit shall contain the wiring fed from more than one phase. In any one room in the premises where all or part of the electrical load consists of lights, fans and/or other single phase current consuming devices, all shall be connected to the same phase of the supply. Circuits fed from distinct sources of supply or from different distribution boards or through switches or MCBs shall not be bunched in one conduit. In large areas and other situations where the load is divided between two or three phase, no two single-phase switches connected to different phase shall be mounted within one box.

No twisting connection between conductors shall be allowed.

Distribution wiring in 1100 volt grade 2x1.5 sq. mm (22/3) single core multi strand F.R.L.S PVC insulated & unsheathed twisted copper wire (approved make) in PVC casing & capping with all its accessories partly recessed in wall in PVC/conduit pipes and partly 20 mm size rigid conduit FR Precision make on surface (for ceiling points) with1x1.5 sq. mm (22/3) single core multi strand F.R.L.S PVC insulated & unsheathed copper wire to light/ceiling fan/exhaust fan/call bell points with piano type switch, call bell push, plate fixed on suitable size of G.I box of 3mm thick and 80 mm width as switch board cum Joint box flashed in wall complete with 3 nos suitable size phase, neutral cu bar with number of holes as required fixed on bakelite /hard rubber insulation of 1100v grade into the joint box (switch board) welded chairs and also arrangement for earth bus solidly jointed with board having number of standard holes for incoming/outgoing entry of polythene/PVC rigid conduit including good the damages to original finishes.

Industrial sockets shall be of moulded plastic and deeply recessed contact tubes. Visible scraping type earth terminal shall be provided. Socket shall have self-adjustable spring loaded protective cap. Socket shall have MCB/ELCB/RCCB. Maximum number of PVC insulated 1100 V grade/copper conductor cable conforming to IS: 694-1990. And followed by NBC,2005

Conduit size	**20mm**		**25mm**		**32mm**		**40mm**		**50mm**		**60mm**	
Wire size in sq.mm.	**S**	**B**	**S**	**B**	**S**	**B**	**S**	**B**	**S**	**B**	**S**	**B**
1.50	7	5	12	10	20	14	-	-	-	-	-	-
2.50	6	5	10	8	18	12	-	-	-	-	-	-
4	4	3	7	6	12	10	-	-	-	-	-	-
6	3	2	6	5	10	8	-	-	-	-	-	-
10	2	-	4	3	6	5	8	6	-	-	-	-
16	-	-	2	-	4	3	7	6	-	-	-	-
25	-	-	-	-	3	2	5	4	8	6	9	7

Notes:

1) The above table shows the maximum capacity of conduits for a simultaneous drawing in of cables.
2) The columns heads 'S' apply to runs of conduits which have distance not exceeding 4.25 m between draw in boxes and which do not deflect from the straight by an angle of more than 15

degrees. The columns heads 'B' apply to runs of conduit which deflect from the straight by an angle of more than 15 degrees.

3) Conduit sizes are the nominal external diameters.

8.1 DISTRIBUTION BOARDS & MCBs

a. General

Distribution boards shall be of standard make with MCBs as per approved make given. Distribution boards shall be constructed out of steel sheet all weld enclosure with double door IP42 protection and shall be powder coated. The MCBs shall be mounted on high-grade rigid insulating support and connected by electrolytic copper bus bars. Each incoming MCB isolator shall be provided with solder less cable sockets for crimping. Phase separation barriers made out of arc resistant materials shall be provided between the phases. Bus bars shall be colour coded for phase identification.

Distribution boards shall be recessed in wall. The mounting height shall not exceed 1.8 Mtr from finished floor level. Distribution board shall be provided with proper circuit identification name plate and danger sticker/plate as per requirements.

All the distribution boards shall be provided with engraved nameplates with 'lighting', 'power' or 'UPS' with DB Nos. as the case may be. Each DB shall be provided with a circuit list giving details of each circuit. All the outgoing circuit wiring shall be provided with identification ferrules giving the circuit number & phase.

Each distribution board shall have a separate neutral connection bar and a separate earth connection bar mounted within the DB each having the same number of terminals as the total number of outgoing individual circuits from the distribution board. Conduit & cable armouring shall be bonded together & connected to the distribution board earth bar.

Where oversized cables are specified due to voltage drop problems, it shall be contractors responsibility to ensure that satisfactory terminal arrangements are provided without an extra cost.

b. Earth Leakage Circuit Breaker

ELCB shall be 4 pole 415 volts 50Hz, 30-300mA sensitivity. These shall be of approved make. These shall be suitable for manual closing and opening and automatic tripping under earth fault circuit of 30-300mA as specified in item of work. The enclosure of the ELCB shall be moulded from high quality insulating material. The material shall be fire retardant, anti tracking, non-hygroscopic, impact resistant and shall with stand high temperature. All parts of switching mechanism shall be non-greasing, self-lubricating material so as to provide consistent and trouble free operation. Operation of ELCB shall be independent of mounting position and shall be trip free type. The RCCB shall be protected against nuisance tripping by protective device.

c. Miniature Circuit Breaker

1. The MCB shall be current limiting type and suitable for manual closing and opening and automatic tripping under over current and short circuit. The MCB shall also be trip free type.
2. Single pole/three pole versions shall be furnished as required.
3. The MCB shall be rated for 10 KA/15 KA fault level.
4. The MCB shall be suitable for its housing in the distribution boards and shall be suitable for connection at the outgoing side by tinned cable lugs and for bus-bars connection on the incoming side.
5. The terminal of the MCBs and the open and close conditions shall be clearly and indelibly marked.
6. The MCB shall generally conform to IS: 8828. -1996
7. The MCB shall have 20,000 electrical operations up to 63A.
8. The MCB shall have minimum power loss (Watts) as per I.S./ IEC.

8.2 EQUIPMENT AND FITTINGS

a. The type, rating, the required features, location of fixing etc. should be as per logistic and conforming I.S specification. The materials shall be of good quality acceptable to Engineer-in-Charge and to be fixed in position as directed by him.

b. **Decorative fittings**: Both single and twin tube assemblies Philips make or equivalent T5 fluorescent fittings shall be of standard fittings made out of cold-drawn sheet steel, stove enameled, the box finished in gray colour and its cover plates in white colour, complete with electronics chokes and other fixtures such a holder, lamps and build wired etc as required.

c. **Mirror Optics Type Fluorescent Light Fittings:** Both single and twin tube assemblies shall be of standard fittings made out of cold-drawn sheet stool, stove enameled. the box finished in gray color and its cover plates in white colour complete with Electronic chokes, holder, tube holders, lamps and earth terminal etc. with mirror reflector.

d. **Bulk Head Fittings:** The fittings shall be made or pressed Aluminum body, outside finished in gray stove enameled and inside white provided with prismatic glass, covers, rubber gaskets. P.L/BC lamp holders. earthing terminal wire nets and lamps.

e. **Street/Compound Light (TFL) Fittings**: The fittings shall be SON 70 Watt /150Watt/250 Watt or weatherproof type fluorescent street light fittings. The fittings shall be made of Aluminum sheet and finished outside in hammer tone gray color, stove enameled and white inside, complete with copper wire chokes, starters condensers, suitable lamp holders, lamps, assembled and wired neatly and provided with clear acrylic molded cover held by spring loaded hooks against sponge rubber gaskets to make the whole unit dust, vermin and waterproof.

f. **Ceiling Fans:** The fans have to be suspended normally from the coiling. These shall be single phase AC 230 V.50 Hz and of sizes indicated as required at site. However, if adequate vertical clearance is not available due to low ceiling, wall-bracket fans will have to be provided. Fans shall include choke type/ electronic step type regulators with hard rubber bushes, condensers, suspension couplings, terminal blocks, suitable top and bottom canopy (covers) etc. Coiling fans shall be of double ball-bearings type, conforming to IS 374 in all respects.

g. **Exhaust Fans:**

Heavy/ Light duty fans are required for exhaust ventilation in buildings. The fans shall be suitable for AC. single phase. 50 Hz, 230 V supply. These must be of robust construction having very low noise level.. All exhaust fans shall be impeller type with ring mounting arrangements for fixing on walls. The exhaust fans shall conform to IS: 3588 in all respects. Capacity and size of fans will be specified as per the volume of air of the room. The exhaust fans are also to be included with auto timer for its running at regular interval.

h. **Metal Clad Switch Socket Unit:** All the switch-socket units shall be made of non-corroding pressure-cast Aluminium alloy and these must be dust, vermin, water and rust proof. Switch-socket units shall be provided with interlocking arrangement for switch and plug HRC fuses, Neon--Indicator lamps, terminal blocks and pin-top The units skill be suitable for both flush and surface mounting. Switch socket units shall comply with IS 4160.

i. **Installation of ceiling fan**: Unless otherwise specified, all ceiling fans shall be hung not less than 2.75 M (9 ft.) above floor. The suspension rod and clamp shall be painted with approved paint without involving extra cost.

j. **Installation of Fluorescent light fitting**: In case of suspension from ceiling by two rods, each fixing to the ceiling shall be capable at sustaining at least 1.1 Kg. of dead weight. The down rods and accessories shall be painted with approved paint without involving extra cost. Unless otherwise specified, this should be suspended 2.60 M (8'-6") above floors.

k. The D.Bs shall generally be Installed at a height of 2.13 Mtrs. (7 ft) from floor level.

l. All fan clamps will have to be provided from R. C. ceiling as per PWD Specification.

m. Control switches for lights, fans, call bells; exhaust fans etc. shall be of rating 6 Amps, 230 Volt, Piano-type- flush mounted, cream colour conforming to relevant Indian Standards. Ceiling roses also shall be of 6 Amps. Rating 230 V. cream color deluxe conforming to the relevant IS - Specification. Switches of 16 Amp capacity and associated 16A six pins socket would also be required to provide facility of connection of power load up to 1 KW. Alternatively, Industrial type plug-socket board may be used In specific cases. Cable used for power load should be of suitable capacity. 230 Volt 5 amps plug socket should be 5 pin type cream clour conforming to the relevant IS specification.

n. After successful completion of the work, the final drawing/ Blue Print Plan showing the details circuit diagrams and fittings, fixtures are to be submitted along with the final bill.

9. Specification of DIESEL GENERATOR SET

9.1 **Scope**

This specification covers design, manufacture, assembly factory test, supply, delivery of diesel generator sets, complete in all respects with all equipment fitting and accessories for efficient and trouble free operation as specified hereunder.

9.2 **Codes and Standards**

The equipment shall comply with all currently applicable status, regulations and safety codes in the locality where the equipment shall be installed. Equipment shall conform to latest applicable Indian/British/ASA/ ASIM/ASME or other International Standard established to be equivalent or superior to the codes.

9.3 **Technical Details**

i. **Generating Sets**

The generating set shall be complete with diesel engine conforming to BS:649/1958, alternator, alternator control panel, instruments, control cables and all other accessories and batteries.

The equipment shall have tropical and fungicidal treatment as per BS:CP:1014-1963 (protection of Electrical Equipment against climatic conditions).

ii. **Engine**

Diesel Engine of specified rating or equivalent BHP suitable for coupling with alternator. Engine shall be internal combustion type and direct injection. Electric starting suitable for diesel fuel, multi stroke of suitable rating with provision of 10% overload for 1 hour during any continuous run of 12 hours.

The speed of engine shall be 1500 rpm and the engine shall be designed to operate in the most adverse conditions.

The engine shall be 6 cylinder 4 stroke type complete with the following accessories :

a) Flywheel to suit flexible coupling
b) Flexible coupling
c) Exhaust gas turbocharger/after cooler/natural aspirated
d) Heavy duty radiator cooled with guard, cooling fan, inbuilt water circulating pump, water circuit with corrosion resistor.
e) Automatic safety control switch in case of high water temperature.
f) Automatic safety control switch in case of low lub-oil pressure.
g) Lub-oil pump, filter, cooler, piping
h) Instrument panel comprising of
    i) Water temperature gauge
    ii) Lub-oil pressure gauge
    iii) Lub-oil temperature gauge
    iv) Starting switch with key
    v) Safety control for low lub-oil pressure and high water temperature
    vi) Hour meter (mech.) and RPM indicator
i) Fuel filters
j) Fuel pump
k) Hoses for fuel tank
l) Air cleaner assembly
m) Hydraulic governor
n) Self starter
o) Dynamo & regulator
p) Mechanical tachometer and running hour meter
q) SILENT CANOPY Acoustic control
r) Vernier control system for speed regulation
s) Prime duty Cycle.

9.4 **Starting System**

The engine shall be Electric starting with 24V starter motor and 24 volt heavy duty lead acid battery of required ampere hour (Ah) with adequate battery leads.

The D.G. sets shall be provided with suitable base frame of sturdy design made of M.S. channel with necessary reinforcement to take the load of engine, alternator and provided with anti-vibration pad.

Daily service fuel tank suitable for required C a p a c i t y shall be provided complete with stand, level gauge, fuel piping for supply/return, vent, filling cover drain plug, valves etc.

9.5 **Alternator**

The alternator shall be brushless type with rotating field and static excitation circuit controlled by field control unit suitably compounded for voltage and load current for a self excited self regulated system.

The alternator shall be in SP-DP enclosure, foot mounted with ball and roller bearings on end shields.

The alternator shall conform to the latest publication of IS:4722/BS:2613 and shall be suitable for tropical conditions.

The alternator shall comply with the following specifications :

Make	:	Approve make list
Rating	:	Capacity in KVA. 415V, 3 phase, 50 Hz, 0.8 pf.
Speed	:	1500 RPM
Enclosure	:	IP:23
Insulation	:	F
Excitation	:	Self excited, Self regulated with brushless system and static voltage control unit suitably compounded for voltage and current to maintain terminal voltage constant at ± 5% at all load for p.f. not less than 0.8.
Terminal Box	:	Cable box suitable for incoming PVC Cable.
Earthing studs	:	2 Nos.

The alternator shall be provided with space heater.

The alternator shall be capable of withstanding without injury single phase, 2 phase and 1/2 phase(s) to earth short circuit for a period of 3 sec. at rated speed.

9.6 **Alternator Control Panel**

The control panel shall be sheet steel enclosed and shall be dust, weather and vermin proof providing a degree of protection of IP-44. Sheet steel used shall be cold rolled and at least 2.0 mm thick and properly braced and stiffened.

Control panel shall be provided with hidden hinged door(s) with pad locking arrangement and suitable brackets/channels shall be provided for floor mounting.

All doors, removable covers and plates shall be gasketed all around with neoprene gaskets. All accessible live connections shall be shrouded and it shall be possible to change individual switches, fuses, MCCBs without danger of contact with live metal.

All live parts shall be provided with at least phase to phase and phase to earth clearances in air of 25 mm and 20 mm respectively.

Adequate interior cabling space and suitable removable cable gland plate shall be provided. Necessary number of cable glands shall be supplied and fitted on to this gland plate. Cable glands shall be screwed on type and made of brass.

Two number of earthing terminals shall be provided.

All sheet steel work shall be digressed, pickled, phosphate and then applied with two coats of zinc chromate primer and two coats of finishing synthetic enamel paint, both inside and outside of shade 631 (grey) and painted with epoxy.

The control panel shall comply with the requirements given in Annexure-I.

The control panel shall be provided with the following accessories but not limited to complete the satisfactory operation.

a) Master engine control switch for OFF/AUTO/MANUAL/TEST

b) Voltmeter 144 sq mm with selector switches for alternator/mains/ phases complete with protection fuses

c) Frequency meter 144 sq mm reed type

d) Electronic meter with digital display of: Current, Voltage, KW, KVA, KVAR, PF, KWHr, Frequency etc.
Over load protection, unbalanced load protection.

e) Current transformers required for metering

f) Ammeter144 sq. mm with CT and selector switch.

g) Mains supply, voltage monitor

h) Engine control monitor

i) Alternator voltage monitor

j) D.C. control relays, timers, reverse power relay, Earth Fault Relay

k) Engine protection system for low oil lubricating pressure and high water temperature, over speed of engine, under speed of engine, low battery voltage.

l) Window type annunciator with static relays, alarm/hooter and accept, test, reset push buttons for all functions

m) Manually operated moulded case circuit breaker of rating as mentioned in single line diagram

n) Neutral isolation contactor

o) Engine hours run counter

p) Control fuses

q) Lifting hooks

r) Gland plates

t) Neutral link

u) Earthing studs

v) Anti vibration pads

w) Auxiliary relays

x) Annunciation System :

- Engine fails to start
- Generator overload
- Earth fault
- Generator prime mover failure
- Generator over voltage
- Engine over speed
- Engine high water temp.
- Stator temp. high
- Engine low oil pressure
- Any other annunciation considered essential etc.

9.7 **Battery and Battery charging alternator**

One lead acid 24V battery of adequate AH rating for each D.G. set shall be provided. The batteries shall be of approved make.

9.8 **Tests and Test Reports**

Type tests, acceptance tests and routine tests for D.G. sets equipment shall be carried out as per relevant standards.

The certified copies of the test certificates/reports of the above mentioned tests shall be submitted to the purchaser before dispatch of equipment. The Bidder shall submit with his proposal, copies of available type test certificates of the equipment offered.

Control panel shall be subjected to the following tests:

a. High voltage test (2000 volts for 1 minute)
b. Megger test

9.9 **Drawings and Data**

As part of the proposal, the Bidder shall furnish relevant technical/descriptive literature of the D.G. set.

The Bidder shall also furnish complete filled in Data Sheet.

Control panel general arrangement drawing showing dimensioned views, cable entry location and mounting details.

Schematic wiring diagram of the control panel.

Bill of material listing equipment designation, make, type, ratings etc. of the various equipment mounted on the control panel.

9.10 TECHNICAL PARTICULARS FOR DG CONTROL PANEL

1.0	Designation	:	DG Control panel
2.0	Location	:	Indoor
3.0	Design ambient temperature	:	45°C
4.0	Type of mounting	:	Floor
5.0	Degree of protection of panel	:	IP-44
6.0	Cable entry		
6.1	Top/Bottom	:	Top/Bottom
6.2	Glands/conduit	:	Glands
7.0	Painting		
7.1	Colour finish		
	a) Outside	:	Shade 631, Epoxy coated
	b) Inside	:	Glossy white
7.2	Epoxy paint required	:	Yes
8.0	Control voltage	:	24V D.C

9.11 ACCOUSTIC ENCLOSURE

Construction Details

The Structure is fabricated using CRCA sheets of 14/16 SWG Thickness and steel members. The enclosure is fabricated on a MS Channel Frame work further strengthened by suitable cross members to make it robust and sturdy. Rock wool / Mineral wool of suitable thickness and density conforming to IS 8183 is used for acoustic insulation to reduce the sound level to 68 – 70 d b from the original sound level of 105 – 110 d b, when measured at 1mtr.distance from the D.G. Set. The acoustic enclosure consists of following:

a) **Acoustic Insulation :**

High density **Fireproof Acoustic Enclosure Material** i.e. resin bonded rock wool / fiber glass wool (75 – 100mm thick of 64Kg/m^3 density) conforming to IS:8183 is provided on all doors and roof to absorb noise. The insulation material used is fire retardant. The insulation is covered with fiber glass cloth and is supported by perforated sheet. Sound attenuators / downstream silencers are provided at all openings for air inlet/outlet to facilitate free air flow but to absorb sound resulting in extremely low noise level. Detachable partitions are provided inside the enclosure to attain further noise attenuation of the engine.

b) **Noise Suppressor**:

A suitably designed absorption type Hospital noise suppressor is provided which minimize the exhaust noise of the engine.

c) **Exhaust System:**

The exhaust gas is taken out through a specially designed flexible pipe, which prevents any back pressure on the engine.

d) **Thermal Insulation :**

The exhaust system and noise suppressor is provided thermal insulation by using glass wool & covering it with Aluminum sheet. This prevents it from radiating excess heat on the engine, makes it safe for the operator and enhances aesthetics.

e) **Surface Treatment :**

The enclosure is surface treated and painted with high quality polyurethane epoxy paint with prior zinc oxide primer base, which makes it weather proof and suitable for outdoor application. The paint is highly resistant to acids, alkaline, salt sprays, halogens, solvents, lubricants etc and has very good dielectric properties and is resistant to abrasion and cracking.

f) **Air Circulation & Ventilation System:**

A suitable forced air circulation and ventilation system is designed to maintain safe operating temperatures inside the enclosure. Requisite air circulation for engine aspiration combustion and cooling is provided by means of Exhaust fans or tube axial fan driven by a 3 phase squirrel cage induction motor according to need of engine.

g) **Vibration Isolation:**

The engine and alternator is mounted on Anti-Vibration Mounting pads to eliminate engine vibration.

h) **Hardware:**

Inlet and Outlet for cable, draining of lube oil and diesel etc. are provided. The doors are gasketed with high quality EPDN gaskets to avoid leakage of sound. All doors are lockable.

i) **Testing / R&D:**

The Gen set shall be thoroughly tested on load before it is dispatched from factory. The test certificate shall be submitted to the owner at the time of delivery of the equipments.

10. SPECIFICATION FOR INTELLIGENT REPORTING FIRE DETECTION SYSTEM

10.1 FIRE ALARM AND DETECTION SYSTEM

a. GENERAL

Fire alarm and detection system to be supplied by the contractor shall be complete in all respects including supply of control panels, wiring/conduit etc and shall meet requirement of applicable standards

A Fire Alarm System shall be provided to effect control over the life safety services required in the building.

The Fire Alarm System provided shall be able to tie up the following Mechanical, Electrical and Low voltage services into an integrated system.
Air Handling Units
Toilet Exhaust Fan
Smoke Evacuation System
Access control system
Lift should be shut down at fire time and should be open.
Flow switch can be integrated with the system.
The system shall be provided fire alarm initiating, annunciating and control devices.
In the event of a fire alarm, but not in a fault condition, the following action shall be performed automatically.
The system Alarm LED on the main fire alarm control panel shall flash.
Hooters in the control panel and in plant shall be sounded.
Air Handling Units on affected floors shall automatically be switched off
And simultaneously respective fire dampers shall also be closed.
Toilet exhaust fans on affected floors shall be put off.
The Panel shall be EN54 listed.
The panel shall be a Microprocessor based, Analogue addressable networkable and Intelligent.
The panel shall have all necessary provisions for interfacing with BMS, smoke evacuation system, Air handling units, firefighting equipment, elevators, access control system, and other third party systems.
In the event of CPU failure, all Signaling Loop Circuits (SLC) modules shall fallback to degrade mode. Such degrade mode shall treat the corresponding SLC loop control modules and associated detection devices as conventional two-wire operation. Any activation of a detector in this mode shall automatically activate associated Notification Appliance Circuits.
The system shall support a detector response time to meet world annunciation requirements of less than 1.5 seconds.
Alarm verification facility should be there.
Drift compensation facility should be there in the devices.
Devices should be able to adjust for specific sensitivity level.

b. CONTROL PANEL

The control panel shall be microprocessor based networked system designed specifically for fire, smoke control, extinguishing agent releasing (if required), integration modules for BMS or any third party control/annunciation. The panel should be wall mounted type and have a glass door with lock & keys .Suitable 20mm knockouts (18x top, 9x top rear and 2x bottom) should be there in the control panel for cable entries. The control panel shall include all required hardware, software and site specific system programming to provide a complete and operational system. The control panel(s) shall be designed such that interactions between any applications can be configured, and modified. The control panel operational priority shall assure that life safety takes precedence among the activities coordinated by the control panel.
Control panel dimension should be 475Hx450Wx125Dmm and it should also be of Steel IP30.
Fire Alarm panel shall be a multi-loop (exact number of loops as per schedule of quantity) panel with maximum loop capacity of 127 devices. It shall have a backlit 640-character liquid crystal display, individual, color coded system status LEDs, and a QWERTY style alphanumeric keypad for the field programming and control of the fire alarm system, and the provision of internal/external printer.
The panel should be advanced graphical LCD user interface with up to 240 fire zones, allows full EN54 compliance.
The control of each zone shall have following facilities for testing the circuits for fire and fault condition
(i) Test
(ii) Normal
(iii) Alarm acknowledge

(iv) Fault test. And it shall be designed in such a way that audiovisual alarm is given when its position is changed from 'Normal'. The power supply to local control panels shall be derived from main control panel. The control panel shall have following visible facilities.

Mains on load
Mains failure
Battery on load
Battery discharged.

The control panel shall have following supervisory facilities.
Zone isolated
Accept – Test push button.
The control panels shall have following salient feature.
The control panel shall continuously supervise open, short and earth fault in detector cabling with auto-visual alarm distinct from fire and shall indicate fault in corresponding zone and shall also transmit the fault signal to main control panel to repeat the audio – visual alarm in control room.
Each zone shall have facility to isolate, leaving remaining zones in healthy condition to ensure that fire/fault list detected properly.
Silencing of the sounder shall not prevent fire alarm being given by any other zone simultaneously.
In case of any fault signal including fault testing which the local control panel may be giving shall not prevent a fire alarm being given, if detectors actuate at the same time.
The necessary equipment shall be provided in each control panel for connection to AHU to automatically stop as soon as fire signal is received.
Panel should be networkable up to 200 nodes.
Panel should be approved by BSI to EN54 Part 2 & 4.
Optional printer facility should be there in the panel.
Dedicated RS232 serial port for direct PC or modem connection.
4 Amp power supply and charger to EN54 part 4.
Operating Temp. 00C to 450C, Operating Humidity 95% (Max)
Mains Supply of 220V-240V, +10%, 47-63 Hz AC, 1A Max with charging current 2x2.4A DDP Temp. Compensated, power supply4x separate 24V D, 5A Off Line switched Mode, Loop current 500mA Max.
Sounder O/P 4 to 8 x 1A Programmable, Relay O/P 4x1A 30 V AC/DC (Max),10 mA, 5V (Min) Programmable, Open Collector O/P is 16 X Programmable 10 mA 30 V DC (Max).
Digital I/P 16 X Programmable, Auxiliary supply O/P 2 x 24 VDC, 500mA.

c. POWER SUPPLY

The source of electricity supply for the entire system shall be as follows (Ref. IS: 2189).
A secondary battery continuously tricle/ float charged from AC mains with facility for automatic recharging the battery sufficiently in 8 hours to supply the maximum system load at an adequate voltage for at least two hours.
The normal voltage of the battery shall be 24 Volts. The capacity of each battery shall be such that it's capable of maintaining the maximum load on the system at an adequate voltage for at least one hour plus the standby load for at least 48 hours.
Means shall be provided to prevent secondary batteries from discharging through the charging equipment in the events of its breakdown or a failure
in supply and it should give fault signal in either event. In order to minimize the risk of failure, suitable overload protective devices like fuse and circuit breakers shall be introduced. The protective devices shall be arranged to operate at suitable current higher than the maximum working current and to give on audible warning of their operation.

The protective devices shall be instead in the circuit as a points as close as possible to source of supply. The rating of fuses and the testing of circuit breakers shall be clearly and permanently indicated on the equipment.

d. DETECTORS:

General Feature's common to all detectors:

a). All fire detectors shall be compatible and should be inter changeable without requiring different mounting bases or alterations in the fire panel.

b) Detectors shall be rotary plug-in type facilitating easy removal and mounting shall be possible with hand only.

c) The detector shall be vibration an shock proof. When disassembling for cleaning purposes, its components must not be damaged by static over voltage.

d) The detector shall be ceiling mounted type.

f) All detectors shall be suitable to operate satisfactorily upto a temperature of 80 degree C, 95% RH.

g) Detectors shall not have any moving parts.

h) Response (activation) shall be clearly visible from the outside by blinking of light.

i) Reversed polarity or faulty zone wiring shall not damage the detector.

j) It shall be possible to check the sensitivity and carry out calibration at site, if required.

k) Each device shall be LPCB & EN54 approved.

l) Twin fire LED's allow 360 degree viewing.

m) Non-pulsing/pulsing facility should be there in the detectors

n) A built-in barrier shall prevent entry of insects into the sensor.

o) Ingress protection rating (Ip) should be 42

e. RATE OF RISE & FIXED TEMPERATURE HEAT DETECTOR

This type of detector shall combine the principles of rate of rise, and fixed temperature detection, which shall operate at 68 deg. C. and 90 deg. C. Rate of rise and fixed temperature detector shall sense effectively to a slow shouldering fire causing a gradual build up of heat as it shall build up to a sudden fierce fire. The rate of rise setting shall be 5 degrees per minute.

It should be electronically addressed and LPCB approved to classes A, B & C.

Twin fire LEDs allow 30 degree viewing.

Pulsing/Non-pulsing controlled from panel.

f. MANUAL CALL BUTTON STATION:

Manual stations shall be constructed of Non-frangible element fitted as standard (conforms to EN54).

Manual Call Button station should be able to status LED and fast response.

Different colour option should also be there.

All operated stations shall utilize a key type reset.

Manual call points shall be installed in such as way that one should not travel more than 30 M to reach a call point station.

It must be approved by LPCB.

It has the facility of Plug-in wiring terminals for easy installation.

g. RESPONSE INDICATOR

Response indicator of LED type shall be provided outside the rooms to indicate fire when any detector in respective room senses the fire. The design and color shall be as per interior Designer approval.

h. ADDRESSABLE SOUNDER

Hooters/Sounder shall be suitable for indoor application and should be loop powered wall sounder. All hooters shall be 24 V DC operated. The minimum sound level shall be 102 db at 10 feet. Hooter shall be EN54 listed and shall be made addressable using a control module. The hooters shall not draw power

from the main panel for their operation in alarm condition. They shall be powered from a non-coded power supply and shall operate on 12-24V.

Hooters should be Loop powered and able to provide 8 volumes Levels. 51 users selected tones (all tones EN54-3 compatible) approved by LPCB.), Ingress protection rating (Ip) should be 42. Tone frequency range should be 300 hz to 2850hz.

i. ISOLATOR BASE

The Sensor should be shielded from external noise.

Following feature should be existing in the Isolator base:-

Twin fire LED's allowing 360 degree viewing Variable sensitivity, electronically addressed, Non pulsing version available. Operating Voltage 17 to 41 VDC, Low power mode 12 micro, Quiescent current 39 micro, Alarm current 19mA, Digital Communication using ESP, operating Temp-10 degree C to + 50 degree C, Storage Temp Range -30 degree C to + 60 degree C, Maximum Humidity 95 % RH Non condensing (at 40 degree C), Ingress protection rating IP 42, approved by LPCB, EN-54

Part 7.

11.SPECIFICATIONS FOR P.A. SYSTEM

Sound System for Arena and Broadcast System for Complete Building, Car Calling System

11.1 Network Controller

The network control unit shall be able to routes up to 28 simultaneous audio channels, delivers power to the system, reports faults and controls the system. Audio inputs can be announcements from call stations, background music or local audio. The configuration can be done comfortably and efficiently via a PC. The network controller shall have four analog audio inputs.

11.2 Features:

Public Address and Emergency Sound System Control Unit
Fully Digital with Four Audio Inputs and Four Audio Outputs
Control and routing of 28 audio channels
Eight supervised control inputs and five control outputs
Ethernet interface for configuration, control, diagnostics, and logging
Digital storage for prerecorded messages
Stores the last 200 fault events

11.3 Controls and Indicators

Front

2 x 16-character LCD display
Rotary/push button

Back

Mains switch
Voltage selector
Interconnections
Front
Headphone output
Back
Mains input
Battery backup input
Eight control inputs
Two analog audio mic/line inputs

Two analog line audio inputs
Five control outputs (two dedicated fault)
Four analog audio line outputs
Ethernet
RS 232
Two system network connections

11.4 Wireless Handheld Microphones

Handheld transmitter shall have infrared datalink for set up with 50 mw output. It shall have built in charging contacts for charging. LCD display for frequency, group and hours of remaining battery life
The receiver shall operate in two 30 Mhz band with 1200 frequencies with infra red link through which uploading of frequency and set up of data can be done quickly. It shall have two color backlit display for easy monitoring of all operating parameters and turns from green to red when a fault condition occurs.
Specifications:

Carrier frequency range	:	650 to 680, 680 to 710, 720 to 750,760 to 790, 790 to 820, 835 to 865
Audio Bandwidth	:	35 to 20000 Hz
T.H.D.	:	<0.3% at 1 Khz
S/N ratio	:	120 dBA
Selectable channels	:	1200

11.5 Wireless Collar Microphone

Transmitter shall have infrared data link for set up with 50 mw output . It shall have built in charging contacts for charging. LCD display for frequency, group and hours of remaining battery life
The receiver shall operate in two 30 Mhz band with 1200 frequencies with infra red link through which uploading of frequency and set up of data can be done quickly. It shall have two color backlit display for easy monitoring of all operating parameters and turns from green to red when a fault condition occurs.
Specifications :

Carrier frequency range	:	650 to 680, 680 to 710, 720 to 750,760 to 790, 790 to 820, 835 to 865
Audio Bandwidth	:	35 to 20000 Hz
T.H.D.	:	<0.3% at 1 Khz
S/N ratio	:	120 dBA
Selectable channels	:	1200

11.6 Stand Microphone

The microphone shall be a rugged dynamic cardiod goosneck microphone with good off – axis rejection for high gain before feedback and suppression of unwanted ambient noise
It shall have On/Off switch with 3 pin XLR connector.

11.7 Vocal Microphone

Microphone shall be dynamic with a choice of three output modules, varimotion diaphragm, spring steel wire mesh grill.

11.8 Call Station Basic

Call station is used to make manual or pre-recorded announcements to any pre-assigned zones or to executing pre-defined actions. The call station basic has a microphone on a flexible stem to transmit speech over the network, one push-to-talk button and a headset socket.

Features:

Redundant network connection
Power 'ON' indication

Status/fault indications
Supervision of microphone capsule
The call station keypad is used in combination with the call station basic to make manual or pre-recorded announcements to any assigned zones, to select the zones or to execute pre-defined actions.
8 freely programmable selection keys
Each key on the call station keypad has one 2-color LED
The keys of the call station keypad can be programmed for momentary or toggle operation

11.9 Car calling station

Car calling station shall have a flush mount microphone with heavy duty press to talk switch, clear busy indication, connected via CAT-5 cable.

11.10 Mixer

Frequency Response	:	+/-0.5dB, 20Hz-30kHz
THD	:	<0.009% @ 1kHz
Noise	:	-129dBu
Crosstalk		
Channel Mute	:	> 96dB
Fader Cut-off	:	>90dB
Routing Isolation	:	> 90dB
Aux Send Pots Offness	:	> 84dB
EQ		
HF	:	12kHz, +/-15dB, Q=1.5
MF	:	240Hz-6kHz, +/-15dB
LF	:	80Hz, +/-15dB, Q =1.5
Power Consumption	:	42W

11.11 Audio Signal Processor

INPUTS	:	up to 16 Analogue; electronically balanced on Phoenix/Combicon removable screw connectors.
Mic/Line Inputs	:	Nominal gain 0dB, electronically switchable up to +48dB,in +6dB steps, input impedance 3.5kOhm
Maximum input level	:	+20dBu with 0dB input gain, (+8dBu with 12dB gain)
CMRR	:	>75dB at 1KHz
Equiv. Input Noise (EIN)	:	<-128dBu typ with 150 Ohms source Phantom power: 48V nominal, selectable per input
OUTPUTS up to 16 Analogue	:	electronically balanced on Phoenix/ Combicon removable screw connectors.
Maximum Output Level	:	+19dBu
Frequency Response	:	15Hz to 20KHz (+0.5dB/-1dB)
THD	:	<0.01% (20Hz to 20KHz, +10dBu output)
Dynamic Range	:	108dB typ. (22Hz to 22KHz unweighted)
Crosstalk	:	<-75dB
		CONTROL PORTS 12 inputs and 6 outputs
Control Input Voltage	:	0 to 4.5v
Control Input Impedance	:	4.7kOhms to +5V (2-wire mode) >1MOhm (3-wire mode)

Logic Output Voltage	:	0 or +5V unloaded
Logic Output Impedance	:	440 Ohm
Logic Output Current	:	10mA source, 60mA sink
Withstanding voltage	:	80V maximum (Off)
Series Impedance	:	220 Ohms (isolated)
Mains Voltage	:	85-270V AC, 50/60Hz
Power Consumption	:	<35VA

11.12 Professional Grade CD player cum Cassette Deck

Professional Grade CD Player cum Cassette Deck comprised of combination CD Player and auto reverse cassette deck, pitch control for dance and exercise studio, continuous play CD-to-tape and tape-to-CD, independent displays for CD and tape functions

CD Player		
Digital Filter	:	4-times oversampling
Sampling frequency	:	44.1 kHz
DA converter	:	16-bit linear/channel
Frequency response	:	10Hz – 20kHz + 0.5dB
Signal to noise ratio	:	90dB
Dynamic range	:	80dB
Total harmonic distortion	:	0.02% (1kHz)
Cassette Deck		
Heads	:	Record/playback x 1 (rotary reverse),
Erase x 1		
Motor	:	DC motor
Wow and flutter	:	0.08%
Frequency response	:	50Hz – 15kHz + 3dB metal
Signal to noise ratio	:	69dB, dolby B NR ON

11.13 Remote Car Call station Interface

Remote Call station interface shall work as an interface between remote call station and main controller. It shall have built in DSP circuit for audio processing function

11.14 Three-Way Loudspeaker

Frequency Range1 (-10 dB)	:	41 Hz to 17 kHz
Frequency Response1 (±3 dB)	:	49 Hz to 15 kHz
Coverage Pattern	:	60° x 40°
Directivity Factor (Q)	:	22.4
Directivity Index (DI)	:	13.5 dB
Crossover Modes switchable	:	Tri-amp/Bi-amp (passive mid-high)
Passive Crossover2	: `	6th order (36 dB/oct) Linkwitz-Riley HP & LP, 1.5 kHz
Transducer Power Ratings LF (4800 W peak), 100 hrs	:	1600 W (6400 W peak), 2 hrs. 1200 W
(AES)3	:	MF: 350 W (1400 W peak), 100 hrs HF: 75 W (300 W peak), 2 hrs
Long-Term System Power	:	LF: 1200 W (4800 W peak) Bi-amplified Passive Mode

Rating (IEC)4	:	M/HF: 300 W (1200 W peak), 100 hrs
Maximum SPL5	:	Tri-amp mode: LF: 128 dB-SPL cont avg (134 dB peak) MF: 135 dB-SPL cont avg (141 dB peak) HF: 135 dB-SPL cont avg (141 dB peak)
Passive mode	:	135 dB-SPL cont avg (141 dB peak)
System Sensitivity6 (1W @ 1m)	:	Passive Mode: 110 dB-SPL (mid/high section only)
Low Frequency Driver	:	2 x 2206H 300 mm (12 in) driver with 100 mm (4 in) voice coil
Nominal Impedance	:	4 ohms (2 x 8 ohms, internally wired in parallel)
Sensitivity6 (1W, 1m)	:	96 dB-SPL
Mid Frequency Driver	:	CMCD-82H cone midrange compression driver with integral 200 mm (8 in) Differential Drive® dual 75 mm (3 in) voice coil driver
Nominal Impedance	:	8 ohms Sensitivity6 (1W @ 1m within
Operaional Band)	:	110 dB-SPL
High Frequency Driver	:	2431H, 38 mm (1.5 in) exit compression driver with 75 mm (3 in) voice coil
Nominal Impedance	:	8 ohms
Sensitivity6 (1W @ 1m)	:	116 dB-SPL

11.15 Line Array Speaker

Extended Line Array 30W column speaker with extended listening area, better intelligibility with speech and music, uniform distribution of natural sound throughout the room, excellent directivity for use in acoustically difficult reverberant applications, ultra slim housing, voice evacuation complaint as standard

Specifications :

Maximum power	:	45W
Rated power	:	30W
Sound Pressure level at 60W/1W	:	91 dB (SPL) (at 1 kHz, 1m)
Effective frequency range (-10dB)	:	190 Hz to 18 kHz
Rated input voltage	:	100V
Rated impedance	:	333 ohm

11.16 Cabinet Speaker

Cabinet speaker with 6W RMS power housed in a wooden cabinet with 200 Hz to 15 Khz frequency range, Max 97 SPL.

11.17 Horn Loudspeaker

Horn Loudspeaker shall have 15W RMS housed in weatherproof IP 65 Housing. Frequency response 500 Hz to 5 Khz. SPL 103 dB.

11.18 Amplifier

Frequency Response (at 1 watt, 20 Hz – 20kHz)	:	±0.25 dB.
Signal to Noise Ratio below rated power (20Hz to 20 kHz)	:	105 dB A-weighted.

Total Harmonic Distortion (THD) < 0.1%. CTs 2000/3000 < 0.35%.	:	at full rated power, from 20 Hz to 20 kHz:
Damping Factor	:	10 Hz to 100 Hz: > 3000.
Crosstalk (below rated power, 20 Hz to 1 kHz)	:	> 80 dB
Common Mode Rejection (CMR) (20 Hz to 1 kHz)	:	50 dB.
DC Output Offset	:	< 2 mV.
Input Impedance (nominal) balanced, 5 kilo ohms unbalanced.	:	10 kilo ohms
Maximum Input Level dBu absolute maximum.	:	+20 dBu before input compression, +32
Load Impedance Bridge Mono: 4/8/16 ohms, 140V. (Approved Make : Crown)	:	Stereo: 2/4/8/16 ohms, 70V.

11.19 Digital Amplifier

The amplifier shall be digital class D amplifier for low power consumption and better sound quality, built in Digital signal processing like 3 section parametric equalization, automatic volume control, 2x 16 character LCD display for status information,

Specifications :

Frequency response for input	:	-3 dB at 50 hz and 20 Khz
S/N ratio for audio input	:	>87 dB
CMMR	:	> 40 dB at 1 Khz

12. SURVEILLANCE CLOSED CIRCUIT TELEVISION (CCTV) SYSTEM SPECIFICATION

DOME CAMERA	Analog type Vandal Resistant Dome camera
	IR at least 10 mtr
	Vandal Resistant
EXTERNAL CAMERA	Vandal resistant Analog type external camera
	Power over Ethernet (PoE) capability
	IR at least 10 mtr
	Vandal Resistant
	IP66
Cat#6 Cable	23 AWG
	LSZH
	Copper Core
Cat#6 Patch Panel	
PoESwicth	

Device Interfaces	24 10/100/1000 Mbps, PoE capable, 4 SFP
Port Standard & Functions	IEE 802.3 10BASE-T Ethernet IEEE 802.3u 100BASE-TX Fast Ethernet IEEE 802.3ab 1000BASE-T Gigabit Ethernet IEEE 802.3af compliance IEEE 802.3xFlow Control support for Full-Duplex Mode Legacy Mode support
Switching Capacity	56Gbps
MAC Address Table	16K entries per device
MAC Address Update	Up to 256 static MAC entries Enable/ disable auto-learning of MAC addresses
Maximum 64 bytes packet forwarding rate	41Mbps

24U RACK

- Cabinet, 24U, 800mm (W) 800mm (D)
- Front Glass Door with Swing Handle Lock
- Removable Split Side Panels with slam Latch & lock
- Heavy Duty Castors & Leveling Legs
- Tray
- Fans -4 nos.
- Power Strip with at least 6no. 6Amp sockets

DISPLAY

- Diagonal Size: 32”
- Resolution: Min; 1920 x 1080 (16:9)
- Frequency: 60Hz
- Colours: 16.7 million
- Energy Star: 5.0

PATCH PANEL SPECIFICATION

Identification	I.D. Plate	PVC. Transparent color Paper
	Panel	SPCC. 1.5 mm thickness with Black (RAL 9005) color painted
RJ45 Jack	Housing	ABS, UL 94V-0.
	Contact Bracket	PC, UL 94V-2. Transparent color
RJ45 Jack Contact	Material	Phosphor Bronze with Nickel plated
	Finish	50 micro-inch Gold plated on Plug contact area
IDC	Housing	PC+Glass Fiber, UL 94V-2
	Terminal	Phosphor Bronze with Tin plated
Jack Bracket Set		ABS, UL 94V-0

Support Bar		SPCC, 1.5 mm thickness with Black (RAL 9005) color painted
PCB		FR4, UL 94V-0

SERVER SPECIFICATIONS

Specification of Server (Pedestal Server – 2P)	
Processor	The Server should have TWO numbers of 6 cores or higher x86 64-bit processors. Number of cores on a single die/socket will be treated as a single processor. The Processor should be of latest available reliable series.
Performance	Minimum Benchmark score of 335 using SPEC CPU2006 (60% of SPECint_rate_base2006 plus 40% of SPECfp_rate_base2006) with the quoted processor and 64 GB RAM
Memory	64 GB DDR III (1600 MHz or higher) expandable to 256 GB
HDD Controller	SAS RAID Controller supporting RAID 0.1
HDD	2*600 GB SAS Hot Swap HDD (10 K or higher RPM)
Video Controller	Integrated Graphics Controller
Network Controller	Dual Port – 1 Gbps or higher
Slots	Minimum two free PCI/PCI –x/ PCI- Express
Ports	2* USB 2.0, 1*Keyboard Port, 1* Mouse Port
Bays	Minimum 5 Hot Swap drive bays
Optical Drive	DVD ROM
Monitor	18.5” TCO 05 certified TFT Monitor
Keyboard & Mouse	OEM Keyboard and OEM Mouse
System Chassis	Server Chassis (Tower) with Redundant Hot Swappable Power Supply with 80 plus efficiency
OS Certification	Certification for Server version of Windows and minimum two Linux

The requirements of security system vary as per client requirement along with its geographical location. Scope of this report highlights security system for Common areas only. The security system proposed for Common area is very minimum amount in the following form Closed Circuit TV System (CCTV)

Following spaces shall be provided with cameras inside the hospital block:

- **Main Entrance**
- **Reception**
- **Cash counter**
- **Lift lobby**
- **OT LOBBY**

Following spaces shall be provided with camera outside the Hospital Block:

- **Various entrances/exits to the hospital block such as: Emergency Entry, emergency exit.**

The security console shall be located in the centralized security room. This room shall have no windows. Ample space shall be provided to view monitors. Analog DVR based CCTV camera system that shall give monitoring team flexibility in viewing the images from multiple locations .Care shall be taken to ensure that the number of displays per screen is limited so that "individuals" can be recognized
when viewing the display in all areas.

13. SPECIFICATIONS FOR CONDUITING & WIRING FOR TELEPHONE SYSTEM

13.1 GENERAL

Contractor shall supply & install conduit & wiring including Telephone Tag Blocks, telephone outlet, cover plate, outlet boxes etc. complete as required.

13.2 CONDUITING

Conduiting for telephone system shall be carried out in MS Conduit. Separate conduit shall be provided for Telephone cables. Conduiting shall be carried out as per specification above.

13.3 WIRING

Each telephone outlet shall be wired in conduit with 0.60mm dia annealed tinned copper conductor PVC insulated and PVC sheathed un armoured cable from floor wise Telephone Tag Block. Main Telephone tag block shall be fixed on ground floor. Floor wise tag block shall be wired from Main telephone tag block with multi paired armoured 0.60mm dia annealed copper conductor PVC insulated & PVC sheathed cables.

13.4 OUTLETS

All telephone outlet shall be modular plate type accessories with RJ 11 Jack outlet. Cover plate shall match in shape & finish with other light and power accessories.

13.5 TELEPHONE DISTRIBUTION BOARD

Telephone Tag Block shall be fabricated from 1.63 mm thick M.S. Sheet duly powder coated after metal treatment. Telephone Distribution Board shall be equipped with krone type tag block of size as mentioned in BOQ. Tag block shall be double jumpering type and shall be suitable for termination of extra pair provided in wiring/ cabling of each outlet. Box shall have hinged cover and finish shall match with aesthetic finish of the building.

13.6

	EPBAX SYSTEM
Sl.No.	**Functional Requirements :**
A	The EPABX should be fully digital & should employ Stored Program Control (SPC) using Pulse Code Modulation (PCM), confirming to latest ITU-T (earlier CCITT) standards. The system supports not only IP but also TDM giving the advantages of both the worlds.

B	The system shall be 100% non-blocking.
C	The offered system should support analog/ digital Phones and should support IP capabilities. The IP gateway should be able to support SIP. Options of wired and wireless IP phones from the same OEM as the main PBX must be available. Communication will be secure and based upon SRTP.
D	The Central Processing Unit (CPU) of IP PBX should use 32-bit microprocessor.
E	The System should have Integrated Modem on the central motherboard for remote maintenance.
F	There should be an LED indication on each card, which can help determine the state of the card.
G	The system should be suitable to accommodate both Decadic Pulse (DP) and DTMF telephones. The system should support outgoing DTMF transmission even from Digital and IP phones.
H	System should supports Digital Phones as well as IP phones. The digital Phones should offer the following features:
	- 2 x 24 Character Tiltable Display
	- Interactive Menu keys for Interactive user prompts
	- Hands free Operation
	- Upto 12 in-built Programmable Keys. For further one-touch keys, support for key module.
	- In-built USB port to connect data equipment like PC or a keyboard.
	- Adapter slots
	- 1st party TAPI compatible to support TAPI based Dialer applications like Microsoft outlook dialer.
I	Apart from the IP support on the IP PBX, it should also work with any type of public exchange or similar network to which it will be connected without requiring any modification in networks. It should be possible to network with exchanges of different makes / technologies using either E&M lines or ISDN BRI/PRI lines.
J	The system should be ventilated by conventional airflow. No cooling fans should be used in any part of the IP PBX cabinet.
K	The equipment should have flexibility to add/delete/modify service features and other facilities without requiring extensive modification. These changes should be possible via a Digital phone.
L	The system should have emergency transfer facility to automatically route the C.O. lines to predefined extensions in case of power failure.
M	The system should support simultaneous voice and data capability over the same single pair telephone cable in (2B+D) ISDN BRI format. The following voice & data terminals should be supported.
	- ISDN terminals such as ISDN-PC card
	- ISDN FAX (G4).

	- Video Conferencing Equipment. The system shall also support PRI ISDN in (30B+D) Format.			
N	The system should support inbuilt Voice processing applications such as Voice Mail, Auto attendant.			
O	The system shall support Integrated Cordless Solution based on the DECT (Digital Enhanced Cordless Telephony) technology. The system should support upto 16 Base stations & 64 handsets. Direct Base station connectivity to the control Board			
P	System should support Roaming & Handover (i.e. the call should not get cut when the DECT user moves from one base station cell area to another Base station cell area)			
	Speech path	Digital PCM-TDM with VoIP support		
	Control technology	Stored Program Control (SPC)		
	System capacity	upto 388 analog/ digital users and 500 IP users		
	Signal conditions- DTMF	As per CCITT Rec.		
	Decadic dial Inter Digit Interval Pulse ratio	10 PPS, 800msec		
		Programmable		
	FLASH time	40 msec. to 1620 m sec		
	E&M signaling	Type I - V, Immediate start, Wink start, delay dialing, Seizure acknowledgment, start		
	Environmental conditions:			
	Temperature	from +5 to + 40 0C		
	Relative Humidity	5% to 85 % RH non condensing		
	Power Consumption	Less than 1000 watts		

14. SPECIFICATION FOR NURSE CALL SYSTEM

Nurses Call System: The system includes patient call switches, Nurse Presence Module, Display Unit, Corridor lamps, Bath Room Patient Call switches, Nurse Station, Zone controller etc
A communications terminal for hospitals, capable of supporting multimedia applications, which unites several traditional systems in a single unit, is to be supplied. For future-oriented reasons this platform must be created using Microprocessor technology as per JCI guidelines.

15. SPECIFICATION OF HEAT VENTILATION & AIR CONDITIONING

15.1 DESIGN CONSIDERATIONS:

a. The option proposed to be adopted for this project, will be planned and selected for:
b. Low capital cost.
c. Energy efficient throughout the varying load patterns.
d. Providing required Indoor air quality (IAQ) with reduced operating cost.
e. Maximum flexibility of operation.
f. Use of highly responsive control system (BMS) to optimize system functioning.

15.2 CAPITAL COST

a. The selection of equipment is designed to achieve the lowest capital cost consistent with energy efficient modern technology.

b. The choice of equipment and specifications will provide the best possible system at a reasonable price.

15.3 ENERGY EFFICIENT

a. The air conditioning systems operate between a minimum demand of 40% and up to a maximum demand of 95% for a major part of the year.

b. Hence, the selection proposed is such that the overall power requirement remains consistent with the demand, avoiding all possible waste.

15.4 INDOOR AIR QUALITY

a. ASHRAE (USA) standard call for maintaining a desirable Indoor Air quality (IAQ) in a tightly sealed building.

b. This is to prevent sickness syndrome in people who occupy these buildings for a long period. This will also help to control the concentration of harmful bacteria to provide a comfortable environment, to save energy, to prevent exhilaration / infiltration of pathogens etc.

15.5 FLEXIBILITY

a. There will be multiple chillers, each with their own pumps.

b. Each chiller will have separate pumps. Therefore, the number of pumps operating at any time will not be more than the number of chillers, thereby saving energy.

c. In addition each floor will have independent AHU/FCU.

d. This will ensure that the equipment in operations is as per demand without any wastage of power.

15.6 CENTRAL SYSTEM AND DUCT ABLE SPLIT, SPLIT TYPE AND DIRECT WINDOW

a. There are several types of chilling units available if designed centralized. However, for this application the following type is considered appropriate.

¬ Air Cooled Type

15.7. <u>BASIS OF DESIGN</u>

a. Design Parameters

Outside Conditions	Summer	: 42.2°C DB; 25.5°C WB (20% RH)
	Monsoon	: 32.2°C DB; 28.3°CWB (60% RH)
	Winter	: 10°C DB; 6.6°CWB (60% RH)
Inside Conditions (Summer & Winter)		: As per Table – I RH not exceeding 55% in all areas. For OT's Relative Humidity shall be max. 50%.
Outdoor Air (Fresh Air)		: As per Table – I & III
Lighting Load		: As per Table – II
Equipment Load		: As per Table – II
Occupancy		: As per Table – II

b. U factor and solar heat gain co-efficient (SHGC) used in heat load calculations:

- ¬ U factor for glass = 6.3 W/m² k
  = 1.1 Btu/ sq ft. h ˚F
- ¬ SHGC for glass = 0.56
- ¬ U factor for Wall = 2.05 W/m² k
  = 0.36 Btu/ sq ft. h ˚F

15.8. FRESH AIR IS CONSIDERED BASED ON ASHRAE 62.1. 2007.

a. **<u>Hours of Operation</u>** 18 hours per day

b. **<u>Roof Insulation</u>** All exposed roof shall be insulated with 50 mm thick PUF or approved equal insulation

c. **<u>Exposed Glazing</u>** All windows will have single heat reflecting glass with venetian blind

15.9. REFERENCES FOR DESIGN PARAMETERS:

S.N.	Design Parameters	References
1.	Outside Conditions	ISHRAE-2007
2.	Glass U-factor	HVAC Handbook
3.	Wall U-factor	HVAC Handbook

4.	SHGC	HVAC Handbook
5.	Fresh Air	ASHRAE-62.1-2007
6.	Ventilation rate (ACPH)	NBC-2005

Table: I

SL No	Function Space	**Pressure Relationship to Adjacent Areas**	**Minimum Air Changes of Outdoor Air per Hour**	**Air Exhausted Directly to Outdoors**	**Air Re-circulated Within Room Units**	**Inside Design Temp (ºC)**
1	Operating room (25% Fresh Air)	Positive	As per code	Yes	Partially	21
2	ICU / ITU Surgery	Positive	As per code	Yes	Partially	22
3	MRI, Radiograph & Fluoroscopy Room					
4	Pre / Post Operative	Positive	As per code	Yes	Yes	22
5	Minor OT (25% Fresh Air)	Positive	As per code	Yes	Yes	22
6	Recovery	Positive	As per code	Yes	Yes	22
7	Blood Bank Room	Positive	As per code	No	Yes	21
8	Ultrasonography / Clinical Pathology / Histo Pathology / Serology / Histology / Microbiology / Biochemistry	Negative	As per code	No	Yes	24
9	Minor Surgery & Treatment room	Negative	As per code	No	Yes	22
10	Radiology rooms	Negative	As per code	Yes	Yes	22
11	CT Scan / MRI	Negative	As per code	No	Yes	24
12	Dressing Room	Negative	As per code	No	Yes	24
13	Endoscopy Room	Negative	As per code	No	Yes	24
14	Audiometric Room	Negative	As per code	No	Yes	24

Table: II

S.N	Description	Light Load (W/Sqft)	Equipment Load (W/Sqft)	Occupancy (Sqft / Person)
1	Operation Theatre / Minor OT	As per actual design	As per actual design	As per given architectural plan
2	ICU / ITU Surgery	As per actual design	As per actual design	As per given architectural plan
3	MRI, Radiograph & Fluoroscopy Room	As per actual design	As per actual design	As per given architectural plan
4	Recovery Room	As per actual design	As per actual design	As per given architectural plan
5	Ultrasonography / Clinical Pathology / HistoPathology / Serology / Histology / Microbiology / Biochemistry	As per actual design	As per actual design	As per given architectural plan
6	Instrument & Sterilization Room	As per actual design	As per actual design	As per given architectural plan
7	Minor Surgeory & Treatment Room	As per actual design	As per actual design	As per given architectural plan
8	Radiology rooms	As per actual design	As per actual design	As per given architectural plan
9	Pre / Post Operative	As per actual design	As per actual design	As per given architectural plan
10	Endoscopy	As per actual design	As per actual design	As per given architectural plan
11	CT Scan / MRI	As per actual design	As per actual design	As per given architectural plan
12	Dressing Room	As per actual design	As per actual design	As per given architectural plan
13	Medical Superintendent Room / Doctor on Duty / Dy. Asst. MS Room	As per actual design	As per actual design	As per given architectural plan
14	Mortuary	As per actual design	As per actual design	As per given architectural plan

15	Blood Bank	As per actual design	As per actual design	As per given architectural plan
16	OT Corridor	As per actual design	As per actual design	As per given architectural plan
17	Conference Room / Library	As per actual design	As per actual design	As per given architectural plan

Table: III

S.No.	Area	Cfm/Person
1	Instrument & Sterilization Room / Scrub & Dirty Wash / Change Rooms	10
2	Mortuary / OT Incharge & Reception / Nurse on Duty	10
3	Medical Superintendent Room / Doctor on Duty / Dy. Asst. MS Room	13
4	OT Corridor	6
5	Conference Room / Library	6

15.10 FRESH AIR IS CONSIDERED BASED ON ASHRAE 62.1 2007.

a. **Hours of Operation** 18 hours per day

b. **Roof Insulation** All exposed roof shall be insulated with 50 mm thick PUF or approved equal insulation

c. **Exposed Glazing** All windows will have single heat reflecting glass with venetian blind

15.11. REFERENCES FOR DESIGN PARAMETERS:

S.N.	Design Parameters	References
1.	Outside Conditions	ISHRAE-2007
2.	Glass U-factor	HVAC Handbook
3.	Wall U-factor	HVAC Handbook
4.	SHGC	HVAC Handbook
5.	Fresh Air	ASHRAE-62.1-2007
6.	Ventilation rate (ACPH)	NBC-2005

15.12 SYSTEM REQUIREMENT

Based on the above requirements, probable A.C. loads of the following probable areas of 5 storeyed and 10 storeyed Multi specialty & Super specialty Hospital are given below:

15.13 SYSTEM DESIGN (HIGH SIDE)

(**i)** Air-cooled Screw/ Scroll Chilling units of required TR capacity with standby facilities.

(ii) Chilled water pumps with stand by facilities
(iii) Hot water Generators of designed capacity for General Area.
(iv) Hot water Generators of designed capacity along with pumps for OTs with stand by facilities.

15.14 SYSTEM DESIGN (LOW SIDE)

a. It is proposed to provide Central double skin Air handling Units for each floors of building for air conditioning the areas.

b. Each OT and other critical area shall be fitted with Fine/ HEPA filters up to efficiency of 99.97%."

i) The cool air from the central Air handling units will be distributed through insulated GI ducts, which would run in the corridor.
ii) Aluminum duct shall be used to distribute cool air from AHUs to Operation Theatres.
iii) A common set of insulated chilled water pipes will supply water to all the central AHUs and FCUs.
iv) Conditioned air would discharge through the extruded aluminum diffusers/Grilles.

v) It is also proposed to provide exhaust fans/blowers for the Toilets, Utility, Mechanical rooms, Kitchen area etc.

c. Insulation work would by done by Closed Cell Polyethylene material having a Thermal Conductivity 'K' not less than 0.035 W/mK at 40^0C outside ambient. Flammability and oxygen index would be in accordance with ASTM Standard.

15.15 DESIGN PARAMETERS OF PROPOSED EQUIPMENTS AND ANCILLARY WORKS

a. Hot Water Boiler

¬ Hot water 'In' Temperature.	-	45°C (113°F)
¬ Hot water 'Out' Temperature.	-	50°C (122°F)

b. Primary Chilled Water Pump

¬ Type	-	End Suction
¬ Speed	-	1450 RPM
¬ Flow Rate	-	2.4 GPM per Ton of Plant Capacity

c. Air Handling Units (Sectional)

¬ Unit casing	-	Double Skin
¬ Fan Outlet velocity	-	Shall not exceed 1800 FPM (9.1 m/s)
¬ Speed of Fan	-	Speed not exceed 1400 RPM
¬ Cooling Coil tube Thickness	-	Not less than 0.5 mm
¬ Tube Outer dia.	-	Not Less than 12 mm
¬ Air velocity across the filters	-	Shall not exceed 500 FPM (2.5 m/s)
¬ Air Velocity across the cooling coil	-	Design at 500 FPM (2.5 m/s) And shall not exceed 550 FPM (2.8 m/s)

d. Ventilation System

i. Axial Flow Fans

¬ Static Pressure	-	30 MMWG
¬ Type of Motor	-	TEFC

ii. Centrifugal Blowers

¬ Type	-	DIDW/SISW
¬ Static Pressure	-	32 MMWG
¬ Outlet velocity	-	Shall not exceed 2000 FPM (10.16 m/s)
¬ Inlet velocity	-	Shall be limited to 1000 FPM (5.08 m/s)

iii. Inline Fans

¬ Type	-	Direct driven type
¬ Static Pressure	-	30/20 MMWG
¬ Electric supply	-	220V/1 PH/50 Hz

iv. Duct Work

¬ Air velocity in ducts	-	Shall Not exceed 1500 FPM (7.6 m/s)
¬ Aspect Ratio of duct	-	Generally up to 1:4
¬ Friction Rate	-	0.0065 to 0.008m/100m

15.16 SMOKE MANAGEMENT SYSTEM

a. Mechanical ventilation fans capacity shall be minimum 30 Air changes per hour (ACPH) in case of fire or during distress call.

b. However for normal exhaust system it should be 12 air changes per hour. This system will ensure proper quality of air and generally provide a clean and pollution free atmosphere.

c. The fans would start automatically through the fire protection system of the building and it shall be connected to main fire alarm system of the building. These fans shall also have an arrangement to start manually as and when required.

d. Building shall have smoke extraction air mechanical fans. Exhaust ducts shall be provided at ceiling level.

e. The capacity of mechanical exhaust and make up air fans capacity shall be of 10-12 air changes per hour. The fans would start automatically through the fire protection system of the building and it shall be connected to main fire alarm system of the building. These fans shall also have an arrangement to start manually as and when required.

f. It is proposed to provide separate metallic ducts for air conditioning purpose for supply and return air to the air handling units (AHUs) room. Escape routes like staircases, common corridors, lift lobbies, etc., shall not be used as return air passage.

g. There shall be separate ducts and AHUs for each compartment and AHUs shall be switched off automatically when automatic fire alarm operates.

h. There shall be separate central AHU for each floor and all the ducts shall be separate for each floor. All the air conditioning ducts serving main floor area, corridors, etc. shall not pass through the staircase area.

i. It is proposed to provide non-combustion material for insulation materials of air conditioning ducts and for air filters of air handling units for air conditioning purpose.

j. It is proposed to provide automatic fire dampers at the inlet of supply air ducts and the return air duct of each compartment on every floor. It shall also be provided at the fire separation wall and each duct penetration on each floor of the masonry shafts.

k. It is proposed to provide all staircases, lift wells and lift lobbies or corridors with a pressurization system to keep them free of smoke and toxic gases during fire for safe escape route.

l. A pressure difference (positive) for staircase shall be maintained of 40 Pa during emergency operation. For this mechanical fans shall be provided. Grilles shall be provided on each landing level of staircase and it will connect through metallic duct. The ducts shall be passed through designated masonry shafts.

m. The pressurization system will be interconnected with automatic fire alarm and detection system of the building.

n. Similarly, the lift wells are also provided with a pressurization system. A pressure difference (positive) for lift wells and lobby shall be maintained of 50 Pa and 30 Pa respectively. It is proposed to provide mechanical fans near the lift shaft along with G.I. ducting to connect the fans to lift well. The fans would start automatically through the fire protection system of the building.

o. All the service shafts serving two or more floors in the core of the building shall be sealed.

p. Smoke extraction fans shall have class 'H' insulation and a fire rating of 2 hours.

15.17 VENTILATION OF SERVICES AREAS LIKE, DG ROOM, SUBSTATION ETC.

a. Service areas include mechanical equipment room comprising of DG sets, LT Room, Transformer room, AC Plant room and pump room.

b. As per the National Building Code of India 2005 (NBC-2005) there shall be separate ventilation of services room i.e. DG sets, LT panel rooms, Transformer room, AC plant room, sewage plant (STP) room etc.

c. Separate mechanical fans shall be provided equivalent to 12 air changes per hour (ACPH) separately for DG room, LT panel room and Pump room as these rooms are placed inside the building. Similarly forced make up air will be provided for these areas. These fans shall be interlinked with main fire alarm and detection system of the building. The fans shall be automatically started in case of fire and there will be provision to run the fans manually as and when required. These areas shall have provided with normal exhaust fans as well to exhaust out the heat or gases equivalent to 10 - 12 air changes per hour.

d. Transformer rooms and other services areas shall be provided with exhaust fans capacity equivalent to 10 - 12 air changes per hour.

e. All type of mechanical fans proposed for smoke extraction shall be of class 'H' insulation or 2 hour fire rating.

f. Services areas shall be maintained at negative pressure to avoid / prevent heat or smoke leakages to the adjoining area.

g. There will be separate shaft air / ventilation shafts for each services area.

15.18. SPACE REQUIREMENTS

a. The Chillers and pumps would be placed on ground and AHUs would be placed at terrace level of the building.

b. All AHUs will be located above the false ceiling or in the separate rooms on each floor should be designed and should shown in Architectural drawing.

15.19. POWER REQUIREMENT

a. The HVAC system will require 3 Ph, 50 Hz, 415 V A.C. Connected load as per design;

b. The HVAC system will also require single phase, 50 Hz, 230Volt A.C for up to 1.5 ton capacity where required.

(i) HVAC Load for Hospital Block to be calculated as per area of both 5 storied and 10 storied building

15.20. REFERENCE STANDARD FOR HVAC SYSTEM Code & Standard

The under mentioned Codes & Standard will be followed:

¬ **ANSI / ASHRAE.** Standard 15-1994. Safety Code for mechanical refrigeration.

- **NFPA.** National Fire Protection Association.
- **ARI.** Air conditioning and Refrigeration Institute.
- **SMACNA.** Fix and Smoke damper installation guide.
- **SMACNA.** Standards for Duct Construction.
- **ASHRAE.** Standard 60.1.2007. Ventilation for Acceptable Indoor Air Quality.

16. SPECIFICATION OF SIGNAGE

All signs, Internal, External and Road Signs shall be as per specifications given hereinafter:

16.1 INTERNAL SIGNS

16.1.1 General Specifications:

a. All text shall be as per the approved font and appropriate size which can be viewed at least from 3 meter.

b. Colour Scheme will be as per direction of the Employer.

c. Symbols shall be used as per general hospital standards wherever appropriate.

d. All signs to confirm the sizes, shapes and other specifications mentioned.

16.1.2 Location:

a. Type 1: Guide Map & Information Sign:

Non-illuminated and illuminated types, to be mounted on Walls inside the building, at strategic locations, to help public to locate the exit points in case of emergency and also to orient themselves on the respective floor.

b. Type 2: Location Identification Signs:

c. Type 3: Room Numbers:

All rooms will have a unique number. The Room Nos. will be mounted on or above the door frame.

d. Type 4: Statutory Signs:

i) Illuminated type with battery back-up mounted on Doors/Walls or suspended from the ceiling. These will be used for Fire Exit at various locations as required.

ii) Photo-Luminescent types, glow in dark: - to be mounted on Walls/suspended from ceiling inside the building. These will be required to provide Statutory

messages inside the building at various locations.

e. Type 5: Warning/Prohibitory Signs:

Non-illuminated types, to be mounted on Walls/suspended from ceiling inside the building. These will be required to provide Statutory messages inside the building at various locations.

f. Type 6: Way Finding Signs: Wall Mounted/Ceiling suspended/Wall projected

Non-illuminated types, these will be mounted on Wall/suspended from the ceiling inside the building. These will require guiding the public to locate the direction towards the various facilities & areas inside the building.

g. Type 7: Doctor Directory Signs

h. Type 8: Evacuation Plan

Photo-Luminescent types, glow in dark: - to be mounted on Walls/suspended from ceiling inside the building. These will be required to provide Statutory messages inside the building at various locations

i. Type 9: Information Display Panel

Hospital will require poster and other information to be displayed which is frequently changed. The displayed frame will be provided mounted on walls to hold frequently changed information/poster.

17. DETAILS OF LIFT SPECIFICATION

Sl.no.	Passenger	Shaft Depth	Shaft Width	Pit Depth	Stop	Travel Distance
1	Bed Lift	3.05	2.25	1.60	5	13.20

Sl no	Item	Details
1	Load – Kgs	1360 (20-persons)
2	Speed – mps	1 mps
3	Travel – mtrs	Ground Floor to Fourth Floor and provision for another 5 floor of 3.6m floor height

4	Stops & Openings	5 Stops, 5 Openings (All openings on the same side) Provision for another 5 stop
	Travel – mtrs	Ground Floor to 9th Floor and 3.6m floor height
	Stops & Openings	10 Stops, 10 Openings (All openings on the same side)
5	Power Supply	400 Volts 3 Phase 50 Hertz. Alternating Current
6	Control	A.C. Variable Voltage Variable Frequency (with close loop) micro-processor control, gear less.
7	Operation	Duplex Full Collective (with/without Attendant)
8	Machine	Geared placed directly above the hoistway
9	Car Size (W x D x H) – mm	1300 x 2400 x 2400 – Inside Dimensions
10	Hoistway Reqd (W x D) - mm	2200 x 3000 – Finished Dimensions
11	Overhead Reqd - mm	4800
12	Pit Depth Reqd – mm	1600
13	Car Enclosure	IND-160
14	Car Panels	Stainless steel car panels in hairline finish
15	Handrails on three sides	Stainless steel mirror finish
16	Flooring	20 mm recess (Flooring -Granite)
17	Car Entrance	Protected by two speed stainless steel door in hairline finish
18	Size (W x H) – mm	1200 x 2100
19	Hoist way Entrances	Protected by two speed stainless steel doors in hairline finish
20	Door Operation	Automatic & Multi-Ray Electronic Door Detector System
21	Details	Fireman’s switch at main lobby
22	signal	Overload Warning Device

23	ARD	Automatic Rescue Device with battery back up
	signal	Combined luminous, Hall Button and digital hall position indicator at all floors with up/down arrows
		Digital Car position Indicator in cars with up/down arrows
		Overload warning indicator in car
		Battery Operated Alarm Bell and emergency light in car with rechargeable dry maintenance free battery and battery charger (Battery back-up for 2 hours operation). Alarm bell to be located Main Lobby in Ground floor with all cable work for each lift
		Hall lanterns at all floors
	Other equipments	Battery operated alarm bell to be located in the lift lobby in ground floor with floor announcements in car and facility playing pre-recorded music within the cars during travel and between the period of floor announcements for lifts
		Voice Announcement System with provision for playing music etc for passenger each lift
	Fireman's switch	On ground floor main lobby for each lift
	Communication system	Intercommunication system – One hand set in each car and one master hand set in main landing with necessary flexible cabling system and accessories for each lift.

17.1 COMPLETION TESTS

A Load test

A contract load test under the supervision of the local authorities and in presence of the Owner's representative shall be carried out before the lift is put into commission. During the test the brakes, limit switches, buffers and car safety devices shall be caused to function with the contract load in the lift. The lift shall be tested for accuracy of levels at all loads in either direction and for smooth vibration less travel. The lift shall be accepted upon satisfactory completion of the contract load test and after the same are certified by the appropriate local authorities/Lift Inspector and Owner's representative

B. Other Completion Tests

Insulation resistance tests to earth of the entire electrical equipment and wiring installation are to be carried out by means of a constant pressure 500 volts testing meggar set and the test result shall not be less than 1 mega ohm.

Result of continuity test of the conduit installation and any other metal work to earth shall not be more than one ohm

The temperature of motors and associated control equipments shall be checked after a continuous run of at least one hour duration to ensure that temperature rises are within the limit.

Test for speed shall be carried out and the speed shall not vary more than 10% of the specified speed under any conditions of load during ascending or descending

17.2 FEES & LICENSES

The Lift Contractor shall submit requisite application forms with necessary fees to the State Lift Inspector/Authority for permission to erect and for operation after getting the requisite forms (to be furnished by him) duly filled in and signed by the Owner. He will also liaison with the lift inspector and arrange for the provisional approval, inspection and issue of the licence by the Lift Inspector for regular use of the lifts.

The lift supplier will bring all his tools and tackles, testing apparatus at the time of inspection of Government Inspector/ Authority and he will be solely responsible for getting the lift installation approved/passed by the lift inspector/Authority

Statutory fees will be paid by the employer

The contractor shall undertake comprehensive maintenance of the equipments installed under this contract for a minimum period of 12 months from the date of completion of the work.

18.SPECIFICATION OF PUMP MOTOR FOR WATER SUPPLY & SWEAGE

18.1 MOTOR DRIVEN DRY PIT PUMPS [FOR CLEAR WATER]

End suction type, horizontally mounted centrifugal pump each capable to deliver the rated discharge of clear water. The pump should be coupled to a suitably TEFC electric motor mounted on a common base frame and anti-vibration pads/sheets, coupling, coupling guard and fixing stainless steel bolts etc. Motor HP to be suitably selected to suit discharge at duty point. The characteristic should have a wide range so that the pump does not fail at lower heads. Pump is to be selected with a minimum efficiency of 65%. The vendor has to select the best efficiency pump from the vendor list

The material of construction of pump shall be all stainless steel [minimum AISI 304] complete with body, housing, impeller & shaft of stainless steel. The base frame also shall be fabricated stainless steel **(nickel alloy bars)** with minimum 5 mm thickness of angle/channel sections & 4 mm thickness of sheets. All nuts / bolts / washers shall be of stainless steel. Gland packing shall be graphite asbestos

The material of construction of motor shall be cast iron housing, pressed stamped internals, copper windings. The motor shall be TEFC, squirrel cage induction type, IP55 rated with Class 'F' insulation & Class 'B' temperature rise, continuous rated for ambient of 50˚ C. motor efficiency should not be less than 87%. This motor will be mounted on the common stainless steel base frame. The motor will be coupled to the pump with a love joy flexible coupling

Arrangement to drain off gland packing leakage shall be provided with suitable funnel & PVC pipe of 32 mm Ø.

For close coupled mono block pump sets, the material of construction will remain the same as for dry pit pumps mentioned above but instead of gland packing there should be a mechanical seal as per manufacturers' standard. The efficiencies of pump & motor should be minimum as mentioned before

In both cases of pumps the rpm should not be more than 3000 [syn]. These pumps should be suitable for clear water operation of sp.gr = 1

18.2 SUBMERSIBLE CLEAR WATER PUMPS

The material construction of pump & motor shall be all stainless steel **#**AISI 304 or superior as per manufacturer. The motor protection shall be IP:68 and there should be a single mechanical seal. All other specifications shall be the same as mentioned in dry pit pumps. The pump must

have all internal sensing devices as well as level sensing for automatic start & stops at required levels. Arrangement must be made for lifting the pumps with guide pipe or chain or wire as per manufacturers' standard. However such lifting arrangements will have to be of AISI 304

18.3 SEWAGE SUBMERSIBLE WET PIT PUMPS

Submersible sump pumps for sewage & waste water applications shall be all cast iron with double mechanical seals. Motor protection shall be IP:68. The motor shall be close coupled vertical motor, squirrel cage induction type with class 'F' insulation. Cooling will be with the liquid surrounding the motor frame outside. The pump set must have all monitoring devices for auto control & tripping, viz. winding temperature, moisture control, & level sensing to prevent any failure in operation. Arrangement must be made for lifting the pumps with guide pipe or chain or wire as per manufacturers' standard. However such lifting arrangements will have to be of AISI 304.

18.4 PUMPSET DATA SHEETS

Pump set data sheets complete with data as per manufacturer, material of construction, characteristic curves, efficiency curves, power consumption curves etc have to be provided for at least 3 manufacturers. Architect/Owner will chose the best available pump set from the data provided and this pump set will have to be provided by the contractor who is awarded the work. The rates quoted by contractor will take this into account

Please note that AISI 304 is slightly magnetic but AISI 316 is non magnetic

19. Specification of Mortuary Cooler

19.1.GENERAL DESCRIPTION

Body Stores in Modular design of standard features will be six body Mortuary Cabinet as per matched requirement. Temperature range in all the cabinets are required 2 to 4^0 C. The unit is equipped with microprocessor based digital control panel which is to be operated with push buttons. For security and safe working high and low temperature alarm system is to be used. Refrigerating unit should be Hermetically sealed, Air cooled, Vibration free, Adjusted to interior temperature mounted on top or rare of cell having refrigeration with R134a or R404 refrigerant. Cooling system should be fully automatic defrost system and evaporator inside of the cell. Construction of Mortuaries Chamber are of double walled construction and made of 304 grades corrosion resistant stainless steel for insulation with high pressure injected polyurethane is to be used for minimizing thermal loss and meeting requirement of refrigeration in mortuaries. Doors are made of Painted stainless steel and fitted with external lock for security. This doors are to be situated in front and allows easy loading of Trays. This doors features lining should be in odorless robber gasket and anti condensation resistors. Internal lighting system should come with water proof fluorescents ceiling fittings and lamp which are fitted with the switch on the control panel. Digital microprocessor temp. display with LED system should be placed on the top of the Modular Cabinet. Exterior side of the 6 doors Mortuary Cooler inclusive complete refrigeration system will be 2500(W) x 2260(D) x 1750(H) mm, with six numbers handles. Body trays should be made of heavy gauge stainless steel as per I.S having dimension 2000(L) x 620(W) x 40(H) mm with handles.

20. SOLAR SYSTEM:

20.1 SOLAR WATER HEATER:

The type, complexity, and size of a solar water heating system are mostly determined by:

- Changes in ambient temperature and solar radiation between summer and winter.
- The changes in ambient temperature during the day-night cycle.
- The possibility of the potable water or collector fluid overheating.
- The possibility of the potable water or collector fluid freezing.

The minimum requirements of the system are determined by the amount or temperature of hot water required during winter, when a system's output and incoming water temperature are typically at their lowest.

The maximum output of the system is determined by the need to prevent the water in the system from becoming too hot.

The Solar Heating System should be made of following parameters:

i. Solar Heating System should be designed for full requirement of water at Hospital per day.
ii. Natural circular system should have to be provided
iii. Hot water pipe must be insulated at all places.
iv. Collector will be Finned type and will be placed at an angle [Latitude+ 15^0]
v. Outer cladding of the tank should be made of painted MS sheet of standard thickness.
vi. End Caps should be made of painted MS sheet of standard thickness.
vii. There should be non return valves, gate valves and full way valves in the system.

20.2 Specification of 50 KWp Grid Connected Roof Top Solar PV Power Plant:

A. Outline of the scheme of the project :

A.1 The array capacity of the proposed grid connected PV Power plants shall be **50kWp.**
A.2 The PV array shall be installed on the available space of the Roof of the Building.
A.3 The power plant shall be connected with grid with five numbers grid tie string inverters each of capacity 10 KVA, 3Ø 415 V 50Hz AC.
A.4 The inverters shall be installed in a suitable kiosk(s) with proper security protection close to the Array Terminal Box with arrangement of proper shed.
A.5 Outputs of the grid tie string inverter shall be terminated to an Inverter Combiner Panel to be located close to the inverters.
A.6 The output of the Inverter Combiner Panel shall be terminated and connected with supply mains through Grid interfacing Panel
A.7 An Export Import Energy Meter to be installed nearer to the Grid interfacing Panel before connected to the mains to measure the energy produce from the PV Power Plant
A.8 The SPV power plant to be installed should be Robust, Economic, Efficient and Time tested.

B. Solar PV Modules

The Cell of the Modules shall be poly crystalline. The capacity shall be consider as per declared capacity in the published technical brochures of the proposed PV Module Manufacturer.

Minimum number of PV Modules:

Sl No:	PV Module capacity type	No of PV Cell
01	240 Wp/250 Wp	60 Nos.
02	290 Wp / 300 Wp	72 Nos.

The PV modules must qualify the relevant **IEC 61215 or IS 14286 and IEC 61730 .** The proposed PV Module must have the Test Certificate issued from accredited test laboratories of MNRE Government of India under JNNSM Programme. The test certificates issued from IEC accredited laboratories shall also be acceptable.

Proposed PV Module must be manufactured in India.

Each PV module used in this solar power project must use an RF identification tag. The information must be mentioned in the RFID used on each module as per guideline of MNRE Government of India (This can be inside or outside the laminate, but must be able to withstand harsh environmental condition

Performance Warranty:

The manufacturer should warrant the output of Solar Module(s) for at least 90% of its rated power after initial 10 years & 80% of its rated power after 25 years from the completion of trial run at site.

If, Module(s) fail(s) to exhibit such power output in prescribed time span, the Contractor will either deliver additional PV Module(s) to replace the missing power output with no change in area of land used or replace the PV Module(s) with no change in area of land used at Owner s sole option.

Manufacturer of proposed PV modules must have the ISO 9001:2008 or ISO 14001 Certification for their manufacturing unit for their said manufacturing item.

Desired specification of the PV Module shall include but not limited to the following:

Sl No	Item	Description
1.0	Certification	i) IEC 61215 or IS 14286 ii) IEC 61730
1.1	Test certificate issuing authority.	NABL/ IEC Accredited Testing Laboratories or MNRE accredited test centers.
2.0	PV Cell	
2.1	Type	poly crystalline
2.2	Size	156mmX156mm
3.0	PV Module	
3.1	Rating at STC	i)240 Wp/ 250Wp, 60 cells (without any negative tolerance) ii)290 Wp / 300Wp, 72 cells (without any negative tolerance)
3.2	Efficiency	minimum14%
3.3	Fill factor	Minimum 70%
3.4	Withstanding voltage	1000V DC
3.5	Glass	
3.5.1	Thickness	3.2 mm (minimum)
3.5.2	Type	High transmission, low iron, tampered & textured glass with anti reflective coating.
3.6	PV Module Junction Box	
3.6.1	Protection level	IP 65 or above
3.7	Bypass Diode	
3.7.1	System Voltage (Vsys)	1000 V dc
3.7.2	Number	3 numbers
3.8	Module Frame	
3.8.1	Type	Anodized aluminum frame

C. PV Array

Desired specification of the PV Array shall include but not limited to the following:

Sl No	Item	Description
1.0	Nominal Capacity	2x50 KWp
2.0	PV Module interconnection connector	MC-4 / Tyco

3.0	PV Module interconnection cable and array cable	PV 1-F standard /NEC standard "USE-2 or RHW-2" type (double insulated)
4.0	PV array String Voltage	Compatible with the MPPT Channel of the inverter
5.0	Number of Parallel String against each MPPT Channel	02 Nos (Maximum)

D. Array Structure

i) PV Array shall be installed at the Roof top of the proposed Hospital building.

ii) PV Array structures shall be of Mild Steel with combination of either of I, C , L sections MS flat as per structure design requirement. The structure should be capable of withstanding **a wind load of 150 km/hr after grouting & installation**.

iii) Weight of the Metallic part of PV Array structure excluding nuts and bolt must be minimum same as the Weight of the total PV Module**.**

iv) Structural shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts.

v) The array structure shall be made of hot dip galvanized MS structure of minimum galvanizing thickness **70 to 80 micron**

vi) Structures shall be supplied complete with all members to be compatible for allowing easy installation.

vii) The module mounting structure shall have to be designed and fabricated with optimum tilting angle considering the site conditions.

viii) The structure shall be designed for simple mechanical and electrical installation. It shall support SPV modules at a given orientation, absorb and transfer the mechanical loads to the ground.

ix) All fasteners for supporting conduits , nut & bolts shall be made with stainless steel , very good quality stainless steel **except foundation bolts and the nuts and bolts to be used for connection of earthing strip with module mounting structure which will be of MS (GI Coated)**

x) Supporting structures including module Mounting structure shall have to be adequately protected against all climatic condition. The array structure shall support SPV modules at a given orientation and absorb and transfer the mechanical loads to the columns properly.

xi) The structures shall be designed for simple mechanical and electrical installation. There shall be no requirement of welding or complex machinery at the installation site. Required civil work or support platform is absolutely essential to install the structures, detailed engineering drawings and instructions for civil and other works shall got approved from the competent authority before carried out at the site.

xii) The Specification of the MS sections, flats must be as per **IS 808**

xiii) The supplier shall specify installation details of the PV modules and the support structures with appropriate diagrams and drawings.

E. PV Array Junction Box (AJB)

Array Junction Box (AJB) shall have to be used for termination of string prior connecting array with each inverter. There shall be two Arrays Junction Box incase, the inverter is located elsewhere away from PV Array. The minimum number of PV Array

Junction Box shall be **five (05) numbers**. The desired specification of the PV Array Junction Box and accessories shall include but not limited to the following:

Sl No	Item Description	Desired Data
1.0	Enclosure	
1.1	Degree of Protection	IP65 with UV Protected
1.2	Material	Polycarbonate.
1.3	Withstanding voltage	1000V DC
1.4	Withstanding Temperature	100 ^{0}C
1.5	Accessories mounting arrangement	DIN Rail
1.6	Number of Strings entry	As may be required
1.7	Approved Make	Hensel/ Spelsberg /ABB /*Ensto or* or equivalent make ***(as per acceptability of*** authority ***)***
2.0	Cable Entry and Exit	
2.1	Position	Bottom at cable entry and exit
2.2	Cable Entry and Exit connector type	MC 4 Connector (PV Array String cable)
2.3	Cable gland	Earthing cable entry
3.0	Surge Protecting Device (SPD)	
3.1	Type	DC
3.2	Approved Make	OBO Betterman / Dehn / Citel /ABB or equivalent make ***(as per acceptability of*** authority ***)***
3.3	Protection class	Type B+C
3.4	Number of set	As may be required as per string Design
3.5	System Voltage	Matched with System Voltage 1000 V DC
4.0	Fuse with fuse holder	
4.1	Position	Positive and negative terminal for each series string
4.2	Type	Glass fuse, for PV Use only
4.3	Rating	Current: Minimum **1.25** times the rated short circuit current of the string Voltage: Minimum **1000 V DC**
5.0	Earthing Provision	Terminal blocks will have to be provided for Earthing
6.0	Terminals, lugs and bus bar	Tinned copper

F. Grid Connected Inverter

The inverters shall be of string inverter. The proposed 50 KWp grid connected solar PV power plant shall be connected with grid. As such, the inverters shall be compatible to operate with existing utility supply. The PV system shall comprise of **five (05) numbers** of grid tie inverters each of nominal capacity 10 KVA.

Desired specification of each 10 KVA inverter shall include but not limited to the following:

Sl. No.	Operating Parameter	Desired specification
1.0	Type	Grid connected String Inverter
2.0	Usage	Specially used for PV system
3.0	Standards	
3.1	Efficiency Measurement	IEC 61683/ Equivalent BIS Std.
3.2	Environmental testing	IEC 60068-2 (1,2,14,30) / Equivalent BIS Std.
3.3	Interfacing with utility grid	IEC 61727
3.4	Islanding Prevention Measurement	IEC 62116

3.5	Type Test certificate issuing authority **(for item no 3.1 , 3.2,3.3 and 3.4)**	NABL/ IEC Accredited Testing Laboratories or MNRE approved test centers.
4.0	**Input (DC)**	
4.1	PV array connectivity capacity	12 KWp (minimum)
4.2	MPPT Voltage range	Compatible with the array voltage
4.3	Number of MPPT Channel	2 nos (Minimum)
5.0	**Output (AC)**	
5.1	Nominal AC Power output	10 KVA
5.2	Number of Grid Ph	3Ø
5.3	Adjustable AC voltage range	Programmable as per grid condition 360V-455V
5.4	Frequency range	47-53 Hz
5.5	AC wave form	Sine wave
5.6	THD	Less than 3%
5.7	Switching	High frequency transformer / transformer less
6.0	General Electrical data	
6.1	Efficiency (Maximum)	95 %
6.2	Sleep mode consumption	Less than 5 W
7.0	**Protection**	
7.1	DC Side	1. Reverse-polarity protection 2. Reverse current to PV array protection, over voltage, Under voltage protection 3. Over current
7.2	AC side	1. DC inject protection to grid less than1% 2. Over voltage and Under voltage 3. Over current 4. Over and under grid frequency protection, 5. Anti Islanding protection
7.3	Isolation Switch	1. PV array Isolation switch (DC)
7.4	Ground fault detection device (RCD) which can detect changes in ground current. Rating shall be as suitable for inverter	To be provided for transformer less inverter.
8.0	Display	
8.1	Display type	LCD Display
8.2	Display parameter	
8.2.1	DC	Voltage Current Power
8.2.2	On grid connected mode	Line status Grid voltage Grid frequency Export Power Cumulative Export Energy
9.0	Interface (Communication protocol)	Suitable port must be provided in the inverter for i) On site upgrade of Software, ii) On site dumping data from the memory, iii) Web based remote monitoring system
10.0	Web monitoring	Matched with the monitoring and data logging system
11.0	Mechanical Data	
11.1	Protection Class	IP 65 or higher
11.2	Operating ambient temperature	$0\ ^0$C to 60^0C
11.3	Cooling	Natural / forced cooling

G. Web enable on line data logger and Remote Monitoring Unit :

Web enable data logging system may be an integrated part of the inverter or a separate unit. The data logging system includes **MPPT wise PV array monitoring** system also. The data Logger should have the provision of recording **the data of solar insulation, PV cell temperature and ambient temperature and associated electrical parameters** at different stages to study performance of system as well as to study status of the system at a particular instant. The data logger should have required transducer to monitor and record the required system data. **The data logger should be provided with an insulation sensor and a module temperature sensor, ambient temperature sensor matched with the system**.

The data logger shall have reliable battery backup and data storage capacity (minimum two days data) to record all sorts of data simultaneously round the clock.

Web based Remote Monitoring system must be compatible with data logger. The system shall be provided **with GSM Modem with required SIM card**. The modem must be compatible to GSM and /or GPRS system. The other required accessories, hardware and compatible software shall have to be provided as an integrated part of the system to monitor the real time data (maximum 20 minutes delay) through web server. The Data logger shall continuously send data to the server. The system can be monitored from anywhere through internet without installing any special software. The server shall not be provided by authority or end user. **The price of the remote monitoring system includes all the rental and other costs of the SIM cards, IP address for a period of five (05) years**.

The Web based monitoring system should have the provision of graphical representation of the data shall include but not limited to the following:

Sl. No.	Operating Parameter	Desired specification
1.0	Input data	PV Power PV Energy
2.0	Meteorological data	Insulation Module Temperature Ambient Temperature
3.0	Output data	
3.1	Inverter	Export Power Export energy

All data shall be recorded chronologically date wise. The data file should be MS Excel/XML/or any readable form compatible and should have the facility of easy download

H. Inverter Combiner Panel

Each of the output of the five (05) Nos Inverters shall be terminated in a Combiner Panel through 32A 415V 4 pole MCB at the in incoming side (Inverter side). The outgoing side (Grid side) shall be connected through a 125A 415V 50 kA TPN MCCB and a 150A 415 V 4 pole Load Break Switch. The set of AC surge suppressor (SPD) shall be connected at the outgoing bus. The Grid Sync Panel shall be outdoor type having double door metal enclosure with a front. **The protection level Grid Sync Panel must be IP 54.** All the equipments and meter display can only be accessed after opening of front doors. The front door must have locking arrangement.

Desired specification of **Grid Sink Panel** shall include but not limited to the following:

Sl No	Parameter	Desired Specification
1.0	In coming MCB (Inverters side)	
1.1	Approved make	ABB / L & T / Schneider / Siemens/Havell's or equivalent make (as per acceptability of authority)
1.2	Number	06 (one) number. 01(one) number against each inverter and one number spare.
1.3	Type	4 pole
1.4	Rating	415V, 32 Amps, 10 kA
2.0	Outgoing MCCB (Grid Side)	
2.1	Approved Make	ABB / L&T / Siemens/ Schneider or equivalent ***(as per acceptability of*** authority***)***
2.2	Type	4 pole
2.3	Rating	125A 415VAC 50kA
3.0	Surge protection device	
3.1	Position	Outgoing side (Grid side)
3.2	Approved Make	OBO Betterman / Dehn / Citel /ABB or equivalent make (as per acceptability of authority)
3.3	Usage as declare by Manufacturer	For AC use only
3.4	Protection class	Type B+C
3.5	Number of set	01 Set
3.6	Rating	600 V 100 kA (minimum)
4.0	AC load break switch	
4.1	Make	ABB / L&T / Siemens/ Schnider /Havell's or equivalent make ***(as per acceptability of*** authority***)***
4.2	Rating	150A 415 V TPN
4.3	Operating facility	Handle with Padlock.
5.0	Indicator	Incoming side and outgoing side (R,Y,B)
6.0	Metering Arrangement	
6.1	Instantaneous Measuring parameter	i. Voltage, ii. current iii. frequency
6.2	CT/ PT Make	KAPPA/ SERVO/AE/ KALPA or equivalent make ***(as per acceptability of*** authority***).***
6.3	Type of meter	Electronics
6.4	Display type of meter	LED/LCD
6.5	Display of the meter	From outside without opening of front cover
6.6	Meter Make	L&T / Siemens/ Schneider/ Secure or equivalent ***(as per acceptability of*** authority***)***
7.0	Bus Bar	
7.1	Material	Copper
7.2	Type	TPN
7.3	Rating	200 A
7.4	Position	Incoming and Out Going Bus
8.0	Earthing Provision	Terminal Blocks will have to be provided for Earthing
9.0	Mechanical	
9.1	Type	Metallic, double door, Outdoor Type
9.2	Protection level	IP 54 (minimum)
9.3	Housing	Floor Mounted/ Wall Mounted
9.4	Enclosed	Double Door Metal Enclosure dust and vermin proof

Sl No	Parameter	Desired Specification
9.5	Cable Entry	Bottom
9.6	Glands Position	At cable entry and exit
9.7	Cooling	Natural/ forced

I. Kiosk (for installation of Array Junction Box, Inverter, Grid Sync Panel) :

(i) All the Array Junction Boxes, Inverters and Grid Sync Panel shall be installed at the same place and at the rare side of the PV Array in a suitable location in a Kiosk.

(ii) The kiosk of must be of a suitable design, covered with a door and locking arrangement with good air circulation. The Kiosk must have security arrangement against theft, manhandling etc. Above the kiosk there should have a suitable shade.

(iii) The equipment / structure of the equipment fixed on the array structure then suitable insulation must be provided between Array structure and the equipment and equipment structure.

(iv) The minimum clearance of the lower edge of the equipments from the developed ground level should be **1m**

(v) The kiosk of must be of a suitable design covered with a cage with door and locking arrangement for protection and to prevent mishandling.

(vi) The cable laid in the kiosk through perforated Aluminum channel with front cover.

(vii) The Kiosk structure must have sufficient strength to bare the load of the equipments.

J. Grid interfacing LT Panel

Output of each of the two Inverter combiner panel shall be terminated to a **Grid Interfacing LT Panel.** The Inverter Combiner Panel shall be outdoor type Poly Carbonate of protection level IP 65**.** All the equipments and meter display can only be accessed after opening of front doors. The front door must have locking arrangement.

Desired specification of each **Grid interfacing LT Panel** shall include but not limited to the following:

Sl No	Parameter	Desired Specification
1.0	MCCB (Grid Side)	
1.1	Number	02 (two) numbers. 01(one) number to be used + 01 Number spare
1.2	Approved Make	ABB / L&T / Siemens/ Schneider or equivalent ***(as per acceptability of*** authority***)***
1.3	Type	4 pole with handle
1.4	Rating	125A 415VAC 50 kA
2.0	Surge protection device	
2.1	Position	Outgoing side (Grid side)
2.2	Approved Make	OBO Betterman / Dehn / Citel /ABB or equivalent make (as per acceptability of authority)
2.3	Usage as declare by Manufacturer	For AC use only
2.4	Protection class	Type B+C
2.5	Number of set	01 Set

Sl No	Parameter	Desired Specification
2.6	Rating	600 V 100 kA (minimum)
3.0	Metering Arrangement	
3.1	Instantaneous Measuring parameter	i. Voltage, ii. current iii. frequency iv. Power
3.2	CT/ PT Make	KAPPA/ SERVO/AE/ KALPA or equivalent make ***(as per acceptability of*** authority***).***
3.3	Type of meter	Electronics
3.4	Display type of meter	LED/LCD
3.5	Display of the meter	From outside without opening of front cover
3.6	Meter Make	L&T / Siemens/ Schneider/ Secure or equivalent ***(as per acceptability of*** authority***)***
4.0	Earthing Provision	Terminal Blocks will have to be provided for Earthing
5.0	Enclosure	
5.1	Degree of Protection	IP65 with UV Protected
5.2	Material	Polycarbonate.
5.3	Withstanding voltage	1000V DC
5.4	Withstanding Temperature	100 ^{0}C
5.5	Number of Strings entry	As may be required
5.6	Approved Make	Hensel/ Spelsberg /ABB /*Ensto or* or equivalent make ***(as per acceptability of*** authority***)***
5.7	Cable Entry	Bottom

K. <u>Export Import Energy Meter :</u>

One number 3 Ø 4 wire 415V AC 3X(20A-100A) whole current **Export Import Energy Meter of L&T / Genus or Equivalent *per acceptability of*** authority **.** The Meter to be supplied must be tested from any of the NABL/ BIS Accredited Testing-Calibration Laboratories. The export Import Energy meter shall be installed at the separate housing within an enclosure. The Export Import Energy meter shall be installed at a suitable location before Point of Common Coupling (PCC) with grid side.

L. <u>Cables & Wirings :</u>

The Specification of wiring material of PV Power plant shall include but not limited to the following:

Sl No	Item	Description
A	DC Cable	
1.1	Conductor	Tinned annealed stranded flexible copper according to IEC 60228 class 5
1.2	Standard	PV-1F / 2 PfG 1169/08.2007 / VDE Standard E PV 01:2008-02 /Equivalent
1.3	Mke	LAPP/Top Solar/Nexans/ Schneider or equivalent ***(as per acceptability of*** authority***)***
B	AC Cable	
2.1	Rated Voltage	1.1kV
2.2	Construction	
2.2.1	Type	Armored or unarmored as per requirement
2.2.2	Conductor	Stranded flexible copper
2.2.3	Insulation	PVC

Sl No	Item	Description
2.2.4	Standard	IS : 1554 -1
2.3	Make	RR Cable/ Polycab/LAPP/ Havell's or equivalent ***(as per acceptability of*** authority***)***
C	PVC Conduit tees, bends etc (Hard & flexible)	
3.0	Standard	ASTM D 1785 u PVC
3.1	Ambient Temperature	0 ^{0}C to 50 ^{0}C
3.2	Type	UV stabilized , temperatures, Shock proof chemical resistant
3.3	Make	Oriplast /Supreme
D	GI Pipe	
4.0	Make	TATA

(i) All the Array Junction Boxes, Inverters **Inverter Combiner Panel** shall be installed at the rare side of the PV Array in suitable locations in Kiosks. **Grid Inter facing panel** also to be put in a Kiosk

(ii) The panels must be installed in suitable kiosks protected from theft and mishandling with sheds so that rain water and direct sun exposure can be avoided.

(iii) The kiosks of must be of a suitable design, covered with a door and locking arrangement with good air circulation. The Kiosks must have security arrangement against theft, manhandling etc.

(iv) The kiosks must have suitable sheds so that rain water and direct sun exposure can be avoided.

(v) The equipment / structure of the equipment fixed on the array structure then suitable insulation must be provided between Array structure and the equipment and equipment structure.

(vi) The minimum clearance of the lower edge of the equipments from the developed ground level should be **1m**

(vii) The kiosk of must be of a suitable design covered with a cage with door and locking arrangement for protection and to prevent mishandling.

(viii) The cable laid in the kiosk through perforated Aluminum channel with front cover.

(ix) The Kiosk structure must have sufficient strength to bare the load of the equipments.

M. <u>System , Equipment, Array structure Earthing:</u>

i. Equipment grounding (Earthing) shall connect all non-current carrying metal receptacles, electrical boxes, appliance frames, chassis and PV panel mounting structures in one long run. The grounding wire should not be switched, fused or interrupted.

ii. Array Structure must be earthed with GI Strip

iii. The complete earthing system shall be electrically connected to provide return to earth from all equipment independent of mechanical connection.

iv. The equipment grounding wire shall be connected to one grounding electrode per PV power plant.

v. Test point shall be provided for each earth pit.

vi. An earth bus and a test point shall be provided inside control room.

vii. Earthing system design should be as per the standard practices.

viii. The Earthing pit must be of Chemical gel type with Chem-Rod as grounding rod.

ix. The Code of Practice Earthing shall be IS 3043:1987

x. Necessary provision shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance.

xi. Minimum six (06) numbers of earth pit. Earthing Pit Cover Needs to be provided

xii. Earth Grid must be made by inter connection of earth pit through GI Strip. The size of the GI earth strip must be minimum **25X3 mm**. The thickness of the galvanization should be

N. Lightning Protection

(i) The Code of Practice of lightning protection system shall be IS 2309: 1987

(ii) Suitable number of Lightning Protection Unit comprises of GI Air Terminal with G.I. pipe of suitable height for mounting the terminal & adaptor must be provided to cover the complete PV Array yard.

(iii) Minimum four (04) numbers lightning arrestor must be provided

(iv) Earth pit used for lightning arrestor shall be separate from the system/equipment earthing.

(v) Chemical gel type of earthing must be used for earth pit.

(vi) The two pits shall be inter connected at a suitable location outside the of the building by a earth bus with test jumper.

(vii) Lightning arrestors shall be interconnected connected and earthed to the lightning protection system through the GI strip

(viii) The size of the GI earth strip used for Lightning Protection system must be minimum **50X5 mm**.

(ix) Minimum five (05) numbers of earth pit for lightning arrestor.

(x) The number of air terminal must be such so that it can cover the total PV array.

O. Signage:

Safety Signage: Safety Signage must be provided mentioning the level and type of voltage and symbols as per IE Rule at different position as may be required.

P. Provision for Module Cleaning

Module Cleaning: Necessary arrangement and equipment is to be provided to facilitate easy cleaning of the PV Modules

Q. Fire Buckets and Fire Bucket Holding stand

Fire Bucket of minimum quantity eight (08) numbers and Fire Bucket Stand of minimum quantity two (02) shall be provided at Array field. Each fire Bucket holding stand (Triangular type) shall have the arrangement to hold four (04) numbers of fire buckets. The Fire Bucket stand must be as per IS 2546. The stand shall be installed at the rare side of the PV Array. The minimum technical specification is a follows:

Bis Specification	IS 2546
Fire Bucket Capacity	10 Litres
Fire Bucket Body Material	Galvanized Mild Steel Sheet
Body Thickness	1 mm

R. Spares ,Tools and Measuring Instruments:

The minimum number and different type of spares, tools and measuring instruments must be supplied under this project within the contract value. Also any special tools, spares, measuring instruments if required as may be shall be provided by the contractor.

Special Terms and Condition

A. Field Proven Inverter

The propose string inverter must be field proven in Indian atmosphere. The string inverter of the proposed manufacturer must be used in any project of minimum **capacity 50 KWp** anywhere in India and in operation on or before **31th December 2012.** Also there must be a good maintenance setup of the proposed inverter manufacturer with having sufficient numbers of qualified service engineers (Degree/ Diploma engineers) and well equipped set up with instruments, tools and tackles at anywhere in West Bengal. The maintenance setup of the proposed inverter manufacturer may be inspected by authority, if required.

B. Equipment and Material

Equipment and material shall comply with description, rating, type and size as detailed in this specification. Equipment and materials furnished shall be complete and operative in all respect. All accessories, which are necessary for safe and satisfactory installation and operation of the equipment, shall be furnished. All parts shall be made accurately to standard gauges so as to facilitate replacement and repair. All corresponding parts of similar equipment shall be interchangeable. Contractor shall carefully check the available space and the environmental conditions for installation of all equipments available at site and shall design the system accordingly.

C. Mode of Execution

The PV power plant shall be procured as a complete package. The entire work shall have to be executed on turnkey basis. Any minor item(s) not included in the schedule or specification but required for completion of the work shall have to be carried out/supplied without any extra cost. While submitting the offer the bidder shall consider cost of those items and may indicate separately as additional deliverable items

D. Materials and Workmanship

Qualified, experienced people should be deployed to install the **PV Power Plant**. All materials shall be of the best quality and workmanship capable of satisfactory operation under the operating and

prevailing climatic conditions of respective. Unless otherwise specified, they shall conform in all respect to the latest edition of the relevant code and standards.. The project must be supervised by a qualified Structural Engineer/ Engineering firm and Electrical /Electronics Engineer so that the work shall be as per drawing and related IS/IEC Code. The work shall be performed confirming safety precaution of all level of worker execute the project. The name and the qualification of the project engineers must be submitted to authority after placement of order. **The qualification of the supervising engineers must be minimum degree or diploma in respective stream.**

E. Testing and Inspection

Material Inspection will be carried out after submission of all test reports /certificates and after completion of the manufacturing work, against formal intimation from the contractor. The contractor shall, give notice of any material being ready for testing and the authority, if desired, shall attend at the contractor's premises and may proceed with the routine tests. The material shall have to be dispatched at site after inspection and clearance from the purchaser. The inspection setup and instruments must be provided by the contractor within the contract value.

F. Commissioning

After the erection and testing of the equipment/works as per above, commissioning of the plant and works shall be carried out and here the term "Commissioning" shall mean the activities of functional testing of the complete system after erection and testing, including tuning or adjustment of the equipment for optimum performance and demonstrating to the Purchaser that the equipment performance meets the requirements of the specifications.

G. Insurance:

Execution Insurance:

It is desired that the contractor shall arrange for insurance coverage for the equipment, accessories, materials etc. to be delivered at site upto handing over of the complete installation. As such the bidder shall include the cost of such insurance in their price bid.

Insurance after commissioning of PV Power Plant

Insurance against Fire, natural calamities shall be arranged by the firm for entire period of contract (i.e five years from the date of commissioning of the power plant).

H. Comprehensive Warrantee and Maintenance

The contractor must ensure that the goods supplied under the contract are new, unused and of most recent or current models and incorporate all recent improvements in design and materials unless provided otherwise in the contract.

The warrantee period **the complete PV Systems** will be **60 (sixty)** calendar months from the date of commissioning**. However the performance guarantee of the PV Module shall be 25 years as per guideline of MNRE Government of India.** The contractor shall remain liable to replace any defective parts that may develop in the plant of his own manufacture or that of his sub-contractors under the conditions provided **for** by the contract under proper use, and arising solely from faulty design, materials or workmanship, provided always that such defective parts as are not, repairable at site and are not essential in the meantime to the maintenance in commercial use of the plant are promptly returned to the contractor's works at the expense of the contractor unless otherwise arranged.

The maintenance includes Routine, Preventive, Breakdown & Capital Maintenance the details are as follows but not limited:

Routine, Preventive, Breakdown & Capital Maintenance:

Routine and preventive maintenance:

Routine and preventive maintenance shall include cleaning of PV Module on regular basis, checks and maintenance activities such as tightening of all electrical connections, daily, weekly, fortnightly, monthly, quarterly, half yearly, and yearly basis which are required to be carried out on all the components of the power plant to minimize breakdowns and to ensure smooth and trouble free running of the power plant. The supplier shall be responsible to carry out routine and preventive maintenance and replacement of each and every component / equipment of the power plant and he shall provide all labour, material, consumables etc. for routine and preventive maintenance at his own cost.

Breakdown maintenance:

Breakdown maintenance shall mean the maintenance activity including repairs and replacement of any component or equipment of the power plant which is not covered by routine and preventive maintenance and which is required to be carried out as a result of sudden failure/breakdown of that particular component or equipment while the plant is running. The supplier shall be responsible to carry out breakdown maintenance of each and every component of the power plant and he shall provide the required manpower, materials, consumables, components or equipment etc. for breakdown maintenance at his own cost irrespective of the reasons of the breakdown/failure

Capital maintenance:

Capital Maintenance shall mean the major overhaul of any component or equipment of the power plant which is not covered by routine, preventive and breakdown maintenance which may become necessary on account of excessive wear & tear, aging, which needs repair/replacement. The capital maintenance of power plant and all civil structures shall normally be planned to be carried out on an annual basis. For this purpose a joint inspection by the supplier and purchaser shall be carried out of all the major components of the power plant, about two months in advance of the annual maintenance period, in order to ascertain as to which components of the power plant require capital maintenance. In this regard the decision of the purchaser will be final and binding. However, if the condition of any plant and component warrants its capital maintenance at any other time, a joint inspection of the purchaser and supplier shall be carried out immediately on occurrence of such situation and capital maintenance shall be carried out by arranging the shutdown of the plant/part of the plant, if required, in consultation with concerned authorities. The decision of the purchaser shall be final and binding. Capital maintenance also includes replacement of defective lights fans under the project supplied by the contractor. The capital maintenance includes painting, of mechanical structure, civil structure.

The contractor shall under take necessary maintenance/troubleshooting work of the Solar PV Power Systems. Down time shall not be more than 72 working hours from time of occurrence. Adequate measures should be taken for prevention of wear and tear of the machines. Solar PV Power System is to be designed to operate with a minimum of maintenance.

The scope of Support Service provides preventive maintenance as & when necessary within the contract period and break down maintenance in the event of malfunctions, which prevent the operation of the power system or part of it within the stipulated time period & free replacement of spares required for maintenance.

Party will provide the A list of Spare parts & measuring instruments are

The contractor will submit warrantee certificates of the work & spare parts and materials at the time of submission of completion report. If any defect is found within the warrantee period, contractor will be liable to repair or replace the same at his own cost and risk, within three (72 hours) days from the date of complaint lodged by the authority or by the user himself.

I. <u>End Users Training</u>

The Contractor shall arrange for training at site for the end users. The duration of training shall be minimum **five days**. The contractor shall provide training materials at least seven days before commencement of training programme. **The training shall be the part of contract and no extra cost shall be provided for organizing the training programme**.

J. Handing Over

The work shall be taken over by authority upon successful completion of all tasks to be performed at site(s) on equipment supplied, installed, erected, commissioned AND RUN SUCCESSFULLY FOR CONSECUTIVE 60 DAYS AT A STRETCH by the contractor in accordance with provision of this order. During handing over complete project work, the contractor shall submit the followings for considering final payment.

i. All As-Built Drawings & Design
ii. Detailed Engineering Document with detailed specification, schematic drawing, and test results, manuals for all deliverable major items, Operation, Maintenance & Safety Instruction Manual and other information about the project
iii. Certificate issued by the structural & civil engineer/firm having engineer with minimum LBS/ESE/EBA License for structural design of PV Array.
iv. Bill of material
v. Inventory of spares at projects site
vi. Completion certificate as per prescribed format provided by authority

Specifications of Solar Water Heater and Solar-PV power plant connected in grid at roof top have been provided for guideline only. At the time of installation at individual site, WBMSCL, need to be consulted for any modifications if necessary as per site condition .The provisions laid out in ECBC 2010 on the subject matter are also required to be adhered.

21. UPS SYSTEM

21.1 SPECIFICATION FOR THE UPS.

i) **Quality power Supply**
The UPS shall be ON-LINE double conversion with filter, stabilized and reliable voltage that is free from all mains interference (Over voltage, frequency variations, voltage drops).

ii) The battery cabinets used in the UPS shall be for longer runtime, The UPS shall have Optional filters, Isolation transformer module, LCD-based remote control panel, LED-based remote control panel & Communication software "professional" version.

iii) **The Operating mode of UPS**
It should operate in on-line operating mode as follows.

- **Economy Mode**: The UPS should use Line Interactive technology, i.e. the load is powered from the mains; the energy consumption is reduced with a subsequent improvement in efficiency (98%).
- **Smart active mode:** The UPS should automatically selects On Line or Line Interactive operating mode according to the quality of the mains supply, by monitoring the number, frequency and type of disturbances at the mains power input.
- **Stand-by-off mode:** With the mains available the UPS should normally not powered and consequently the power consumption is almost nil. Only when the mains fails or falls outside a preset range, does the inverter take over in 200ms using power from the batteries. This mode shall be suitable for Emergency escape lighting as pr standard **EN 50171.**

iv) **The UPS shall have Expandable feature**. The units can be connected in parallel up to 8 units to increase power availability or redundancy. The system can be expanded at any time. For the expandability there shall be "Hot System Expansion" feature, the additional unit can be connected in parallel while the other units are on-line and supplying regular power to the load. The new UPS is on-line and will receive the updated information automatically.

v) **High Reliability**
The UPS should be connected in parallel up to 8 units to exponentially increase the reliability of the system.

vi) **Maximum battery care**

In the UPS there shall be an automatic battery test which shall be able to periodically check the efficiency of the batteries. The batteries should not be used during micro-interruption (40ms), as the required energy is drawn from a group of capacitor. (Battery saving).

vii) **Maximum safety for personal**

There should be a feedback protection device in the UPS to prevent any voltage back feed in the upstream distribution board, thus ensuring the maintenance personal.

viii) For Advanced communication there shall be software system which displays the most important information such as the input and output Voltage, the load applied, the remaining back-up time, etc. It should also be able to provide information even in the event of a failure, to support the fault diagnostics.

It should also contain the following hardware interfaces:

- RS232 serial port
- Dry contacts
- EPO (Emergency Power Off)

Contact for UPS shutdown using the remote emergency button.

i) To allow easy and intuitive operation of the UPS There should be Mimic Panel. This helps in accessing the most important parameters: status and alarm, control and commands, input, output, battery measurements (power, current, voltage, frequency and temperature) and settings.

ii) **Low Input Harmonic Distortion,** The UPS shall have The Power Factor Correction (PFC), standard on all modules, so that the input power factor level to 0.95 for any load percentages so that it is ideal in conjunction with motor generator or in installation with other sensitive loads. There shall be built in Active Filter designed to reduce the level of THDi to less than 4% and to increase the input power factor up to 0.99.

This Active filter shall be based on the IGBT's Technologies controlled by the Digital Signal Processor (DSP). This DSP instantly monitors and controls the inputs current absorbed by the UPS in order to eliminate the unlike harmonics and maintain the THDi less then 4%. With the effect of Active Filter the UPS can also be connected to the low loads. These active filters shall be fitted inside the UPS so that no additional footprint is required.

Less harmonics in the UPS input reduces the neutral cable size and consequently the installation cost. Also it gives maximum reliability as any failure of the optional Active Filter has no influence on the power supplied to the load; the only consequence is the increase of current harmonics level rejected to the mains, which gives maximum reliability for the load.

iii) **The input requirement of the UPS is as follows:**

Voltage	:	380/400/415V
Voltage tolerance	:	320-480V at rated load & 240-480V at 50% load
Frequency	:	50-60 Hz
Current distortion	:	<4% with active filter

iv) **The Bypass of the UPS is as follows:**

Rated voltage	:	380/400/415V
Phases number	:	3 + N
Voltage tolerance	:	± 15%
Rated frequency	:	50 Hz
By-pass	:	Static and manual for maintenance
Transfer time	:	nil

v) **The Battery for the UPS is as follows:**

Type of battery	:	maintenance-free sealed lead-acid
Battery blocks	:	12 V SMF
Recharge time minimum	:	6 Hr

Vi) **Technical Data Sheet:**

1	Technology	IGBT based rectifier & Inverter Digital Signal Processor controlled
		for the following:
		a. Rectifier/Charger
		b. Battery management.
		c. Inverter
		d. Static Switch
	UPS type and configuration	True On-Line, Double conversion with "INBUILT ISOLATION TRANSFORMER"
		meeting VFI-SS-111
	UPS capacity	(TO BE PROVIDED BY BIDDER) KVA with inbuilt isolation Transformer
	Rated Output	(TO BE PROVIDED BY BIDDER)
		……..(KVA/KW) (SHOULD BE DISIGNED FOR 0.9 Output P.F)
		The UPS system is compatible for lagging power factor
		upto 0.9 leading PF loads without deration.
	Power factor at full load	>/= 0.99
	Power factor at 50% load	>/= 0.98
	Input current THDi at full load	</= 3.0%
2	**Input**	
	Voltage	380/400/415 V
	Voltage tolerance	320-480V at rated load.
		upto 240-480V at 50% load.
	Frequency	50/60 Hz
	Frequency tolerance	± 10%
3	**Rectfier/Charger**	
	Type of rectifier used	IGBT based DSP controlled Rectifier.
	Ripple voltage at full load	Typically 0.
	Efficiency of rectifier	>/= 98%
	Battery charger features	
	i) Type of charging circuit.	Constant Voltage Constant Current.
	ii) Battery status monitoring facility.	Thro LCD display at the front panel.
	iii) Battery protection circuits.	Battery Breaker/Isolator to be provided
4	**Inverter**	
	Technology of inversion	IGBT based PWM design with DSP
5	**Output**	
	Voltage	380/400/415 VAC, 3 phase, 4 wire
		Settable.
	Output voltage regulation	
	I) Balanced load	± 1%
	ii) Unbalanced load	± 3% for 4 wire system
	Output Frequency	50 Hz
	Output Frequency range	± 0.5 Hz
	OP Frequency synchronising range	Selectable between 1Hz to 5Hz
	with Bypass	
	Transient voltage regulation for	± 2%
	0 to 100% and vice versa	
	Recovery time	< 10 m.sec
	Wave form	Sinusoidal
	Crest Factor	3 : 1
	Harmonics :	
	i) Total harmonic distortion at 100%	
	non-linear load .	< 3%
	ii) Total harmonic distortion at 100%	< 1%
	linear load .	

	Phase displacement:	
	i) Balanced load	120 ± 1 deg. Electrical
	ii) 100 % Unbalanced load	120 ± 2 deg. Electrical
	Overload at 0.9 pf loads	150% for 60 sec
		125% for 10 min.
	Neutral current & conductor size	1.5 times of Phase current.
6	Static and Manual Bypass :	Standard and built-in
7	Eco mode	SHOULD BE AVAILABLE
	Efficienct at ECO Mode	98%
8	**Efficiency**	Excluding transformer loss
	At Full load	**>/= 93.0%**
	At 75 % load	**>/= 93.5%**
	At 50% load	**>/= 93.5%**
	At 25% load	**>/= 90.5%**
9	**Environmental conditions**	
	i)Temperature (design ambient)	0 - 40 deg C
	ii)Relative humidity	95 % RH
	iii) Acoustic Noise measured at 1	< 53 dBA
	Mt distance	
10	Event logging	Available.
11	**Protection**	
a	Overload	Available.
b	Short circuit	Available.
c	Input low voltage	Available.
d	Output over voltage	Available.
e	Battery over charging	Available.
f	Battery over discharging	Available.
12	**Physical**	
a	Construction	Compact and modular design
b	Ventilation	Forced Air cooling.
13	**Dimensions of UPS panels**	
a	Width (in mm)	To be furnished by bidder
b	Depth (in mm)	To be furnished by bidder
c	Height (in mm)	To be furnished by bidder
14	Reliability	> 99.5%
15	**Conformity to Standards**	
a	Performance	IEC 62040-3
b	ISO certification	ISO 9001 (To be submitted with the BID)
c	Company Certification	OHSAS (To be submitted with the BID)
16	Whether capacity addition of UPS	Paralleling facility of minimum 5 units of
	systems in phases possible and	similar capacity is required for future use
	how	
17	Service Facility	OEM should have wholely owned Service Center & Call Logging Facility with District Support Centre
18	**Battery**	
a	Duration of back up for rated output	**30** minutes on each UPS (BATTERY SIZING SHEET TO BE PROVIDED)
b	Type of battery	Maintenance Free Sealed Lead Acid.
c	Design Life	5-6 years
d	Capacity of Battery AH	To be specified by bidder (BATTERY SIZING SHEET TO BE PROVIDED)
e	Total VAH	**.....** VAH (TO BE PROVIDED BY BIDDER)
f	D C Bus voltage	480V DC
g	Battery Voltage	12 V SMF
h	End cell voltage	1.75V
i	Charging time	6 hours

22. SPECIAL CONDITIONS

22.1 GENERAL

The design and workmanship shall be in accordance with the best engineering practices, to ensure satisfactory performance and service life. The requirement offered by the contractor shall be complete in all respects. Any materials or accessories which may not have been specifically mentioned, but which are usual and necessary for the satisfactory and trouble free operation and maintenance of the equipment shall be provided without any extra cost of the purchaser. This shall also include spares for commissioning of the equipment.

22.2 The contractor shall obtain all sanctions (electrical loads, approval of drawing/ESS/D.G.'s estimator/approval of meter room etc. from the concerned authorities and permits required for the electrical installation work. All actual fee payable in this regard will be reimbursed against receipt/documentary evidence. On completion of work, the contractor shall obtain NOC from Director of Electricity Government of west Bengal .And a copy of the same shall be delivered to the Owner.

The Owner shall have full power regarding the materials or work got tested by independent agency at the electrical authority expenses in order to prove their soundness and adequacy. The contractor will rectify the defects/suggestions pointed out by independent agency through Owner at his own expenses.

The installation shall comply in all respects with the requirements of Indian Electricity Act 1910, Indian Electricity Rules (IER) 1956 and other related Laws and Regulations (for F.F. etc.) as amended up to date, there under and special requirements, if any, of the WBSEDCL etc. The bidder is liable to furnish the list of authorized licensed persons/ employed/deputed to carry out the works/perform the assigned duties to fulfill the requirement of Rule No.3 of IER 1956 as amended up to date.

22.3 DRAWINGS

i) Shop Drawings

The contractor shall prepare detailed coordinated electrical shop and working drawing indicating lighting/lighting fixtures, convenience outlets, D.G.'s, H.T., Transformer, M.V. Panel Boards/Relay Panel, PCC, DB's, Rising Mains, Cable Schedule with other relevant services and submit to the Owner for approval or the Engineer-in-Charge before commencing the work. The shop drawings shall indicate all setting out details and physical dimensions of all components with wiring and cable details including system operating write up in the system i.e. 11 KV Panel Board, Control and Relay Panel Package Substation, D.G.'s, PCC's, MCC's, cable schedule and routes, manhole trap and fixing details as well as for conduit indicating run and size of wire/cables, outlet/pull/junction boxes etc. with fixing details etc. for the above mentioned work. All work shall be carried out on the approval of these drawings. However, approval of these drawings do not relieve the contractor of his responsibility for providing maintenance free and fool proof system including any missing component/accessories to meet with the intent of the specifications. Contractor will submit 2 prints for preliminary approval and finally six prints for distribution.

ii) Completion Drawings/As Built Drawings

On completion of the work and before issue of certificate of virtual completion, the contractor shall submit to the employer 4 sets along with soft copy of 'As Built' drawings of the work along with 01 Nos. cloth tracing originals including write up (trouble shooting, installation, operation and maintenance manual with instructions) incorporating all such changes and modifications during engineering and execution along with warrantee & guarantee certificates from manufacturers.

These drawings must provide:

- ♣ Run and size of conduit, inspection and pull boxes including routing and locations.
- ♣ Number and size of conductor in each conduit.
- ♣ Locations and rating of sockets and switches controlling the light and power outlet.
- ♣ A complete wiring diagram as installed and schematic drawings showing all connections in the complete electrical system.
- ♣ Location of outlets of various services, junction boxes, light fixtures.
- ♣ Location of all earthing stations route and size of all earthing conductors.
- ♣ Layout and particulars of all cables.

- ♣ Location and details of PCC's, MCC's, Feeder Pillars, capacitor control panels, PLC D.G. set panel,

UPS panel, and relay panels with description detailed control wiring diagram.

- ♣ Location of transformer and its details and control wiring diagram.
- ♣ Location of Hume pipe/pcc ducting and manhole including HT/LT cable layout and scheduling.
- ♣ Location of D.G.'s, exhaust and auxiliary equipments with schematic drawings.
- ♣ Layout of cable trays with support and their fixing details/vertical rising.
- ♣ Location of all earthing station, route and size of all earthing conductor.
- ♣ Layout and particulars of rising mains with fixing details.

iii) Position of HT/LT Switch Boards/Transformer & D.G.'S

The recommended position of the switch boards transformer & D.G.'s as will be shown on the layout drawings will be adhered to as far as practicable.

The contractor shall submit 2 sets of samples of each type of accessories and apparatus, proposed to be used in the installation at site for approval (drawings or samples) as required shall be submitted by contractor and the choice of selection out of the approved list lies with the Owner. For all non-specified items, approval of the Owner shall be obtained prior to procurement of the same. Owner shall in no way be liable for rejection of the any material due to poor quality, poor workmanship, poor material etc.

22.4 MANUFACTURER'S INSTRUCTIONS

Where manufacturers have furnished specific instructions, relating to the material/equipments to be used on this job, covering points not specifically mentioned in this document, manufacturers' instructions should be followed.

22.5 MATERIALS AND EQUIPMENTS

All the materials and equipments shall be of the approved make and design. Unless otherwise called for any approval by Owner's Engineer-in-Charge, only the best quality materials and equipment shall be used.

22.6 GENERAL DETAILS

a. Space Heaters & Lighting.

One of more adequately rated heaters thermostatically controlled with On-Off switch and fuse shall be provided to prevent condensation in any panel compartment. The heaters shall be installed in the lower portion of the compartment and electrical connections shall be made from below the heaters to minimize deterioration of supply wire insulation. The heaters shall be suitable to maintain the compartment temperature to prevent condensation. CFL lamp shall be provided in any panel compartment.

b. Fungistatic Varnish

Besides the space heaters, special moisture and fungus resistant varnish shall be applied on parts, which may be subjected or predisposed to the formation of fungi due to the presence or deposit of nutrient substances. The varnish shall not be applied to any surface of part where the treatment will interfere with the operation or performance of the equipment. Such surfaces or parts shall be protected against the application of the varnish.

c. Ventilation Opening

In order to ensure adequate ventilation, compartments shall have ventilation openings provided with fine wire mesh of brass to prevent the entry of insects and to reduce to a minimum the entry of dirt and dust. Outdoor compartment openings shall be provided with shutter type blinds.

d. Degree of Protection

The enclosures of the Control Cabinets, Junction Boxes and Marshalling Boxes, Panels etc. to be installed shall provide degree of protection shall be as given below.

- ♣ Installed outdoor: IP-55.

- ♣ Installed indoor in air-conditioned area: IP-52.
- ♣ Installed in covered area: IP-52.
- ♣ Installed indoor in non air-conditioned area where possibility of entry of water is limited: IP- 42.
- ♣ For L.T. switchgear (AC and DC distribution boards): IP-52.

The degree of protection shall be in accordance with IS: 13947 (Part-I)/IEC-947 (Part-I). Type test report for degree of protection test, on each type of the box shall be submitted.

23.LIST OF APPROVED MAKE

Sl. NO.	ITEM	MANUFACTURER'S NAME
1	SOLAR POWER PANEL	KL SOLAR COMPANY/ SURANA VENTURES LIMITED/WAREE ENERGIES LTD.
2	UPS SYSTEM	APC/NUMERIC/DELTA/EMERSON
3	INVERTOR	NUMERIC / MICROTEK / SU-KAM/DELTA/APC/EMERSON
4	AMMETER / VOLTMETER / ENERGY METER/ TRIVECTOR METER	AE / L&T/ SCHNEIDER
5	L.T POWER CAPACITOR	UNIVERSAL / SIEMENS / L&T / SCHNEIDER / EPCOS
6.	AMMETER / VOLTMETER / ENERGY METER/ TRIVECTOR METER/FREQUENCY METER	AE / L&T/ SCHNEIDER/ SECURE
7.	FUSES & SWITCH FUSE UNIT	SIEMENS/ ABB/ SCHNEIDER/ LEGRAND/ L&T
8.	ACB / MCCB / CONTACTOR/ SUB DISTRIBUTION BOARDS/ MINIATURE CIRCUIT BREAKERS/ EARTH LEAKAGE CIRCUIT BREAKER / RESIDUAL CURRENT CIRCUIT BREAKER	SIEMENS/ ABB/ SCHNEIDER/ LEGRAND/ L&T
9.	METAL CLAD SOCKET	SIEMENS/ LEGRAND/ BHARTIA CUTLUR HAMMER
10.	RISING MAINS	GODREJ/ VIDHYUT/ SPC ELECTROTECH/L&T/SCHNIDER
11.	LED'S LIGHT	PHILIPS/ /BAJAJ/ WIPRO/HAVELLS
12.	ISOLATORS FOR MOTORS	LEGRAND/ SIEMENS/ SCHNEIDER/ ABB
13.	CHANGE OVER SWITCH	HAVELLS/ L&T/ABB
14.	CONTACTOR, TIMER, SINGLE PHASE PREVENTOR & OVER LOAD RELAY	L&T/ ABB/ SIEMENS /HAVELS
15.	METERS - DIGITAL TYPE	AE/ L&T/ RISHAB/ GE
16.	PROTECTIVE & APFC RELAYS	ASLTOM/ ASHIDA/ L&T
17.	CT'S / PT'S- DRY TYPE-EPOXY	AE / KAPPA / L&T / SCHNEIDER
18.	INDICATING LAMP / PUSH BUTTON ACTUATERS - LED CLUSTER TYPE	L&T/ SIEMENS/ BCH
19.	ROTARY SWITCHES	L&T/ KAYCEE/ BCH

20.	TERMINAL BLOCK	ELEMEX/ WAGO
21.	LT PANELS	SIEMENS / L&T / LEGRAND / SCHNEIDER
22.	LIGHTNING ARRESTER ESE STOMASTER TYPE	LPI (AUSTRALIA)/ LPS (FRANCE/ FM (SUDAFIX) LY COM (H.K) / SGI ENGINEERS/ ALLTEC CORPORATION
23.	GAS FIRE SUSPERSSION SYSTEM	FIRE LINE/ TYCO FIRE/SIEMENS
24.	STARTERS (A.C.)	SIEMENS / L&T / SCHNEIDER / NORTH WEST/HAGER
25.	SELECTOR SWITCHES	SIEMENS / L&T / SCHNEIDER
26.	LUGS	DOWELLS/ COMET
27.	BRASS CABLE GLANDS	COMMET/ BELIGA
28.	LT POWER CABLE (ALUMINIUM/ COPPER)	POLYCAB / FINOLEX/ HAVELLS
29.	CONTROL CABLE (COPPER)	UNIVERSAL/ NICCO/ POLYCAB / SKYTONE/HAVELLS/FINOLEX
30.	LT & HT XLPE CABLE	UNIVERSAL / RPG CABLES / NICCO/FINOLEX/HAVELLS/ KEI/ SKYTONE/
31.	H.T. CABLE END TERMINATION	BIRLA/ 3 M / REYCHEM/ FRONTEC
32.	1.1 KV GRADE PVC INSULATATED FRLS COPPER FLEXIBLE WIRE UP TO 10 SQ.MM	HAVELLS/GLOSTER/FINOLEX/MESCAB/POLYCAB/L&T
33.	MS CONDUIT / GI CONDUIT (ISI MARKED)	BEC/ AKG / ATUL
34.	PVC CONDUIT (ISI MARKED)	BEC/ POLYPACK/ AKG /ATUL
35.	PVC INSULATED COPPER CONDUCTOR FRLS WIRE	FINOLEX / HAVELLS/ SKYTONE/ RAJNIGANDHA/ KEI/ MESCAB/ POLYCAB
36.	PLATE TYPE - SWITCHES / SOCKETS / TV & TELEPHONE SOCKETS AND ALL OTHER WIRING ACCESSORIES	SIEMENS/ ABB/ HAVELLS/LEGRAND/ NORTH WEST/CRABTREE
37.	ACCESSORIES FOR METALIC / GI CONDUIT (ISI MARKED)	SHRMA STEEL CORPORATION / PRAKASH ENGINEERING WORKS / SUPER SALES CORPORATION
38.	PVC INSULATION TAPE	STEEL GRIP/ ANCHOR
39.	PHENOL LAMINATED SHEET	HYLAM / FORMICA
40.	Switch Gear	L&T/Siemens/ABB/EE/SCHNEIDER
41.	LIGHTING DBS & MCBS	SIEMENS/LEGRAND/HAVELLS/ ABB/ HAGER/ L&T
42.	Electric Motors	Kirloskar/Crompton Greaves/ABB/Siemens
43.	MCB,10KA	LEGRAND (MDS)/ SIEMENS/ HAGER/HAVELLS/ L&T/SCHNEIDER/ABB
44.	DISTRIBUTION BOARD	LEGRAND (MDS)/ SIEMENS/ HAGER/HAVELLS
45.	CT. / PT.	AE / KAPPA / L&T / SCHNEIDER
46.	LIGHTING FIXTURES & FANS	PHILIPS/HAVELS/GE/BAJAJ
47.	EXHAUST FANS	EPC/BAJAJ/ CROMPTON
48.	BULK HEAD FITTINGS	BAJAJ/ CROMPTON/ PHILIPS/ WIPRO/HAVELS
49.	EXHAUST FANS / CEILING FAN / WALL MOUNTED FAN	CROMPTON/ POLAR/ ALMONARD/ HAVELLS/ USHA

50.	LIGHTING FIXTURES	PHILIPS/ BAJAJ/ WIPRO/ HAVELLS/GE/CGL
51.	LIGHTING CONTROL SYSTEM	SCHNIDER/ PHILIPS/ LUTRON
52.	LIGHTNING PROTECTION G-3	SGI / INDELEC / ERICO
53.	SMOKE DETECTORS	NOTIFIER/ HONEYWELL(XLS-3000)/ UNITED TECHNOLOGIES/SIEMENS/COOPER/RAVEL/BOSCH
54.	HEAT DETECTORS	NOTIFIER/ HONEYWELL(XLS-3000)/ UNITED TECHNOLOGIES/SIEMENS/COOPER/RAVEL/BOSCH
55.	MANUAL CALL BOX	HONEYWELL(XLS-3000)/ SIEMENS/RAVEL/COOPER/BOSCH
56.	HOOTER/ SOUNDER	HONEYWELL(XLS-3000)/ SIEMENS/RAVEL/COOPER/BOSCH
57.	RESPONSE INDICATOR	HONEYWELL(XLS-3000)/ SIEMENS/RAVEL
58.	FIRE PANEL	HONEYWELL(XLS-3000)/ SIEMENS/RAVEL
59.	PA AMPLIFIER/ PA SPEAKERS	BOSE/ PHILIPS/ AHUJA /BOSCH
60	MICROPROCESSOR FIRE CONTROL PANEL	HONEYWELL(XLS-3000)/SIEMENS/RAVEL
61.	LINE MATCHING TRANSFORMER	BOSE/ PHILIPS/ AHUJA/BOSCH
62.	GOOSE NECK MIKE	BOSE/ PHILIPS/ AHUJA/BOSCH
63.	PA RACK	APW/NET RACK/VAL RACK
64.	MICs	BOSCH/AHUJA
65.	SIGNAL/CONTROL CABLE	FINOLEX/HAVELLS/GLOSTER/POLYCAB/KEI
66	LIFT	OTIS/KONE/Thyssenkrupp/Johnson
67	CAMERA WITH ALL ACCESSORIES	HONEYWELL /PELCO/BOSCH
68	ROAD BARRIER	NICE/ MAGNETICS/ GODREJ/ GE
69	CARD READER	SENSORMATIC-USA/ MOTOROLA/HONEYWELL(XLS-3000)
70	MONITOR	ALBA/ LG/ SAMSUNG
71	VCR	BPL/ PANASONIC
72	MULTIPLEXER	SENSORMATIC OR EQUIVALENT
73	SEQUENCER	ALBA/ VANTAGE
74	PROXIMITY CARD	MOTOROLA/ HUGHES/ HONEYWELL/GE/SIEMENS
75	TELEPHONE TAG BLOCK	KRONE/ TVS R&M/SYSTIMAX/SCHNEIDER/PANDUIT
76	TELEPHONE CABLES	DELTON / SKYTONE/ CLIPSAL
77	CO-AXIAL CABLES	FINOLEX/ DELTON/SKYTONE
78	EPABX	ALKATEL/ SIEMENS/ NORTEL/PANASONIC
79	CCTV SYSTEM	HONEYWELL/ SIEMENS /PELCO
80	IT & TELECOM SYSTEM	SCHNEIDER/ SYSTIMAX/ PANDUIT
81	Jack Panels	DLink/AMP/TYCO
82	Switches	AVAYA/HP/CISCO
83	Fiber/Cat6 Cables	Molex/TYCO/R&M
84	Active Servers	HP/Dell/IBM
85	FIRE ALARM SYSTEM	HONEYWELL(XLS-3000)/ SIEMENS/COOPER
86	ACCESS CONTROL SYSTEM	HONEYWELL/ SIEMENS/GE
87	BATTERIES	QUANTA/ROCKET/HIPOWER/EXIDE
88	BATTERY CHARGER	KELTRON/ NELCO/ EXIDE/ HBL NIFE
89	DG SET	KIRLOSKER/JACKSON/STERLING WILSON
90		
91	HT PANELS	SIEMENS/ ABB/ AREVA/ L&T/ CGL/SCHNEIDER
92	TRANSFORMER	VOLTAMP/ ABB/ AREVA / KIRLOSKER/ CROMPTON/SCHNEIDER
93	UNITISED / COMPACT SUB-STATION	ABB/SIEMENS/ SCHNIEDER

94. HVAC SYSTEM		
	5 STAR RATED SPLIT TYPE AIR CONDITIONER & 5 STAR RATED WINDOW TYPE AIR CONDITIONER	HITACHI/CARRIER/DIAKIN/VOLTAS
	FAN COIL UNIT	EDGETECH/WAVES/VOLTAS/ZECO
	AIR/WATER COOLED SCREW/SCROOL CHILLER	VOLTAS /CARRIER/DAIKIN/KIRLOSKAR
	FIBREGLASS RIGID BOARD	U.P.TWIGA
	XLPE DUCT INSULATION/ CROSS LINKED POLYMER DUCT INSULATION	ARMACELL/K FLEX/ SUPREME/ARMAFLEX
	COOLING TOWER	CHOKSI/PAHARPUR/ADVANCE/BELL
	HVAC controls	HONEYWELL/JHONSON/SIEMENS
	PRE FILTER/FINE FILTER/ HEPA FILTER	CLEAN FILTER/DYNAFILTERS/ PYRAMID/SPECTRUM
	M.S.PIPE	TATA/JINDAL/BANSAL
	2 WAY VALVE WITH CONTROLS	ADVANCE/HONEYWELL/JOHNSON
	3 WAY VALVE WITH CONTROLS	ADVANCE/HONEYWELL/JOHNSON/SIEMENS
	CHILLED/CONDENSER WATER PUMP	KIRLOSKAR/MATHER & PLATT/BEACON
	ELECTRIC MOTORS	ABB, CROMPTON, KIRLOSKAR,SIEMENS,HINDUSTAN
	G.I.SHEETS	SAIL/TATA/JINDAL/ESSAR
	ALUMINIUM SHEETS	BALCO/JINDAL/NALCO
	Pre fabricated Ducts	Radiant/ZECO/Camduct
	Centrifugal Fan	Kruger/Nicotra/Flaktwoods/Wolter
	Axial flow fan	Kruger/Nicotra/Flaktwoods/Wolter
	Propeller fan	Almonard/GEC Alsthom/Khaitan
	BUTTERFLY VALVES	CASTLE/ADVANCE/Honeywell/L&T/ ZOLOTO
	BALANCING VALVES	ADVANCE/ZOLOTO/ Honeywell
	MOTORIZED VALVE	L&T/ADVANCE/ZOLOTO/HONEYWELL/SIEMENS
	NON RETURN VALVE	ADVANCE/L&T/ HONEYWELL /ZOLOTO
	Y Strainer	Emerald/ ADVANCE/ZOLOTO
	THERMOMETER/PRESSURE GAUGE	H.GURU/Warree
	Gate/Globe/Ball Valve	ADVANCE/L&T /ZOLOTO
	Chilled Water Pipes	Tata/Jindal/Sail
	Diffusers/Grilles	Ravister/Air Master/Air Flow
	Fire Damper	Ravister/Air Master/Air Flow
	Duct Insulation (Fibre Glass)	UP Twiga
	Flexible Duct	Atco/Sevenstar/Rolastar
	Pipe Fittings	HEAVY/ Local repute make
	Sluice Valve	Koley/ Kalpana/ Karter/ C&R
	Foot Valve	Koley/ Kalpana/ Karter/ C&R
95	Anti-corrosive wrapping material	IWL/ Indolit
96	Landing/ Hydrant Valve	ASCO/ GEI/ Fire Sheild/ Guards

97	Fire Hose	CRC/ BRG/ Fire Sheild
98	Sprinklers	TYCO/VIKING
99	ALARM VALVE	TYCO/VIKING/HD FIRE
100	ADDRESSABLE RELAY/CONTROL MODULES/MONITOR MODULES	COOPER/SIEMENS/MORLEY/HONEYWELL/BOSCH/ RAVEL
101	Fire Alarm Panel	COOPER/SIEMENS/MORLEY/HONEYWELL/BOSCH/ RAVEL
102	Coupling and Branch Pipe	ASCO/ GEI/ Fire Sheild/ Guards
103	Hose Box and Hose Reel	Zenith Engineers/ Repute make
104	Fire Brigade Connector	ASCO/ GEI/ Fire Sheild/ Guards
105	Installation Control Valve	HD Fire/ UL approved
106	Fire Sprinkler	HD Fire/ Tyco/ Viking
107	Butterfly Valve	Koley/ Kalpana/ Karter/ C&R
108	Addressable Fire Alarm	Ravel/ Morley/ Honeywell (ASSER)/United Technologies
109	Addressable Detector	Ravel/ Morley/ Honeywell (ASSER) /United Technologies
110	Addressable Modules	Ravel/ Morley/ Honeywell (ASSER) /United Technologies
111	Addressable Manual Call Point	Ravel/ Morley/ Honeywell (ASSER)/United Technologies
112	Electronic hooter cum speaker	AGNI/ Repute make
113	Power Cables	Finolex/Gloster/ KEI/ Havells/ Polycab
114	Control Cables	Finolex/Gloster/ KEI/ Havells/ Polycab
115	Fire Pumps	Kirloskar/ Mather & Platt
116	Fire Pump Motors	Kirloskar/ Siemens/ Crompton
117	Fire Pump Engine	KOEL/ Greaves
118	Pressure Gauge	H.Guru/ Fiebig
119	Pressure Switch	Indfoss/ Danfoss
120	Extinguisher	Fire Sheild/ Omex/ Firefite
121	Fire Check Door	AGNI/ CBRI approved
122	Hydrant Valve, Branch Pipe, Nozzle	Sukan/Fireshield/Safe Fire/Winco

NOTE: Contractors have to take approval from Engineer in charge before placing of order of any required materials from the above mentioned approved makes . If any required materials not available in above list Engineer in charge can add the make / Brand in list at any stage with the approval of the Employer, decision will be final and binding on contractors. If any doubts about listed make / Brand Engineer in charge may amend the list at any stage, decision will be final and binding on contractors.

Section 5.7
Schedule of Medical Equipment and Hospital Furniture

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
		Medical equipment - General Terms and conditions of Contract				
	1	The unit supplied should function continuosly in ambient temperature of 10º to 40º C and relative humidity of 15% to 90%.				
	2	The unit should be capable of being stored continuously in an ambient temperature from 0 to 50º C and relative humidity of 15% to 90%				
	3	Power input to the system should be single phase 220-240 Vac, 50 Hz single phase supply or 440 Vac, 50 Hz, 3 phase as applicable. Cables should be terminated in protected plug top or isolator of suitable capacity.				
	4	Suitable servo controlled stabilizer / CVT should be supplied if the unit is not supported by built-in stabilizer.				
	5	UPS of suitable rating should be supplied with battery back up for minimum 30 Minutes should be supplied for the system which needs continous Power for safety of equipment, patients and Operator				
	6	All products Should be FDA or CE or BIS as applicable (At least one of these certificate is mandatory). Copy of original certificate should be submitted along with Installation Report				
	7	The manufacturing facility if available in India should have ISO certification wherever applicable.				
	8	Electrical Safety testing should be done at the user's site as part of acceptance testing. This is mandatory.				
	9	All statutory Approvals Like AERB / Explosive Licence/ running Blood bank approvals is the responsibility of Contractor				
	10	Should have local service facility provided by the manufacturer or his authorised agent to carry out PM as per schedule and corrective maintenance at short notice.				
	11	Remanufactured / Reconditioned / demo equipments will not be acceptable and undertaking to this effect to be submitted from the manufacturer.				
	12	Cost of consumables and reagents for next 5 years should be submitted along with installation report				
	13	The Contractor should provide 3 (three) year warranty from the date of handing over of equipments . CMC amount for next 5 years should be quoted for every equipment				
	14	All major and minor spare parts should be available with the supplier for a period of 10 years from the date of supply				
	15	Supplier should have a team of trained and experienced service engineers within 24 hrs reach.				
	16	Electrical Safety testing should be done at the user's site as part of acceptance testing. This is mandatory.				
	17	2 copies of user's manual in Hard copy &CD should be supplied				
	18	4 Preventive maintenance to be carried once in every 3 months during warranty period				
	17	1 copy of maintenanace manual with Block diagram, parts price list, trouble shooting procedure and detailed preventive maintenance protocol to be provided				
	18	Certificates of test and calibration with complete details done at factory of prior to despatch and should be attached along with Installation report				
	19	**Mandatory:** Compliance report to be submitted for specification in the columns provided along with the specification. Non compliance / partial compliance should be explained clearly in the remarks column. While filling compliance against each item in tech. spec sheet, actual values should be furnished alogn with yes or no reply.				
	20	Installation, Commissioning, acceptance testing and validation should be done as per manufacturers protocol at site.				
	21	All test equipment, phantoms, kits, reagents, personnel for Trial run of the equipment will be the responsibility of the contractor				
	22	Acceptance of installation shall include training of personnel at site (users, technicians and engineers) should be undertaken.				
	23	All surgical instruments should be made of High quality SS , with dull finish and CE /ISO ceritified				
1		**Radiology**				
		Digital Radiography System (Ceiling Suspended)		**1**	**1**	GE / Philips / Siemens / Agfa / Konica
	1	**Generator**				
	a	The Generator should be of high frequency of capacity of 50 KW or above.				
	b	KVP range should be 40 KV- 150 KV or more.				
	c	The output at 100 KV should be 500mA or more.				
	d	Should have display of KVP & mAs.				
	e	Anatomical Radiography Programming should be possible.				
	f	Indication for Exposure timing should be there with automatic exposure control facility.				
	2	**X-Ray Tube and Collimator**				
	a	The X-Ray Tube should be of rotating anode with dual focus having the following sizes: (i) Large focus: 1.2 mm or less (ii) Small focus: 0.6 mm or less				
	b	The unit should have Anode Heat Storage capacity of 350 KHU or more.				
	c	Distance measuring scale should be provided.				
	d	Tube rotation on vertical axis should be +/- 90 degree at least.				
	e	Tube Angulations around horizontal axis should be at least + 90 degree.				
	f	Should have multi-leaf collimator having bright light source auto shut provision for the light along with automatic image shuttering and cropping facility.				
	3	**Digital Detector [Flat panel Caesium Iodide (CsI)]** - 2 (Two) nos. of fixed/portable type (wired / wireless) with required battery.				
	a	One detector should be fixed with horizontal table and another detector will be fixed with vertical bucky stand.				
	b	The active image size of the detector should be at least 35 cm x 41 cm or more.				
	c	The spatial resolution should be minimum of 2.5 lines pair/mm.				
	d	The pixel size should be 200 micrometers or less.				
	e	The detector should be capable of fixing in vertical Bucky stand.				
	f	Detective Quantum Efficiency (DQE) should be 65 % or above at 0 lp/mm.				
	4	**Vertical Detector Stand**				
	a	The unit should be provided with vertical stand.				
	b	The unit should have provision to do all upright X-Rays.				
	c	The vertical Detector should travel from at least 1.5 feet to 5 feet above floor level.				
	d	Bucky tilting should be -16 to + 90 degree or wider				
	5	**Work Station**				
	a	The operating console should have LCD/TFT monitor.				
	b	Storage disc capacity should be 500 GB or more.				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	c	The system should have built in DICOM interface ready.				
	6	**Table**				
	a	Fixed type table with fixed/portable type detector				
	b	Patient couch should be automatic and can be operated from the table side. Movement should be vertical and horizontal.				
	7	**Accessories**				
	a	Should provide with Dry Imager camera. The Camera should print at least standard film sizes.				
	b	Should provide with 2 no. of Lead Apron (Light weight user friendly)				
	c	One Separate additional work station to be provided				
	d	UPS from reputed manufacturer of at least 30 minutes back up for the console only and a Servo Stabilizer of appropriate KVA for the whole system.				
	e	The equipment should be new and unused. The manufacturing date should not be more than 180 days when it would reach the consignee address.				
	f	Gonadal shield for boys and girls of all age group one set.				
	g	Stand for LEAD apron and Gonadal shield.				
	8	**Standard & Safety**				
	a	Should be of US FDA / CE ("Conformité Européene"), AERB type approval / NOC may be allowed				
	9	**Warranty & CMC**				
	a	Warranty and CMC includes (i) everything in specification of the equipment including Air conditioning, UPS, Servo Stabilizer and all other accessories (ii) all accessories and ancillaries in site preparation including interiors.				
	b	Warranty and CMC will also include X-Ray tube which will have to be replaced by a new, fresh and functioning one in case of tube fault, if any, during period of contract.				
2		**500 M.A. X-ray machine with Radiography and Fluroscopy**	**Each**	**0**	**1**	Siemens/GE/Philips/Allengers
	1	**X Ray Generator**				
	2	Two pulse X-ray generator				
	3	Power output: 40 KW X Ray Generator 500mA , 125 KV				
	4	Electronic Timer				
	5	To increase the X-ray tube life, X-ray generator should be provided with a device capable of stopping rotating anode immediately after the termination of the exposure				
	6	**X Ray Tube:**				
	7	Two Nos. BEL DRA 1 - 125/20/40 X Ray Tube should be offered with the unit with 2 pairs of HT Cables				
	8	**Column Stand**				
	9	Light weight Floor to Ceiling type with Spring Counter Balancing System with rope failure protection device. It should be 360 degree rotatable				
	10	**Examination Table**				
	11	Vertical to head down position with automatic stop at Vertical, Horizontal and Head down position				
	12	Vertical to head down position with automatic stop at Vertical, Horizontal and Head down position.				
	13	Table should be provided with obstacle protection during horizontal to vertical position.				
	14	Spot Film Device should be provided with magnetic breaks and automatic arrest facility during spot filming.				
	15	Bucky with adjustable cassette tray with a grid ratio of 10:1 and 100 lines per inch				
	16	Motorized Under Couch Collimator and Manual Over Couch collimator				
	17	The Spot Film Device should include the following:				
	18	4 in 1 on 8"X10" Film				
	19	2 in 1 on 10"X12" Film				
	20	1in 1 on 14"X14" Film				
	21	along with a suitable Grid				
	22	Foot Rest, Abdomen Binder, Compression Device foot Switch hand Grip, Skull Cone, Shoulder Rest, Strap Radiation flaps				
	23	IITV				
	24	The entire system should have resolution of 10lp/cm and consist of the following:				
	25	Light weight ceiling free IITV system mounted on the table.				
	26	High resolution CCD camera to capture the image from the output phosphor of the II.				
	27	Trolley mounted 17" TFT Monitor (44")				
	28	Specifications of the Image Intensifier:				
	29	Nominal entrance field diameter of 23 cm with triple field selection capability.				
	30	Output window size 20-25 mm.				
	31	Vertical & Horizontal image orientation reversal switches mounted on II.				
	32	The assembly should have `All metal' construction and provide magnetic and lead shielding.				
	33	Specifications of the CCD camera.				
	34	Should be of PAL Systems with minimum 750 x 580 pixels.				
	35	Video Standard 50 Hz. 625 lines interlaced.				
	36	Video gain should have automatic gain control.				
	37	Circular blanking facility.				
	38	Video output – 1 Vpp composite video.				
	39	Last image hold facility must be present.				
	40	specification of the monitor.				
	41	TFT/LED type Medical Grade monitor minimum 43 cm. 17" diagonal with circular mask.				
	42	Local controls for image contrast and brightness adjustment.				
	43	Should be cart/ trolley mounted and movable anywhere in the fluoroscopy room.				
	44	Vertical Bucky stand for standing abdomen (quote optionally).				
	45	Quoted unit should be approved by BARC/AERB.				
	46	**Accessories:**				
	47	Cassettes : Push lock type cassette with Green/Blue Base Rare earth screens of size :				
	48	8"x10" – 2 nos.				
	49	10"x12" – 2 nos.				
	50	14"x14" – 2 nos.				
	51	14"x17" – 2 nos.				
	52	Lead Aprons – 2 nos.				
	53	Radiation Shield – 1 no				
	54	Lead Aprons – 4 nos.				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	55	**Standards, safety, and training**				
	56	Should have the ISO certification and the copy of the same should be enclosed along with the technical bid.				
	57	Training should be provided for usersand biomedical engineers				
	58	Unit should have type approval certificate from AERB				
	59	Should comply with AERB /BIS/ICRP Guidelines for radiation leakage and X-Ray equipments.				
	60	**Documentation**				
	61	User/Technical/Maintenance manual to be supplied in English				
	62	Certificate of calibration and inspection from factory.				
3		**300 M.A. X-ray machine with Radiography and Fluroscopy**	Each	**1**	**0**	Siemens/GE/Philips/Allengers
	1	**X Ray Generator**				
	2	Two pulse X-ray generator				
	3	Power output: 24 KW X Ray Generator 300mA , 100 KV				
	4	Electronic Timer				
	5	To increase the X-ray tube life, X-ray generator should be provided with a device capable of stopping rotating anode immediately after the termination of the exposure.				
	6	**X Ray Tube:**				
	7	Two Nos. BEL DRA 1 - 125/20/40 X Ray Tube should be offered with the unit with 2 pairs of HT Cables :				
	8	**Column Stand**				
	9	Light weight Floor to Ceiling type with Spring Counter Balancing System with rope failure protection device. It should be 360 degree rotatable.				
	10	**Examination Table**				
	11	Vertical to head down position with automatic stop at Vertical, Horizontal and Head down position.				
	12	Table should be provided with obstacle protection during horizontal to vertical position.				
	13	Spot Film Device should be provided with magnetic breaks and automatic arrest facility during spot filming.				
	14	Bucky with adjustable cassette tray with a grid ratio of 10:1 and 100 lines per inch				
	15	Motorized Under Couch Collimator and Manual Over Couch collimator.				
	16	The Spot Film Device should include the following:				
	17	4 in 1 on 8”X10” Film				
	18	2 in 1 on 10”X12” Film				
	19	1in 1 on 14”X14” Film				
	20	along with a suitable grid				
	21	Foot Rest, Abdomen Binder, Compression Device foot Switch hand Grip, Skull Cone, Shoulder Rest, Strap Radiation flaps				
	22	**IITV**				
	23	The entire system should have resolution of 10lp/cm and consist of the following:				
	24	Light weight ceiling free IITV system mounted on the table.				
	25	High resolution CCD camera to capture the image from the output phosphor of the II.				
	26	Trolley mounted 17” TFT Monitor (44”)				
	27	specifications of the Image Intensifier:				
	28	Nominal entrance field diameter of 23 cm with triple field selection capability.				
	29	Output window size 20-25 mm.				
	30	Vertical & Horizontal image orientation reversal switches mounted on II.				
	31	The assembly should have `All metal’ construction and provide magnetic and lead shielding.				
	32	**Specifications of the CCD camera.**				
	33	Should be of PAL Systems with minimum 750 x 580 pixels.				
	34	Video Standard 50 Hz. 625 lines interlaced.				
	35	Video gain should have automatic gain control.				
	36	Circular blanking facility.				
	37	Video output – 1 Vpp composite video.				
	38	Last image hold facility must be present.				
	39	**Specification of the monitor.**				
	40	**TFT/LED type Medical Grade monitor minimum 43 cm. 17” diagonal with circular mask.**				
	41	Local controls for image contrast and brightness adjustment.				
	42	Should be cart/ trolley mounted and movable anywhere in the fluoroscopy room.				
	43	Vertical Bucky stand for standing abdomen (quote optionally).				
	44	Quoted unit should be approved by BARC/AERB.				
	45	**Accessories:**				
	46	- Cassettes : Push lock type cassette with Green/Blue Base Rare earth screens of size :				
	47	- 8”x10” – 2 nos.				
	48	- 10”x12” – 2 nos.				
	49	- 14”x14” – 2 nos.				
	50	- 14”x17” – 2 nos.				
	51	- Lead Aprons – 2 nos.				
	52	- Radiation Shield – 1 no				
	53	- Lead Aprons – 4 nos.				
	54	**Standards, safety, and training**				
	55	Should have the ISO certification and the copy of the same should be enclosed along with the technical bid.				
	56	Training should be provided for usersand biomedical engineers				
	57	Unit should have type approval certificate from AERB				
	58	Should comply with AERB /BIS/ICRP Guidelines for radiation leakage and X-Ray equipments.				
	59	**Documentation**				
	60	User/Technical/Maintenance manual to be supplied in English				
	61	Certificate of calibration and inspection from factory.				
4		**Portable Xray Machine (60 ma) Mobile**	Each	**0**	**1**	Siemens/GE/Philips/Allengers
		Technical Specification				
	1	**Operational Requirements**				
	2	Compact, lightweight, easily transportable mobile radiographic unit suitable for bedside x-rays				
	3	The unit must have an effective braking system for parking and transport. The tube stand must be fully counterbalanced with rotation in all directions				
	4	General purpose, high frequency, multi pulse, Mobile X – Ray machine, light in weight, digital display of KV & mAs parameters.				
	5	Exposures with remote control should be available.				
	6	The unit must have cassette storage facility for all size of cassettes				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	7	**The Generator**				
	8	Microprocessor controlled high frequency, output 2 KW				
	9	It should have a digital display of mAs and kV				
	10	kV range:40kV to 100 kV				
	11	mA range: 60 mA				
	12	**X-Ray Tube**				
	13	Stationary anode Stationary Anode type with 1.5mm x 1.8mm or less focal spot size				
	14	Manual. The collimator should have 90W or more lamp for clear visualization of radiation field in open areas like wards/ICUs. It should have auto shut off facility to ensure longer life of the Collimator lamp				
	15	Weight-150kg or less for easy mobility and maneuverability.				
	16	Unit should operate on single phase voltage range from 190-240V, 15 Amp plug without any external Transformer				
	17	The exposure release switch should be detachable with a cord of sufficient length as per ICRP recommendation				
	18	**Standards, safety, and training**				
	19	Should have the ISO certification and the copy of the same should be enclosed along with the technical bid.				
	20	Training should be provided for usersand biomedical engineers				
	21	Unit should have type approval certificate from AERB				
	22	Should comply with AERB /BIS/ICRP Guidelines for radiation leakage and X-Ray equipments.				
	23	**Documentation**				
	24	User/Technical/Maintenance manual to be supplied in English				
	25	Certificate of calibration and inspection from factory.				
5		**C arm with accessories**	Each	**1**	**1**	Siemens/GE/Philips
	1	**Technical Specifications**				
	2	Mobile surgical image intensifier system with counter balanced C-.arm for fluoroscopic and General work.				
	3	**X-ray Generator and X-ray tube (Specify the name of manufacturer)**				
	4	X-ray generator should be of high frequency technology. (Specify the name of manufacturer)				
	5	Fluoroscopy Mode 40-110 KV or more with last image hold 0.2 mA to 7mA for high contrast mode				
	6	Cassette exposures up to 60mA should also be possible.				
	7	System should have provision for Automatic Dose Rate Control.				
	8	X-ray tube should be Dual focal spot type. Specify the make, model and name of manufacturer				
	9	**Charm**				
	10	Orbital movement 125° (– 35° to + 90°)				
	11	Angulation ± 180° or more				
	12	Horizontal movement 20 cm or more				
	13	C-arm depth 60 cm or more				
	14	Swivel range ± 12° or more				
	15	Motorized Vertical movement 40 cm or more				
	16	Tube to II distance 85 cm or more				
	17	Radiation indicators				
	18	**X-ray image intensifier Specify the make, model and name of manufacturer**				
	19	Size 9 inch (Specify the name of manufacturer)				
	20	Company should be able to demonstrate complete IITV Chain image resolution of minimum 12 lp/Cm with appropriate tools.				
	21	Image rotation facility				
	22	Unit should be provided with Cassette holder.				
	23	It should be possible to storage minimum 4 images thru control console. A separate image management system with PC/Laptop should be provided by the company to store images in 200GB or more HDD with post processing, with storage/retrieve facility on a CD/Pen drive.				
	24	It should have a CMOS sensor based camera of latest technology with 1k x 1k matrix. Specify the make, model and name of manufacturer.				
	25	**Image Viewing**				
	26	15" or more TFT monitors of medical grade mounted in a trolley. Specify the make, model and name of manufacturer				
	27	Please specify the make and relevant details like brightness, resolution,etc.				
	28	**Accessories**				
	29	Sterile cover				
	30	Lead aprons 6 Nos				
	31	**Standards, safety, and training**				
	32	Should have the ISO certification and the copy of the same should be enclosed along with the technical bid.				
	33	Training should be provided for usersand biomedical engineers				
	34	Unit should have type approval certificate from AERB				
	35	Should comply with AERB /BIS/ICRP Guidelines for radiation leakage and X-Ray equipments.				
	36	**Documentation**				
	37	User/Technical/Maintenance manual to be supplied in English				
	38	Certificate of calibration and inspection from factory.				
	39	**Warranty**				
	40	Full Warranty one year from the date of taking over including all accessories				
6		**CR System**	Each	1	1	AGFA/Fuji/Konica
	1	The CR System should have following essential features				
	2	Image recording system (Cassettes & Imaging Plates (IP))				
	3	The following sizes of Radiography Cassettes along with Image Plates should be supported by the unit.				
	4	Sizes				
	5	a) 14"X17" 2 Nos				
	6	b) 14x14 2Nos				
	7	c) 10x12 1Nos				
	8	d) 8x10 1 Nos				
	9	Cassettes should preferably have rewriteable label to avoid mix up of patient name / ID with image data before the same is brought to the CR reader / Digitizer from X-Ray room for cassette scanning / reading				
	10	Image Reading (CR Reader / Digitizer)				
	11	The CR Reader / Digitizer should be able to process 60 Imaging Plates / hour or more of 14"x17" size at 10 pixel resolution				
	12	It should have a standard spatial resolution of 10 pixels/mm for all above mentioned cassette sizes.				
	13	It should have grey scale resolution of at least 20 bits / pixel for data acquisition and 16 bits / pixel for output to processor				
	14	Time to preview image of 35 cm x 43 cm cassette should be less than 30 secs.				
	15	It should be DICOM PACS ready.				
	16	f) The digitizer should be table top model with horizontal cassette loading. It should have rigid IPs or flexible IP embedded on tray for better life				
	17	Processing Server / CR Workstation with 19" LCD Panel				
	18	PC based unified server / workstation for centralized patient identification & management of Images / Studies.				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	19	Process of identification should be ready for interface with existing Hospital Information System (HIS) or Radiology Information System (RIS) in DICOM protocols				
	20	**Standards, Safety and Training**				
	21	The quoted model should have FDA or CE or BIS certificate and copy of the same should be enclosed along with the technical bid.				
	23	Training should be provided for users and biomedical engineers				
	24	**Documentation**				
	25	User/Technical/Maintenance manual to be supplied in English				
	26	Certificate of calibration and inspection from factory.				
7		**Colour Doppler**	Each	**1**	**2**	Siemens/GE/Philips
	1	State of art colour doppler system with full digital technology for whole body applications to include (both adults and paediatric) which include abdominal, obs/gyn, peripheral vascular, musculoskeletal, small parts imaging and endocavitary (transvaginal / transrectal) with the following specifications				
	2	Latest generation electronic phased array color doppler system with minimum 1000 electronic independent channels. System should be DICOM 3 or higher version compatible and capable of being interfaced with HIS/RIS/PACS and connectivity to any PC/computer etc in DICOM format.				
	3	Should be field upgradeable to next generation system on site. All new software should be upgraded free of cost for at least 3 years.				
	4	Speckle reduction filter, real time spatial compounding, frequency compounding or better technology should be available in convex and linear probes for better resolution and penetration.				
	5	**Technical specification**				
	6	Latest generation electronic phased array color Doppler system with minimum 1000 electronic independent channels.				
	7	256 gray shades or more for sharp contrast resolution.				
	8	**System should be offered with following electronic broad band width transducers**				
	9	1:Broad band convex array transducer with frequency range of 2 – 6 MHz suitable for radiology applications.				
	10	2:Broad band Linear array transducer frequency range of 6 to 12 MHz suitable for vascular and small parts applications.)				
	11	3: Trans rectal Transducer 5-9 MHz or more- transrectal probe should have biopsy facility with needle guides .				
	12	Harmonic Imaging should be available in all probes with the following modes and setting for**:**				
	13	Tissue harmonic				
	14	Contrast harmonic				
	15	Harmonic angio				
	16	Quantification of harmonics imaging				
	17	Harmonic imaging in power Doppler imaging mode for improved sensitivity and specificity in differentiating blood/agent from tissue.				
	18	Gain control in two dimensions for additional level of flexibility to image quality control.				
	19	Real time high frequency 2D for higher resolution and low frequency Doppler for higher sensitivity in all probes.				
	20	Frame rate should be **150** FPS or more. The frame rate in triplex mode should not be less than 12 frames per second.				
	21	Steerable PW/CW on all phased array probes.				
	22	High-definition acoustic zoom for enlarging sections of 2D and color flow images with more acoustic information for greater clarity and detail while maintaining an optimal frame rate.				
	23	Modes – 2D B Mode, B/B Mode, M-Mode, steerable PW/CW Doppler, color Doppler,B/M Mode, B/PW Doppler, B/CWDoppler, B / Power Angio,B and Power Angio should be available..				
	24	Monitor should be High resolution, non interlaced LCD Color monitor of 17 inches or more with tilt and swivel facility to view in all angles and all light conditions.				
	25	Color flow imaging for				
	26	Increased lateral & spatial resolution				
	27	Detection of even subtle areas of turbulence, displaying a more physiological blood flow appearance without loss of frame rate				
	28	Color flow with capability of automatically picking up color flow as a function of focal depth.				
	29	Tissue colorization (B-Color) for improved contrast resolution.				
	30	Should have facilities and application software for adult abdominal, obs/gyn, peripheral vascular, musculoskeletal, small parts imaging and endocavitary applications. (All application package should be built into the system).				
	31	Cine loop facility, both frame by frame and in cine mode, with a memory for atleast 300 2D color images' review and atleast 20 seconds of doppler and M mode data.				
	32	High frame rate review for better clarity of playback images study in slow motion.				
	33	Quad loop with memory for pre and post image comparison of any procedure.				
	34	Memory – 256 frames or more in quad loop. M Mode & Doppler scroll memory -40 seconds or more.				
	35	PW velocity range up to 5.5 m/s & more than 6.5 m/s with HPRF option at 0 degree preferably. Automatic real time/ frozen tracing of instantaneous peak velocity & instantaneous mean velocity(or frequency) should be available.				
	36	Various maps for pre and post processing.				
	37	SystemDynamicRange should more than 150db				
	38	User defined system and application presets for multi-user department. The number of application presets is to be mentioned				
	39	In- built hard disk storage capacity of atleast 80 GB with facility of direct storage and retrieval of B/W and color images (both frozen and cine loops). CD, DVD drive for read and write of stored images.				
	40	Depth of Field Minimum 28 cm should be available				
	41	PRF Range should be 500 Hz to 50,000 Hz				
	42	Alpha numeric key board with illuminated keys and status display. Key panel Height Adjustment Should be Possible. All panel key should be customized, including Freeze Key.				
	43	Color Map resolution up to 128 levels.				
	44	Facility for high definition digital acquisition, review and editing for complete patient studies.				
	45	Unit should have 3transducers holders and one gel bottle holder				
	46	3 Active Ports should be available. Any Probes any Port interchangeable connectivity should be possible with simple electronic selection method for interchanging transducers				
	47	Detailed Radiology, obs&gyn and vascular measurement packages should be available.				
	48	System should have extensive calculation packages				
	49	a. Distance, volume ,Area, % stenosis on B mode				
	50	b. Distance, Time, Heart Rate, Slope on M mode				
	51	c. Velocity, Acceleration time, Slope, PI, RI, S/D Ratio with Auto Doppler calculation on Doppler mode				
	52	The system should have Up / Down & Right / Left Image rotation, One touch Image optimization and Edge Enhancement settings				
	53	The system should have gate adjustments on spectral modes, auto angle correction, filter adjustment, base line and sweep speed adjustments.				
	54					
	55	System should have facility for separate 2D quick scan (auto 2D optimization)/ Doppler Quick Scan(auto baseline and PRF adjustment).				
	56	**SYSTEM ACCESSORIES AND CONSUMABLES**				
	57	Colour Laser printer with direct printing connectivity for printing stored images				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	58	Online UPS with capacity for 30 mins back-up of all functions of the equipment i.e performing ultrasound procedure, exposure onto films				
	59	Color printer paper – 100 sheets				
	60	**Power supply**				
	61	Power input to be 220 – 240 VAC , 50 Hz fitted with Indian plug. Resettable overcurrent breaker shall be fitted for protection.				
	62	**Standards, Safety, and Training.**				
	63	Should be FDA or CE approved product				
	64	Manufacturer should have ISO certification for quality standards.				
	65	On site comprehensive training for lab staff and support services till customer satisfaction with the system				
	66	**Documentation**				
	67	User/Technical/Maintenance manual to be supplied in English				
		Certificate of calibration and inspection from factory.				
8		**Mammography Unit**	Each	**0**	**1**	Siemens/GE/BET/Allengers
	1	Mammography Unit for diagnostic examinations, screening and biopsies. Ability to perform survey, spot compression and magnification for detailed diagnosis.				
	2	**X-RAY SYSTEM**				
	2.1	High-frequency X-Ray Generator of 4 kW or higher capacity with optimum image quality at lowest possible dose by automatic selection of best combination of anode- filter, density & kV combination.				
	2.2	kV range : 25kV - 35kV				
	2.3	mAs range : 2mAs - 600 mAs				
	2.4	Molybdenum X-Ray tube of fine focal spot 0.1/0.3.				
	2.5	Max. tube current 150mA.				
	2.6	Tube Heat Storage capacity of 150 KHU or more.				
	2.7	Filters- Molybdenum				
	2.8	Automatic Exposure control with transparency compensation and density correction.				
	3	**MAMMOGRAPHY STAND**				
	3.1	Unit should have motorized, iso-centric rotation of the swivel arm for quick and accurate patient positioning.				
	3.2	Cassette holder with bucky of sizes 18x 24cm. and 24x30 cm.				
	3.3	Automatic selection of small focus of X-Ray tube for Magnification Technique.				
	3.4	Magnification factor of 1.8				
	3.5	Automatic compression device for optimum compression force with user selectable preset compression force, automatic decompression after exposure(user-selectable)				
	3.6	SID at least 64 Cm				
	3.7	Facility of 1)compression plate to automatically adapts to the patient's anatomy, 2) reduces the speed of the compression plate as soon as it touches the breast should be there				
	3.8	Unit should have motorized, height-adjustable object table				
	3.9	Facility of digital stand display for easy viewing of position showing compression force, compressed breast thickness and projection angle.				
	3.10	Unit LEDs indicate optimized compression and system ready for exposure				
	4	**ACCESSORIES :**				
	4.1	Lead Screen				
	4.2	2 Aprons				
	4.3	Servo Controlled Stabilizer				
		Standards, safety, and training				
		Should be a CE or FDA approved product				
		Training should be provided for users				
		Unit should have type approval certificate from AERB				
		Should comply with AERB or BIS or ICRP Guidelines for radiation leakage and X-Ray equipments.				
		Documentation				
		User/Technical/Maintenance manual to be supplied in English				
		Certificate of calibration and inspection from factory.				
		ICU/CCU				
9		**Biphasic Defibrillator**	Each	2	3	Zoll /Philips /Nihon Kohden
		Specification				
	1	**Operational Requirements**				
	2	Defibrillator should be Bi Phasic				
	3	Should monitor ECG and display them				
	4	Should print the ECG on thermal papers				
	5	Should work on Manual and Automated External Defibrillation (AED) mode				
	6	Should be capable of doing synchronized cardio version				
	7	Can be operated from mains as well as battery				
	8	**Technical Specifications**				
	9	Should be Biphasic defibrillator monitor with Recorder, having capability to arrest all arrhythmia within a maximum energy of 200 Joules				
	10	Should monitor ECG through paddles, pads and monitoring electrodes and Defibrillate through pads and paddles.				
	11	Should compensate for body impedance for a range of 25 Ω to 150 Ω				
	12	Should have a built in 50 mm strip printer				
	13	Should have charging time of less than5 seconds for maximum energy.				
	14	Should have bright display for viewing messages and ECG waveform of 6 seconds				
	15	Should have external paddles with paddles contact indicator – for good paddle contact. Both Adult and pediatric paddles should be available.				
	16	Should have event summary facility for recording and printing at least 250 events and 50 waveforms.				
	17	Should have a battery capable of usage for at least 90 minutes or 30 discharges.				
	18	Should be capable of printing Reports on Event summary, configuration, self test, battery capacity etc				
	19	Should have facility for internal self test/check before usage and set up function				
	20	Should be capable of delivering energy in increments of 1-2 joules up to 30 J and increments of maximum 50 J thereafter.				
	21	**System Configuration Accessories, spares and consumables**				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	22	Defibrillator - 01				
	23	Paddles Adult and Paediatic External -01 Each.				
	24	Patient cables -01				
	25	ECG Rolls -10				
	26	**Power Supply**				
	27	Power input to be 220-240VAC, 50Hz fitted with BIS plug (ISI mark).				
	28	**Standards, Safety and Training**				
	29	Should be US FDA and CE approved product.				
	30	On site Comprehensive training for lab staff and support services till customer satisfaction with the system				
	31	**Documentation**				
	32	User/Technical/Maintenance manuals to be supplied in English.				
	33	Quality Test Certificate of calibration				
10		**Multiparameter Monitors**	Each	**2**	**4**	Philips /GE /Draeger
	1	**OPERATIONAL REQUIREMENTS**				
	2	Capability of measuring, displaying of patient data				
	3	**TECHNICAL SPECIFICATIONS**				
	4	Minimum 10.4" inches multicolored TFT display screen.				
	5	Capable of simultaneous display of Six waveform and eight digital parameters.				
	6	Combination of single, dual and multi parameters modes.				
	7	Multichannel (up to 12 leads) ST segment analysis.				
	8	Facility to monitor and display – ECG, respiration, NIBP, SPO2 with pleth, EtCO2 with capnography, Temperature, Cardiac output & IBP – 2 nos.				
	9	Automatic arrhythmia detection & alarm for standard and lethal arrythmia.				
	10	Trend of at least 24 hours.				
	11	100 Nos. event recall facility both manually and automatically triggered by alarm.				
	12	Integrated or external printer for report output.(Optional)				
	13	**SYSTEM CONFIGURATION, ACCESSORIES, SPARES AND CONSUMABLES**				
	14	ECG / Resp : with a set of 5 Lead ECG cable with clip - 1 sets per monitor				
	15	NIBP : Adult cuff – standard size 1 nos. and small size 1 no. and large size 1 no. per monitor (complete sets)				
	16	SP02: with reusable adult SPO2 sensor with cable – 1 Nos. per monitor.				
	17	2 IBP with 2 Nos. of reusable transducer cables with brackets and disposable domes -10 Nos. per monitor.				
	18	Two Temperature with One Rectal temperature probe and skin temperature probe				
	19	**POWER SUPPLY**				
	20	Power input to be 220 -240 V AC, 50 Hz.				
	21	**STANDARDS, SAFETY AND TRAINING**				
	22	Should be FDA or CE or BIS approved product.				
	23	Manufacturer should have ISO certification for quality standards.				
	24	On Site Comprehensive training for staff and support services till customer satisfaction with the system.				
	25	**DOCUMENTATION**				
	26	User/Technical/Maintenance manuals to be supplied in the English.				
	27	Certificate of calibration and inspection.				
11		**Suction machine**	Each	**3**	**5**	SISCO
	1	Shall have Crompton Greaves/American Universal/GEC Motor of minimum ¼ H.P. capacity. The machine should be portable on four wheels and handle for transportation				
	2	**Technical Specification**				
	3	The Suction pump should be oil immersed fitted on Motor shaft				
	4	Suction pump should have line grinding internally.				
	5	To facilitate maintenance the cover of machine should be easily to open from the top & sides				
	6	The suction machine should be capable of producing minimum vacuum of 500 approx mm Hg. Which should be adjustable and monitored by vacuum gauge of suitable range. The suction capacity should be 15 litres per minute and can be regulated.				
	7	It should have two bottles of 1 or 2 liters (As per requirement) with synthetic rubber lids. The bottle shall be fitted with the arrangement to prevent overflow of fluid.				
	8	ON/OFF Switch and Power indicator should be available				
	9	Body material: Base, top & panel made of rust proof and corrosion resistant moulded ABS/Stainless Steel. Jar/Bottle material: Autoclavable polycarbonate.				
	10	Inbuilt maintenance free battery. Battery backup up to 60 minutes on full charge. Should be with buit in charger.				
	11	Should operate on 230V,50 Hz supply.				
	12	**Acessories,Spares and Consumables**				
	13	System as specifies				
	14	Powercord 2 metre long with 15A three pin plug top				
	15	One litre bottle with over flow protection- 01 no				
	16	Lid set -01				
	17	Seal for bottle -01 nos				
	18	Suction tubing set - 02 set				
	19	**STANDARDS, SAFETY AND TRAINING**				
	20	Manufacturer should have ISO certification for quality standards.				
	21	On Site Comprehensive training for staff and support services till customer satisfaction with the system.				
	22	**DOCUMENTATION**				
	23	User/Technical/Maintenance manuals to be supplied in the English.				
	24	Certificate of calibration and inspection.				
12		**Head Light Source**	Each	**1**	**1**	Keeler/Heine
	1	**Head light**				
	2	Should have				
	3	a) Light weight				
	4	b) Portablility				
	5	c) Illumination more than 1lac lux				
	6	d) Color temperature of 5000K				
	7	e) No light degradation				
	8	f) Light spot size 100mm at 16 inch working distance				
	9	g) Variable intensity range				
	10	h) Battery pack in the belt				
	11	i) Battery rechargeable				
	12	j) Long battery life				
	13	**k)** Operating time not less than 4 ½ hours				
	14	**STANDARDS, SAFETY AND TRAINING**				
	15	Manufacturer should have ISO certification for quality standards.				
	16	On Site Comprehensive training for staff and support services till customer satisfaction with the system.				
	17	**DOCUMENTATION**				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	18	User/Technical/Maintenance manuals to be supplied in the English.				
	19	Certificate of calibration and inspection.				
13		**Fibreoptic Bronchoscope with light source**	Each	0	1	Pentax/Fujinon/KarlStorz
		Description				
	1	FLEXIBLE FIBER OPTIC BRONCHOSCOPE				
	2	COLD LIGHT SOURCE				
	3	CAMERA				
	4	MONITOR				
	5	TROLLEY				
	6	**Technical Specification**				
	7	The working length of the fibre scope should be 60 cms to allow mounting of Endotracheal tube on the scope before performing Bronchoscopy.				
	8	The outer diameter should be less than 3.7 mm and allow mounting of tube size less than 4.0 mm to the scope, lesser diameter preferable. Suction channel is a must.				
	9	Range of bending at the tip should be minimum 120 degree up and 60 degree down approx.				
	10	Compatible light source. Automatic light adjustments to maintain optimum brightness. High efficiency halogen source should be suplied with compatible fiberoptic cable				
	12	Five section trolley for organizing fiberscope and facility to hang the fiberscope without bending.				
	13	Leak tester to be provided.				
	14	Standard acessories including brush for cleaning the bronchoscope lumen.				
	15	**POWER SUPPLY**				
	16	Power input to be 220 -240 V AC, 50 Hz.				
	17	**STANDARDS, SAFETY AND TRAINING**				
	18	Should be FDA or CE or BIS approved product.				
	19	Manufacturer should have ISO certification for quality standards.				
	20	On Site Comprehensive training for staff and support services till customer satisfaction with the system.				
	21	**DOCUMENTATION**				
	22	User/Technical/Maintenance manuals to be supplied in the English.				
	23	Certificate of calibration and inspection.				
14		**Nebulizers**	Each	**5**	**10**	Omron/Bbraun/
		Technical Specification				
	1	It should be made of highly heat resistant polymeric material which can be disinfected by autoclaving				
	2	Should have pneumoclean air filter to provide purified air for aerosol nebulization				
	3	Should have an easily detachable fan cover and air filter to allowing cleaning of every corner of the passage and the medication cup should be easily attachable and easy to clean. The diaphragm to be replaced for each patient to help prevent cross infection.				
	4	The unit should be capable of removing more than 96% of 0.3 micron or larger airborne dust particle with the help of pneumoclean to provide purified air for aerosol nebulization.				
	5	Patient tube should be 1-1.5 meter in length.				
	6	Should provide extra accessories.				
	7	Disposable cap /diaphragms for drugs – 25, lids – 6 and patient circuit 6/tube-2, air filters – 10 no.s				
	8	Nebulizing rate : atleast 4ml/min				
	9	Mist particle size :Approx 1-5 microns				
	10	Nebulizing time setting: The timer may be set for any desired point between zero and 30 minutes.				
	11	For Nebulization period longer than 30 minutes, the timer can be set for "continuous" operation.				
	12	Medication cup capacity :150 ml				
	13	**POWER SUPPLY**				
	14	Power input to be 220 -240 V AC, 50 Hz.				
	15	**STANDARDS, SAFETY AND TRAINING**				
	16	Manufacturer should have ISO certification for quality standards.				
	17	On Site Comprehensive training for staff and support services till customer satisfaction with the system.				
	18	**DOCUMENTATION**				
	19	User/Technical/Maintenance manuals to be supplied in the English.				
	20	Certificate of calibration and inspection.				
15		**Emergency crash Cart**	Each	**2**	**3**	Janak/Godrej/Meditech
	1	Epoxy coated emergency crash cart with facility to carry oxygen cylinder and drawers and shelves for resustitative items. Mobile Crash Cart				
	2	Complete with fittngs like:				
	3	Oxygen cylinder				
	4	Drawers				
	5	Lamp				
	6	**STANDARDS, SAFETY AND TRAINING**				
	7	Manufacturer should have ISO certification for quality standards.				
	8	On Site Comprehensive training for staff and support services till customer satisfaction with the system.				
16		**Portable Lights**	Each	**2**	**4**	Philips/Hospitech
		Operational Requirements				
	1	LED Type				
	2	**Technical Specification**				
	3	Extended life				
	4	Color temperature: 5000K				
	5	Light pattern: 3.3" x 6.3" at 27.6" (focal distance) (Day light)				
	6	(85mm x 160 mm @700 mm)				
	7	Light Intensity:				
	8	a) Low 16,000 lux				
	9	b) Medium 20,000 lux				
	10	c) High 24,000 lux				
	11	Operating Voltage: 230 V				
	12	BTUs per hour: 325				
	13	Superior grade dichroic-coated lens with feathered edges to minimize eye fatigue for the doctor				
	14	frame to be Powder-coated to ensure the highest level of corrosion resistance and asepsis control.				
	15	Color-corrected temperature should approximate the color of natural daylight.				
	16	Third axis of rotation should be provided for smooth positioning of the light head for enhanced view.				
	17	**STANDARDS, SAFETY AND TRAINING**				
	18	Manufacturer should have ISO certification for quality standards.				
	19	On Site Comprehensive training for staff and support services till customer satisfaction with the system.				
17		**Patient warmer**	Each	**2**	**4**	Oneline surgicals/Bair Hugger

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	1	Intraoperative temperature management unit for forced-air warming.				
	2	The unit should provide safe, quiet and effective warming to the patient.				
	3	Should be light weight making transport easy.				
	4	Should be freestanding as well as be easily attached to an IV pole or bedrail.				
	5	Should have snap-fit hose swivels in at least three points for easy blanket attachment and positioning.				
	6	Matching Adult lower body resuable warming blanket 5 Nos.				
	7	Matching Adult upper body resuable warming blanket 15 Nos.				
	8	Power cord with standard Indian plug and other cables to make the equipment functional.				
	9	**STANDARDS, SAFETY AND TRAINING**				
	10	Manufacturer should have ISO certification for quality standards.				
	11	On Site Comprehensive training for staff and support services till customer satisfaction with the system.				
		Operation Theatre				
18		**Anesthesia Work Station with Ventillators**	Each	**4**	**8**	GE/Maquet/Drager
	1	The Anesthesia Machine should have the following essential components.				
	2	Anesthesia machine complete with				
	3	Anesthesia gas delivery system.				
	4	Circle absorber system.				
	5	Precision vaporizer for halothane, isoflurane				
	6	Anesthesia ventilator.				
	7	Detailed specifications:				
	8	Anesthesia gas delivery system.				
	9	Should have provision for delivery of oxygen, nitrous oxide and medical air with pressure gauges. With 3 flow meters for oxygen ,nitrous oxide and air				
	10	Should have independent attachments for connecting central gas supply and pin indexed cylinders. Should have provision for attaching 1 cylinder of(O_2 and N_2O).				
	11	Oxygen and Nitrous oxide should be linked either mechanically or pneumatically to ensure a minimum of 25% oxygen delivery at all times to avoid delivery of hypoxic mixture.				
	12	Should have audio-visual oxygen Failure warning System with Nitrous oxide cut off.				
	13	Should have back bar which is ISO pin type to attach vaporizer easily.				
	14	Should be supplied with necessary attachments to use of the breathing circuits (Bains, Jackson-Rees and closed circuit etc.,)Reusable circuit for adult and pediatric will be provided.				
	15	Should have top shelf to keep monitors and a tabletop to keep anesthetic drugs, equipments etc.				
	16	The machine should possess battery back up if any electrical components are present				
	17	Castor wheels should be durable and moisture resistance & Smooth.				
	18	The Anesthesia machine frame should be made of rust proof material/Stainless steel.				
	19	Unit provided with a integrated battery back up				
	20	Standard Circle Absorber System				
	21	Should have adjustable pressure limiting valve, breathing circuit pressure measuring device.				
	22	Should have a bag/ventilator selecting valve integrated onto the absorber. Absorber is having isolation when using with patient				
	23	Facility to attach oxygen sensor.				
	24	Should have dual absorbent chamber canister. Arranged vertically one above the other.				
	25	Precision Vaporizers (Temperature and flow compensated) for Servoflurane, Isoflurane.				
	26	Should be easy to attach and dismount from the back bar.				
	27	Vaporizers should have ISO pin type (Selectatec) mounting and vaporizer interlocking facility..				
	28	Should have a standard filling port with keyed filling device.				
	29	Should be designed for transport with liquid in vaporizer chamber with protection against tipping and shaking				
	30	Maintenance free vaporizer (desirable)				
	31	Ventilator				
	32	Should be a bag in bottle anesthesia ventilator with standing (ascending) bellows.				
	33	Should be supplied with adult and pediatric bellows.				
	34	Should be able to set tidal volume, respiratory rate and I:E ratio				
	35	Ventilator should have audible alarms for ventilator failure, low oxygen supply pressure, inadequate volume delivery, disconnection alarm, and power supply failure.				
	36	**Standards, Safety and Training**				
	37	Should be US FDA and CE approved product.				
	38	Manufacturer should have ISO 9001 certification for quality standards.				
	39	On site Comprehensive training for lab staff and support services till customer satisfaction with the system				
	40	**Documentation**				
	41	User / Technical / Maintenance manuals to be supplied in English.				
	42	Certificate of calibration and inspection.				
19		**Resucication Kit**	Each	**4**	**12**	Suntech/Online surgicals/Sisco
		Technical Specifications				
	1	Should have Silicone self expanding Manual Resuscitators of all sizes (Infant, Pediatrics. Adult) with mask of all sizes.				
	2	100%, autoclavable; reusable				
	3	Non re-breathing valve with 40 cm of H2O pressure release for infant and paediatric				
	4	360° swiveling patient connector with standard 15 mm / 22 mm diameter				`
	5	Oxygen reservoir bag with valves				
	6	2 mtr. PVC oxygen tubing				
	7	Should have Laryngoscope of both straight blades and curved blades of various size Standard blades (Macintosh, Miller), Non-standard blades (McCoy)				
	8	Lighted stylet for oral and nasal intubation				
	9	Oral Airways -Silicone, autoclavable & reusable in sizes 000, 00 & 0, 1.2,3,4				
	10	adult size nasal airways, one(1) each 20F, 22F, 24F,26F, 28F, 30F, 32F, 34F				
	11	Four pediatric nasal airways, One(1) each 12F, 14F,16F,18F				
	12	Magils forceps all standard sizes				
	13	All size malleable Stylet (for endotracheal tube for neonate to adult)				
	14	Gum elastic bougie(size 3/ 4)				
	15	Laryngeal Mask Airway Classic reusable (sizes-1 ,2, 3,4)				
	16	Cricothyrotomy set				
20		**OT table**	Each	**4**	**8**	Steris/BenQ/Mediland
	1	Electro- Hydraulic opeartion table				
	2	heavy weight of the patient. Complete with all accessories.				
	3	Electro-hydraulically powered for movements of height, tilting and trendelenburg.				
	4	The base of stable construction with large twin-disk-castors for easy travel and manoeuvring				
	5	Table top 500 mm x 1940 mm, Hight range 750 mm x 1090 mm				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	6	Trendelenburg - 25 Deg Up & Down, Lateral tilt 25 Deg Right / Left				
	7	The Operation table provided with corded hand control and override – control panel for additional safety.				
	8	The tabletop divided in 5 parts i.e., head plate (removable), back plate, seat plate and leg plates (removable).				
	9	Guided rails for X-Ray cassettes inserted from the head end.				
	10	Reverse positioning of patients on a special shoulder plate (three section) that can be connected at the foot end of the tabletop.				
	11	The back plates are gas spring adjusted offering easy and smooth control.				
	12	The Operation table should have safe positioning and adjustment due to optimal covering of moving joints.				
	13	The Operation table should provide optimal patient positioning in a supine position. The longitudinal shift feature of 290mm should give unobstructed imaging of vertebrae.				
	14	Mobile Operating Table, Electrohydraulic, SFC padding				
	15	Standard Accessories:				
	16	Head Rest, Leg plates, pair, hinged and abductable, SFC padding				
	17	Arm board, Radial Setting Clamp, Geopel knee crutch, Body Strap				
	18	Standard Accessories:				
	19	1. Arm Rests With Pads - 32 Nos.				
	20	2. Anaesthesia Screens - With Clamps - 16 Nos.				
	21	3. Knee Crutches With Pads/Clamps - 26 Nos.				
	22	4. Body Straps - 16 Nos.				
	23	Lateral Position Accessories:-				
	24	1. Lateral Arm Support - 2 Nos.				
	25	2. Body Horns Large With Pads and square clamps - 2 Nos.				
	26	3. Doughnut Head Pad - 1 No.				
	27	Accessories for Gynecology- 1 set per 4 OT table				
	28	1. Round Drainage Funnel set - 1 No.				
	29	2. Lithotomy Leg Holders - 2 Nos.				
	30	3. Doughnut Head Pad - 1 No.				
	31	**POWER SUPPLY**				
	32	Power input to be 220 -240 V AC, 50 Hz.				
	33	**STANDARDS, SAFETY AND TRAINING**				
	34	Should be FDA or CE or BIS approved product.				
	35	Manufacturer should have ISO certification for quality standards.				
	36	On Site Comprehensive training for staff and support services till customer satisfaction with the system.				
	37	**DOCUMENTATION**				
	38	User/Technical/Maintenance manuals to be supplied in the English.				
	39	Certificate of calibration and inspection.				
21		**OT Lights**	Each	**4**	**8**	Philips/Steris/Trilux/Bet
	1	Ceiling suspended high quality Operation Theatre lights with very high lumens. Twin mounted O.T. lights with each Ceiling Suspension Halogen lamps with Constant Voltage Transformer, Battery Back-up and UPS.				
	2	The Light withDouble Dome, Micro lens with light heads sealed, smooth extremely flat aero – dynamic design and disinfectant-resistant powder coat paint that ensures minimal disturbance to the laminar flow.				
	3	(>140,000+>100,000LUX) with field size 25 cm to 30 cm (variable)				
	4	The Cool light, homogeneous, colour-true and cast shadow free light with two step interference filtering.				
	5	Optimum lighting conditions, even with extremely deep wounds.				
	6	Double fork system in order to ensure easy manoeuvrability.				
	7	Bulb replacement system from top, thus ensuring easy accessibility and higher hygiene standard.				
	8	IEC norms and international safety standards.				
	9	Micro Lenses (Light Guides) that produce a uniform cascade i.e. numerous focal points arranged in different, vertical spatial planes. Thus, distinctly more light is directed to every point of the illuminated surgical site – whether large or small, deep or shallow.				
	10	Provides homogeneous light distribution with optimized in depth illumination. Thus the light does not need to be re-positioned even when the surgeon probes deeper into the surgical site.				
	11	Free of cast shadows. This will be possible through micro-lens light system that reduces shadow build-up. The light from micro lens sources in the light head should stream from both the middle and from the side, thus illuminating the entire light field so that any obscuration of one lighting system is compensated by the other, unobscured systems.				
	12	Mechanically the Extension Arms & Spring Arms should be rectangular in Construction giving Maximum stability.				
	13	to be supplied with spare handles and bulbs				
	14	**POWER SUPPLY**				
	15	Power input to be 220 -240 V AC, 50 Hz.				
	16	**STANDARDS, SAFETY AND TRAINING**				
	17	Should be FDA or CE or BIS approved product.				
	18	Manufacturer should have ISO certification for quality standards.				
	19	On Site Comprehensive training for staff and support services till customer satisfaction with the system.				
	20	**DOCUMENTATION**				
	21	User/Technical/Maintenance manuals to be supplied in the English.				
	22	Certificate of calibration and inspection.				
22		**Flash Sterilizer**	Each	**1**	**2**	Natsteel/Reico
		Technical Specification				
	1	Stand-alone bench top autoclave 20 Litres, automatic .Single door, self sealing with high-quality silicone gasket				
	2	Dimension should match to suit the voume of autoclave				
	3	The autoclave should have double wall sheet metal with suitable insulation in between walls.				
	4	Pre-set automatic cycles for unwrapped instruments, wrapped instruments/packs				
	5	Two automatic programmes, approx: 2.2 bar at 134 degree C and 1.1 bar at 121degree C.				
	6	The equipment should have automatic pressure control switch /automatic water control device to ensure that the equipment does not run dry.				
	7	System should have digital display for Temperature and Time.System should have analogue display for Pressure.				
	8	System should have audio visual alrm for low water level,and other system errors.				
	9	Fit with 5 L water reservoir, automatic fill, autonomy for at least 10 cycles				
	10	Should be with 3 removable shelves				
	11	Should have Double safety door locking device				
	12	Should have safety feature protection against over-pressure and over-temperature				
	13	Audible and visual alert upon cycle interruption or completion				
	14	Unwrapped cycle time: cold 30 min, hot 20 min				
	15	Control panel with alpha-numerical display and cycle indicators				
	16	Should be complete with 3 instruments trays				
	17	Power Supply:230V,50 Hz				
	18	Power consumption: 3000 W(Approx)				
	19	**System Configuration Accessories, spares and consumables**				
	20	Autoclave-20L				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
23		**Surgical Diathermy**	Each	**4**	**8**	Vallylab/Erbe/ J&J/Martin
	1	It should be a multipurpose Electro Surgical generator, having both Monopolar & Bipolar coagulation and Monopolar cutting				
	2	Automatic Power Regulation				
	3	Using SFS (Smart Feed back System) for response to change in tissue impedance resulting in minimal thermal damage				
	4	Digital Display for power settings				
	5	3 different modes of Monopolar Coagulation				
	6	Soft, forced and spray coagulation				
	7	Bipolar Coagulation with auto start facility				
	8	4 programmable power settings on front panel can be saved and recalled for various applications				
	9	Hemostasis (blend) 4 steps coagulation degree control from front panel				
	10	Monopolar cut: From 1 to 400 watts in increment of 1 watt				
	11	Bipolar Coagulation: From 1 to 120 watts in incurrent of 1 watt				
	12	Max. HF voltage (Bipolar cut) 700V peak to peak				
	13	Safety class & type (IEC 601.1)				
	14	It should have soft, spray and forced coagulation in Monopolar coagulation mode with the following outputs.				
	15	Soft - 120 watts at 200 ohms				
	16	Settings from 1 to 120 watts in increment of 1 watt				
	17	Spray - 120 watts at 300 ohms				
	18	Settings from 1 to 120 watts in increment of 1 watt				
	19	Forced - 120 watts at 300 ohms				
	20	Setting from 1 watts to 120 watts in increment of 1 watt				
	21	Auto start delay for preparations for 2 seconds				
	22	Output power indication by 3 digit display				
	23	Output power limitation: 1 watt increment				
	24	Should have automatic patient plate detector, which indicates the absence of neutral electrode by LED with acoustic alarm when activated.				
	25	Time Limit: LED glows if activated for more than 10 sec and shuts off the HF Power after total 15 sec				
	26	Exact Power limitation automatically controlled.				
	27	Maximum power consumption 800 VA Max				
	28	Length/Breadth/Height - 430/440/175 mm				
	29	Weight - 12.5 Kg Max				
	30	Impact line voltage 230 V ± 15%, 50 Hz				
	31	Equipment Classification Degree of mobility for portable				
	32	**POWER SUPPLY**				
	33	Power input to be 220 -240 V AC, 50 Hz.				
	34	**STANDARDS, SAFETY AND TRAINING**				
	35	Should be FDA and CE approved product.				
	36	Manufacturer should have ISO certification for quality standards.				
	37	On Site Comprehensive training for staff and support services till customer satisfaction with the system.				
	38	**DOCUMENTATION**				
	39	User/Technical/Maintenance manuals to be supplied in the English.				
	40	Certificate of calibration and inspection.				
		Emergency and Accident				
24		**Automatic External Defibrillator**	Each	**1**	**1**	Philips/Zoll
	1	Simple operation, dedicated therapy controls, configurable options.				
	2	Automated External Defibrillator (AED) capability with Shock Advisory System.				
	3	Data storage, Transmission and retrieval capabilities.				
	4	Power:				
	5	Battery Only Configuration-choice of batteries.				
	6	Dual battery capability.				
	7	DC Power Adaptor for transportation				
	8	Batteries should charge while device operates from Power Adaptor.				
	9	Low Battery Indicator and message.				
	10	Warm start.				
	11	Service indicator.				
	12	Display: LCD, User selectable contrast, minimum 4 secs of ECG				
	13	Data Management: Report Types- Three Formats types, two full capacity patient records.				
	14	Communications: PC Card, Internal Modem, External EIA/TIA Modem, Cellular Modem or serial connection.				
	15	Should be US FDA and CE approved product.				
		Physio Therapy Department				
25		**Interferential therapy unit**	Each	**1**	**1**	Technomed Electronics/Electrocare/Blue bell
		Specification				
	1	Should have 4-Pole interferential therapy facility				
	2	Should have 4-Pole vector therapy facility				
	3	Should have 2-Pole bipolar Interferential therapy facility				
	4	Should have the choice of medium frequencies 4 KHz and 2 KHz				
	5	Base frequency should be 0 to 150 Hz				
	6	Sweep frequency should be 0 to 100 Hz				
	7	Should have the following sweep programs				
	8	a. Square 1/1 Sec				
	9	b. Trapezodial: 1/5 Sec				
	10	c. Triangular: 6/6 Sec				
	11	Should have 0-99 minutes presettable timer with alarm				
	12	Intensity control should be 0-90 mA continuously variable.				
	13	Should have intensity balance to equalize 2 Channels.				
	14	Output type should be 100% Isolated				
	15	Should have LCD/Digital display				
	16	Input supply to be 230 V AC, 50Hz fitted with Indian plug				
	17	**Standards, Safety and Training**				
	18	Should have the ISO certification				
	19	The quoted model should have CE or ISO or BIS certificate and copy of the same should be enclosed along with the technical bid.				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	10	**Documentation**				
	21	User/Technical/Maintenance manual to be supplied in English				
26		**Ultra sound therapy Unit**	Each	**1**	**1**	Technomed Electronics/Electrocare/Blue Bell
	1	Ultra Sound therapy Unit-Digital display for output continuous & pulse modes four selectable settings in pluse mode digital timer, audio alarm for timer comforming.				
	2	**Standards, Safety and Training**				
	3	Should have the ISO certification				
	4	The quoted model should have CE or ISO or BIS certificate and copy of the same should be enclosed along with the technical bid.				
	5	**Documentation**				
	6	User/Technical/Maintenance manual to be supplied in English				
27		**Hydrocolator**		**1**	**1**	Technomed Electronics/Electrocare/Blue Bell
	1	Hydrocolator-Thermostatic temperature control from 0 to 20 Degree, Min 4 Pac medium size.				
	2	**Standards, Safety and Training**				
	3	Should have the ISO certification				
	4	The quoted model should have CE or ISO or BIS certificate and copy of the same should be enclosed along with the technical bid.				
	5	**Documentation**				
	6	User/Technical/Maintenance manual to be supplied in English				
28		**Electric Muscle Stimulator**	Each	**1**	**1**	Technomed Electronics/Electrocare/Blue Bell
	1					
	2	Should be microprocessor controlled muscle stimulator				
	3	The unit should have LCD display				
	4	The unit should be light weight and portable				
	5	Five different stimulus current modes should be available: Galvanic, Interrupted Galvanic,Faradic, Surged Faradic and TENS				
	6	Should display the actual intensity in Galvanic mode Ma				
	7	TENS should have Frequency and width modulation				
	8	Should be supplied with Standard Accessories				
	9	To be operatable at 230 V, 50 Hz AC				
	10	**Standards, Safety and Training**				
	11	Should have the ISO certification				
	12	The quoted model should have CE or ISO or BIS certificate and copy of the same should be enclosed along with the technical bid.				
	13	**Documentation**				
	14	User/Technical/Maintenance manual to be supplied in English				
29		**Computerised traction & Microwave therapy**	Each	**1**	**1**	Technomed Electronics/Electrocare/Blue Bell
	1	Shortwave diathermy 500W with pulse and continuous mode & Traction machine-deluxe model, progressive & regressive mode & Traction bed, four folds				
	2	**Standards, Safety and Training**				
	3	Should have the ISO certification				
	4	The quoted model should have CE or BIS certificate				
	5	**Documentation**				
	6	User/Technical/Maintenance manual to be supplied in English				
30		**Exercise Therapy Equipment**	Each	**1**	**1**	Technomed Electronics/Electrocare/Blue Bell
	1	180 D goniometer (SS), 360 D goniometer (SS), digit finger gonimeter (SS), Stethoscope (Make:Diamond)				
	2	**Standards, Safety and Training**				
	3	Should have the ISO certification				
	4	The quoted model should have CE or BIS certificate				
	5	**Documentation**				
	6	User/Technical/Maintenance manual to be supplied in English				
31		**Infra red lamp**	Each	**1**	**1**	Technomed Electronics/Electrocare/Blue Bell
	1	**Standards, Safety and Training**				
	2	Should have the ISO certification				
	3	The quoted model should have CE or BIS certificate				
	4	**Documentation**				
	5	User/Technical/Maintenance manual to be supplied in English				
32		**Wax Bath**	Each	**1**	**1**	Technomed Electronics/Electrocare/Blue Bell
	1	**Technical Specification**				
	2	Should be electricity heated mobile wax bath				
	3	Should have capacity of atleast 20 liters				
	4	Inner tank should be made up of SS				
	5	Temperature range should be adjustable from 10 to 80 degree Celsius				
	6	Strip heaters of 2kw should be fitted at the bottom of the tank				
	7	Should have alarm with visual indicator				
	8	To be operatable at 230 V, 50 Hz AC				
	9	Should be supplied with all standard accessories and consumables.				
	10	**Standards, Safety and Training**				
	11	Should have the ISO certification				
	12	The quoted model should have CE or BIS certificate				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
33		**Shoulder wheel**	Each	**1**	**1**	Technomed Electronics/Electrocare/Blue Bell
	1	Shoulder Wheel- Marine wheel, 1.2.meters diameter adjustable to arm length				
	2	**Standards, Safety and Training**				
	3	Should have the ISO certification				
	4	The quoted model should have CE or BIS certificate				
	5	**Documentation**				
	6	User/Technical/Maintenance manual to be supplied in English				
		Paediatrics				
34		**Radiant Warmer with Bassinet**	Each	**4**	**5**	GE/Phoenix / Nice Neotech
	1	The fixed radiant warmer comprises of heating element of 500-600 W and with display of skin temperature in manual mode while control and skin temperature in servo mode. The heater box must be swivel & construction of the stainless steel reflector & guard rail is such that there is no possibility of shock hazards.				
	2	There should be a light source for making (halogen /LED) observation of the patient.				
	3	The baby tray comprises of the clear acrylic collapsible side panels. The baby tray should be of minimum 6 mm thickness, unhinged and can be easily removed for cleaning. Warmer and bassinet should be separate, on wheels and should be able to lock warmer and bassinet in position. Warranty should include replacement of side panel, in case of breakage during warranty period under normal handling. For further replacement, a unit cost per replacement.				
	4	The unit should be able to accommodate X – ray unit. There must be acrylic X–ray tray with X-ray guide for positioning the cassette.				
	5	The system must be design in such a manner that disinfection can be carried out easily. The unit should have Trendelenburg and reverse Trendelenburg (continuous mode maximum upto 15 deg).				
	6	Mattress padding should be with a foam density of 21 – 25 kg / m Mattress cover should be made of fire retardant ma terial and should be anti ba cterial and washable. Mattress should be waterproof and resistant to cleaning with chlorine based solution.				
	7	There must be display for the temperature control for the measured value & set value. Temperature display should be bright, numerical with at least 1" LED display. The unit should have a rechargeable battery back up to show the temperature of the baby during the power failure.				
	8	The unit must have two drawers, IV stand & Apgar alarm for 0-10 min. The diameter of I.V stand should be 2.5 cm minimum.				
	9	The heating element should be of quartz /in frared (non-ceramic material) with parabolic reflector / calrod/ with the life time warranty . Heater should be protected by a metal grid.				
	10	**PHYSICAL PARAMETERS:** Length of Bassinet : Minimum 650 mm Width of Bassinet : Minimum 430 mm Working level from the ground : 840 mm (+/- 5%) Distance from mattress top and heat source : minimum 850 mm Weight Approx : 40 Kg Castors (Brakes / lock on front two wheels) : 75 mm				
	11	**RECOMMENDED ENVIRONMENTAL SPECIFICATIONS:** Operating temperature range : 20° C to 33° C Storage Temperature range : -25° C to 60° C Operating humidity range : 0 – 100 % RH				
	12	**SKIN TEMPERATURE** Range : 32° C to 38° C Accuracy : + / - 0.2° C Resolution : 0.1° C Probe Interchangeability : + / - 0.2° C Infant required temperature range : 32° C to 38° C Heater output controllable from 0 to 100 % in increments of 5 % in manual mode. The unit should stop heating if the temperature exceeds the desired value by one degree and restarts only when temperature fails back into one degree. Operating humidity range : 0 – 100 % RH				
	13	**ELECTRICAL SPECIFICATION**				
		Electrical supply: Work with Standard Electrical supply (220-240V/50Hz) but can tolerate wide range of voltage fluctuation (like 180-260 V).				
	14	Standard Accessories & Consumables : (quoted price should include all accessories and consumables listed below:) Mattress 1 no. Temp. Probe (Reusable) 03 nos Power cord 01 nos. Fuse set 02 nos. IV Pole of length at least 1 metre. One monitor tray Price for one additional monitor tray should be given separately.				
	15	The supplier should have local service facility. The service provider should have the necessary equipments recommended by the manufacturer to carryout preventive maintenance test as per guidelines provide in the service / maintenance manual.				
	16	The complete unit including the heating element should be CE 93/42 or FDA or UL or BIS certified.				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	17	Test certificate for the equipment to be submitted with the tender				
35		**Baby Incubators**		2	4	GE/Phoenix/Nice Neotech
	1	Should be a Microprocessor Controlled System with Air and Skin Modes of operation.				
	2	Should have 3 displays each for Air /Skin Set Temperature, Air Temperature, and Skin Temperature available in both Centigrade and Fahrenheit.				
	3	Should have a Feather Touch operation with large digital display and comprehensive alarms. Control Panel should be liquid proof and allow easy and hygienic disinfection.				
	4	Should have a memory backup to restore set temperature and control mode automatically in the event of power failure.				
	5	Should have an integral bed with trendle and fowler position adjustment of the bed angle and bed should be tiltable at both ends.				
	6	Should have Thermistor Temperature Probes, with accuracy of +/-.2°C,				
	7	Probe should be interchangeable without requiring calibration.				
	8	Should give unimpeded access to the patient with large front door and withdrawable baby tray.				
	9	Should have elbow operated ports to allow easy access and eliminate cross infections.				
	10	Should have an X-ray cassette compartment with X-ray scaling and catheter measuring scale.				
	11	Equipment should be easy to clean and disinfect.				
	12	Should have a High Intensity CFL Light for observation.				
	13	Should have Comprehensive alarms: Air Temp. Low / High, Skin Temp. Low / High, Air Flow Failure, Heater Failure, Probe Failure, Air / Skin, Temperature > 39 ° C, Power Failure, Fan Failure, System fail.				
	14	Heater should automatically cut off if air / skin temperature inside the incubator exceeds 39° C.				
	15	Should have rust free and at least 4" Anti Static Castors.				
	16	Should have IV Stand Facility.				
	17	Should have a built-in thermometer.				
	18	**Standards, Safety and Training**				
	19	Should have the ISO certification				
	20	The quoted model should have CE or BIS certificate				
	21	**Documentation**				
	22	User/Technical/Maintenance manual to be supplied in English				
36		**Photo Therapy Equipments**		2	4	GE/Phoenix/Nice Neotech
	1	Should have a source unit with 4 Blue CFL Lamps and 2 white CFL Lamps.				
	2	Should have an Irradiance level > 18µW/CM2/nm.				
	3	Should have Internal and External Reflectors designed to avoid wastage of light rays by sending uniform rays to the bed surface.				
	4	Should have a time totalizer to Measure the Hours of lamps usage				
	5	Should be able to be positioned easily over cots, incubator, radiant heat cradles.				
	6	Should have more mobility and easy adjustment of height and tilting of source unit.				
	7	Chokes, if any, should be placed in the base unit, so that the extra heat dissipated from the choke will not reach the baby. Plastic Body is preferable to minimize heat radiation.				
	8	Should have a wide base for rigidity.				
	9	**Standards, Safety and Training**				
	10	Should have the ISO certification				
	11	The quoted model should have CE or BIS certificate				
	12	**Documentation**				
	13	User/Technical/Maintenance manual to be supplied in English				
37		**Neonatal Ventillator**		2	3	Drager/Hamilton
	1	ventilator capable of ventilating from pre-mature to pediatric patients < 50 kgs. Principle of working should be Pressure limited, time cycled, continuous flow system.				
	2	Multi microprocessor controlled system with individual selection of various ventilation parameters & PEEP. Rapid trigger response time for minimum work of breathing.				
	3	The ventilator should have a display screen brightness and contrast adjustable clearly displaying the mode of ventilation, alarm settings, measured rate display, set rate, inspiratory time, indicator of set mode,Pressure bar graph,sensitivity,breath type display ,I:E ratio,digital display of peak inspiratory pressure, Peep alarm etc.				
	4	It should have a pressure sensing device to synchronize the patient's natural breathing cycle with the ventilator with a maximum sensitivity of 0.10 cmH2O and a response time of 5 to 40 milliseconds depending on the sensitive setting.				
	5	It should have a variable triggering facility which should be displayed as a graphical display on the screen.				
	6	The system should be such that the Patient pressure delivered should be based on a reference pressure (Patient Circuit Pressure)				
	7	Should have the following modes of ventilation:				
	8	AC, SIMV/IMV, CPAP, CPAP with backup ventilation, Standby.				
	9	The system should have the following parameters:				
	10	FLOW: Adjustable 2 TO 32 LPM				
	11	I:E RATIO 4:1 TO 1:10				
	12	WAVEFORM : Adjustable TAPERED OR SQUARE				
	13	EXP PRESSURE : 0 TO 20 cmH2O				
	14	INS PRESSURE :5 TO 70 cmH2O				
	15	RATE : 2 TO 150 bpm				
	16	INSP. TIME : 0.1 TO 3 SEC				
	17	Should have following audio – visual alarms:				
	18	High Inspiratory Pressure				
	19	Low/Prolonged Inspiratory Pressure				
	20	Low PEEP/Baseline Pressure				
	21	Apnea				
	22	High Respiratory Rate				
	23	Loss/Low Electrical Power				
	24	System Error/Vent Inop				
	25	Loss of Inlet Gas				
	26	Safety pressure relief valve adjustable from 15 to 85 cmH2O.				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	27	Should be capable of delivering oxygen from 21% to 100%				
	28	Electronically controlled manual breath to be based on the inspiratory pressure, time and waveform settings.				
	29	Display of breath type should be seen on the display.				
	30					
	31	Two sets of patient tubes should be supplied with the system.				
	32	Should have facility for ventilation data transfer				
	33	Should be user-friendly & have sturdy design				
	34	Should be CE, ISO and US FDA APPROVED system.				
	35	The complete system should be supplied on a single trolley capable of holding the ventilator, compressor, humidifier, hose hanger and the electrical output should have a single output.				
	36	**HUMIDIFIER:** Humidification system with reusable Infant / pediatric chamber capable of using in both manual and automatic mode. It should consist of reusable single heater wire with reusable temp probe and heater wire adapter				
	37	**Standards, Safety and Training:**				
	38	Should be FDA and CE approved product				
	39	Electrical safety conforms to standards for electrical safety IEC- 60601-1 General Requirements				
		OPD Equipments				
38		**ECG machine computerized**	Each	**2**	**4**	GE/Schiller/Philips
	1	**Operational Requirements**				
	2	The ECG Machine should be able to acquire all 12 Leads simultaneously and interpret them dignostically.				
	3	**Technical Specifications**				
	4	Should acquire simultaneous 12 lead ECG for both adult and pediatric patients and interpret them dignostically.				
	5	Should have Real time Colour display of ECG waveforms with signal quality indication for each lead				
	6	Should have Artifact, AC, and low and high pass frequency filtersof diagnostic quality				
	7	Should have a storage memory of at least 100 ECGs with easy transfer by optional modem and data card.				
	8	Should have large size full screen preview of ECG report for quality assessment checks prior to print.				
	9	Should have interpretation facility of the amplitudes, durations and morphologies of ECG waveforms and associated rhythm for adult and pediatric patients				
	10	Should have alphanumeric Keyboard for patient data Entry. (virtual or hard keys)				
	11	Should have High resolution (200 dpix500dpi on 25 mm/sec speed) digital thermal printer				
	12	Should have report formats of 3 x4; 6 x2, Rhythm for up to 12 selected leads; 12 Lead Extended measurements, 1 minute of continuous waveform data for 1 selected lead.				
	13	Should have battery capacity of at least 30 ECGs or 30 minutes of continuous rhythm recording on single charge				
	14	Should be able to be connected to HIS /LAN/Wireless LAN(OPTIONAL)				
	15	Should display ECG on LCD/TFT Display of 640x480 pixel resolution.				
	16	USB Support (optional) for Storage on external portable memories.				
	17	Multimode of ECG Storage capability on Flash Memory				
	18	**System Configuration Accessories, spares and consumables**				
	19	ECG Machine 12 Leads with Interpretetion - 01				
	20	Patient Cable -01				
	21	Chest Electrodes Adult-(set of six) -02 sets.				
	22	Chest Electrodes Paediatric-(set of six) -02 sets				
	23	Limb Electrodes(set of 4)- 02 sets				
	24	**Standards, Safety and Training**				
	25	Should be FDA or CE or BIS approved product.				
	26	Manufacturer should have ISO 9001 certification for quality standards.				
	27	On site Comprehensive training for lab staff and support services till customer satisfaction with the system				
	28	**Documentation**				
	29	User / Technical / Maintenance manuals to be supplied in English.				
	30	Certificate of calibration and inspection.				
39		**B.P.apparatus table model (Analog)**	Each	**10**	**15**	Diamond/SISCO/Venus surgical/
40		**B.P.apparatus stand model (Analog)**	Each	**10**	**15**	Diamond/SISCO/Venus surgical/
		Gyanecology				
41	1	**Foetal Doppler**	Each	**2**	**4**	Hunteleigh/CHX-8G
	2	It should be LCD Display (55 mm x 27 mm)				
	3	It should be ultrasonic emitting frequency – 1 MHz and power - <5mW/cm2				
	4	Overall sensitivity at the distances 200mm from the face of the probe >=90db				
	5	Automatic FHR test range 30-240 BPM (beat/minute)				
	6	Resolution – 1 BPM				
	7	Audio output – 1 W				
	8	Battery voltage – 3 x 1.2V (alkaline battery)				
	9	**Standards, Safety and Training**				
	10	Should be FDA or CE or BIS approved product.				
	11	Manufacturer should have ISO 9001 certification for quality standards.				
	12	On site Comprehensive training for lab staff and support services till customer satisfaction with the system				
	13	**Documentation**				
	14	User / Technical / Maintenance manuals to be supplied in English.				
	15	Certificate of calibration and inspection.				
		ENT				
42		**Audiometer**	Each	**1**	**1**	Interacoustics / Maico
	1	Light weight with suitable carrying case to accommodate the main unit and accessories.				
	2	-Channels:2 separate channels with independent attenuators.				
	3	-Test frequencies 250Hz to 8000Hz				
	4	-Hearing level range :				
	5	-air-conduction 10db to 120 db				
	6	-bone -10db to 80db(apprx)				
	7	-masking 10db to 90 db (apprx) narrow band, wide band				
	8	-Attenuator: 2.5db and 5 dB steps				
	9	-Stimulous:continousn pulsed or warable tone				
	10	-Total Hormonic distortion:				
	11	air: less than 2.5 % / bone: less than 5%				
	12	***Display**				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	13	-Power supply : suitable mains adapter: 230 VAC				
	14	**Standard accessories**				
	15	-Microphone -Headphone				
	16	-Patients' response switch required by the system				
	17	-Power cord-Bone vibrator				
	18	-Carrying case to accommodate the main unit & accessories				
	19	-Headphone TDH 39 and TDH 49				
43		**Operating Microscope (ENT)**	Each	**1**	**1**	Carl zeiss/ Leica/Moller wedel
	1	Manual 5-step magnification changer with apochromatic optics, magnification factors 0.4x-0.6x-1.0x-1.6x-2.5x; integrated green and orange filters				
	2	Objective lenses f=200 mm, 300 mm (with manual focusing mechanism and sterilizable rubber cap, range: minimum 13 mm) and f=400 mm (mount diameter 48 mm)				
	3	Straight binocular tube f=170 mm, interpupillary distance adjustment from 55 mm to 75 mm				
	4	Pair of widefield push-in eyepieces 10x with sleeves and magnetic locks, diopter setting from –8D to +5D				
	5	With objective lens f=200 mm and eyepieces 10x:				
	6	Magnifications 3.4x-5.1x-8.5x-13.6x-21.3x				
	7	Visual Field Diameter 61.8-41.2-24.7-15.5-10.0 mm				
	8	120 inclined coupling				
	9	Front side handgrips				
	10	Coaxial fire optic illumination system 12V 100W				
	11	Dual lamp system with quick change over				
	12	Continuously lamp intensity adjustment by control knob near to the surgeon				
	13	Automatic on/off switch for the lamp				
	14	Stable and sturdy floor stand on four lockable castors, column (height: minimum 1.7 m), spring-balance articulated arm, carrier arm, power supply unit, light guide 2 m, power cable 6 m				
	15	Sterilizable rubber caps for all knobs, dust cover, spare halogen lamp 12V 100W (12 Nos.)				
	16	Standards, Safety and Training				
	17	Should be FDA or CE or BIS approved product.				
	18	Manufacturer should have ISO 9001 certification for quality standards.				
	19	On site Comprehensive training for lab staff and support services till customer satisfaction with the system				
	20	Documentation				
	21	User / Technical / Maintenance manuals to be supplied in English.				
	22	Certificate of calibration and inspection.				
44		**ENT Operation set including headlight**	Each	**2**	**3**	sisco or equivalent
		One No of each instrument as below				
		LARYNGOTOMY SET -				
	1	BACKHAUS TOWEL CLAMPS 110mm				
	2	B.P HANDLE NO.3				
	3	B.P. BLADE, ISI "LISTER", SIZE: 10, (BOX OF 100)				
	4	B.P. BLADE, ISI "LISTER", SIZE:15, (BOX OF 100)				
	5	LANGENBECK RETRACTOR 215mm,35X15mm " "				
	6	LANGENBECK RETRACTORS 215mm,40X11mm " "				
	7	KOCHER BONE HOOK SHARP 220MM " "				
	8	VOLKMANN RETRACTOR SHARP 4 PRONGS220mm " "				
	9	SCHONBORN UVULA HOOK 230MM " "				
	10	HALSTED MOSQUITO ARTERY FORCEPS CD.125mm " "				
	11	CRILES HAEMOSTATIC FORCEPS CD.140mm " "				
	12	HALTSED FORCEPS CURVED 1X2 TEETH125MM, " "				
	13	STANDARD DISSECTING FORCEPS PLAIN150mm " "F				
	14	STD DISSECTING FORCEPS TOOTHED150mm " "				
	15	ADSONS DISSECTING FORCEPS PLAIN125mm " "				
	16	DRESSING SCISSORS SH/BL ST. 150mm" " S/F				
	17	JOSEPH SCISSORS ST.150mm " "				
	18	METZENBAUM SCISSORS CURVED 150mm" "				
	19	LEXER DISSECTING SCISSORS CURVED165MM, " "				
	20	WILLIGIER RASPATORIES 8MM, 160MM " "				
	21	JANSEN BONE RONGEURS SINGLE ACTIONST. 175mm " "				
	22	KILLIAN LARYNGECTOMY SCISSOR DOUBLE ACTION 200MM " "				
	23	CZERNY UTERINE TENACULUM FORCEPS4X4 PRONGS 200MM " "				
	24	KOEINIG GUIDING PROBE NARROWFLAT 200MM. " "				
	25	KOCHER GUIDING PROBE150MM " "				
	26	DESCHAMPS-BLUNT LIGATURE RIGHT210mm " "				
	27	DESCHAMPS-BLUNT LIGATURE LEFT210mm " "				
	28	FERGUSSON SUCTION CANNULA WITH FINGER CUT-OFF AND STYLET 5.0MM, 180MM " "				
	29	DEBAKEY NEEDLE HOLDERS STANDARD150MM T.C. TIP " "				
	30	TRACHEOSTOMY TUBE, GERMAN SILVER"CH. JACKSON", SIZE: 18,24,30& 36 (EACH SIZE)				
	31					
	32					
	33	**TYMPANOPLASTY SET - " " - CONSISTING OF:**				
	34					
	35	LEMPERT EAR RASPATORY NARROW STRAIGHT 160MM " "				
	36	PLESTER SICKEL KNIFE SLIGHTLY CURVED 160MM " "				
	37	PLEASTER FLAP KNIFE R/CUTTING BLADE IN LINE WITH SHF. 2.4 X 3.5MM, 160MM " "				
	38	PLEASTER FOOT PLATE KNIFE STRAIGHT 160MM " "				
	39	PLESTER SCRAPER 60 DEG. ANG. FOR ROUGHENING OF TYNPANUM SURFACE 160MM " "				
	40	MICRO EAR HOOK STRAIGHT SHAFT SLIGHTLY ANGLED AT TIP 160MM " "				
	41	PLESTER FOOT PLATE HOOK 90 DEG. ANGLED 160MM " "				
	42	DOUBLE ENDED SPOON SHAPED ELEVATOR 180MM " "				
	43	WULLSTEIN MICRO CUPPED FORCEPS STRAIGHT OVAL JAW 0.8 X 1.3MM SHAFT 80MM " "				
	44	WULLSTEIN MICRO CUPPED FORCEPS CURVED UP OVAL JAW 0.9 X 1.0MM SHAFT 80MM " "				
	45	BELLUCCI MICRO SCISSOR CURVED TO THE RIGHT SHARP X SHARP SHAFT 80MM " "				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	46	PLESTER SUCTION CANNULA WITH FINGER CUT-OFF, & STYLET 1.5MM, 195MM " "				
	47	PLESTER SUCTION CANNULA WITH FINGER CUT-OFF, & STYLET 2.5MM, 195MM " "				
	48	PLESTER SUCTION CANNULA WITH FINGER CUT-OFF, & STYLET 3.0MM, 195MM " "				
	49	MOLLISON S/R RETRACTOR 4 X 4 PRONGS SHARP 150mm " "				
	50	PLESTER S/R RETRACTOR BLUNT LEFTLENGTH 110mm,25X18mm " "				
	51	PLESTER S/R RETRACTOR BLUNT RIGHTLENGTH 110mm,18X25mm " "				
	52	EAR RASPATORY CURVED 8MM, 165MM " "				
	53	ROSEN ROUND CUTTING KNIFE 45 DEG. ANG. STR. TIP DIA:2.6MM, 160MM " "				
	54	SHAMBAUGH EAR FENESTRA HOOK 90 DEG. ANGLED 0.4MM, 160MM " "				
	55	SHAMBAUGH EAR FENESTRA HOOK 90 DEG. ANGLED 0.8MM, 160MM " "				
	56	SHAMBAUGH EAR FENESTRA HOOK 90 DEG. ANGLED 1.0MM, 160MM " "				
	57	PLESTER ANTRUM HOOK 90 DEG. ANGLED CYLINDRIC TIP 160MM " "				
	58	PLESTER ANTRUM HOOK 45 DEG. ANGLED WITH BUTTON TIP 160MM " "				
	59	BUCK EAR CURETTE, CURVED SHARP 3.0MM, 150MM " "				
	60	BUCK EAR CURETTE, CURVED SHARP 2.5MM, 150MM " "				
	61	HALSTEAD MOSQUITO ARTERY FORCEPS ST125mm " "				
	62	PLESTER SUCTION CANNULA WITH FINGER CUT-OFF AND STYLE 2.0MM, 195MM " "				
	63					
	64	**MASTOIDECTOMY SET - " " - CONSISTING OF:**				
	65					
	66	RAMPLEY SPONGE HOLDING DRESSINGFORCEPS 250mm " "				
	67	BACKHAUS TOWEL CLAMPS 85mm " "				
	68	B.P.HANDLE NO.7 " "				
	69	GILLIES TISSUE FORCEPS 1x2 TEETH150mm " "				
	70	MCINDOE DISSECTING FORCEPS 150mm" "				
	71	MAYOS SCISSORS CD 135mm " "				
	72	IRIS SCISSORS STRAIGHT 115mm" "				
	73	HALSEY NEEDLE HOLDERS SERRATED130MM " "				
	74	JENKINS GOUGES 3mm,140mm " "				
	75	JENKINS GOUGES 4mm,140mm " "				
	76	JENKINS GOUGES 6mm,140mm " "				
	77	JENKINS GOUGES 8mm,140mm " "				
	78	JENKINS GOUGES 10mm,140mm " "				
	79	TILLY NASAL DRESSING FORCEPS 160mm" "				
	80	KRAUSE NASAL POLYPUS SNARE KNEE SHAPED 250MM " "				
	81	KILLIAN SEPTUM SPECULUM SCREW JOINT 7.0 X 90MM, 145MM " "				
	82	THUDICUM NASAL SPECULUM 8.5 X 6.0 X 70MM " "				
	83	THUDICUM NASAL SPECULUM 8.5 X 6.0 X 70MM " "				
	84	THUDICUM NASAL SPECULUM 8.5 X 6.0 X 70MM " "				
	85	THUDICUM NASAL SPECULUM 8.5 X 6.0 X 70MM " "				
	86	THUDICUM NASAL SPECULUM 8.5 X 6.0 X 70MM " "				
	87	COTTLE MALLET WEIGHT 240GMS " "				
	88	GILLIES SKIN HOOK 185mm " "				
	89	JANSEN CURETTE DOUBLE ENDED 160MM " "				
	90	HOWARTH NASAL RASP. DOUBLE ENDED 230MM " "				
	91	VOLKMANN RETRACTOR SHARP 4 PRONGS220mm " "				
	92	JANSEN SELF RETAINING RET. BLUNT3X3 PRONGS 105mm " "				
	93	WETLANER SELF RETAINING RETRACTORBLUNT 3 x 4 PRONGS 165mm " "				
	94	MOLLISON S/R RETRACTOR 4X4 PRONGSSHARP 150mm " "				
	95	LEMPERT CURETTES FIBRE HANDLEFIG.0000,1.8mm 215mm " "				
	96	LEMPERT CURETTES FIBRE HANDLEFIG.0,2.6mm 215mm " "				
	97	CAWTHORNE NIBBLING FORCEPS NARROW JAW 3MM, 160MM " "				
	98	ADITUS SEEKER & CURRETE " "				
	99	FREER ELEVATOR CURVED SIDEWARDS 187MM " "				
	100	RUSKIN BONE RONGUER DOUBLE ACTION190mm " "				
	101	KERRISON PITUITARY PUNCH 40DEG. UPCUTTING 3mm x 180mm " "				
	102	LEMPERT SUCTION AND IRRIGATION TUBE (SET OF 4) " "				
	103					
	104					
	105	**RHINOPLASTY SET - " " - CONSISTING OF:**				
	106					
	107	RAMPLEY SPONGE HOLDING DRESSINGFORCEPS 250mm " "				
	108	B.P HANDLE NO.3				
	109	BACKHAUS TOWEL CLAMPS 85mm " "				
	110	HALSTED MOSQUITO ARTERY FORCEPS CD.125mm " "				
	111	HALSTED MOSQUITO ARTERY FORCEPS 1 X 2 TEETH, CURVED 125MM " "				
	112	STEAVENS TENOTOMY SCISSORS 4" STR. " "				
	113	FOMON LOWER LATERAL SCISSOR STRONGLY CURVED 135MM " "				
	114	DRESSING SCISSORS SH/BL CD. 150mm" "				
	115	GRAEFE TISSUE FORCEPS WITH SHARP TEETH 110MM " "				
	116	IRIS FORCEPS STRAIGHT 10CM " "				
	117	IRIS FORCEPS STRAIGHT TOOTHED 10CM " "				
	118	COTTLE COLUMELLA CLAMP WITH FIXATION BEARING & ADJ. SCREW 100MM " "				
	119	TROELTSCH EAR DRESSING FORCEPS KNEE SHAPED TIP 1.8MM SERR. 115MM " "				
	120	DIRECTOR WITH ANEURYSM NEEDLE110mm" "				
	121	AUFRICHT RETRACTOR SPECULUM 160MM " "				
	122	WEIL-BLAKESLEY ETHMOIDAL FORCEPS4.2mm X 120mm " "				
	123	GILLIES SKIN HOOK 185mm " "				
	124	COTTLE RETRACTOR 4 PRONGS 140MM " "				
	125	TONGUE DEPRESSOR SMALL 13mm" "				
	126	TONGUE DEPRESSOR MEDIUM 19mm" "				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	127	TONGUE DEPRESSOR LARGE 22mm " "				
	128	LIST BONE CUTTER ANGLED SINGLE ACTION 200MM " "				
	129	JANSEN BONE RONGEURS SINGLE ACTIONCD. 175mm " "				
	130	ASH SEPTUM STRAIGHTENING FORCEPS 220MM " "				
	131	JANSEN MIDDLETON NASAL FORCEPS SPOON SHAPED BITING 200MM " "				
	132	WALSHAM SEPTUM STRAIGHTENING FORCEPS RIGHT 210MM " "				
	133	WALSHAM SEPTUM STRAIGHTENING FORCEPS LEFT 210MM " "				
	134	COTTLE MALLET WEIGHT 240GMS " "				
	135	COTTLE SEPTUM KNIFE 150MM " "				
	136	LANDOLT PERIOSTEAL ELEVATORS SEMI-SHARP WIDTH 5mm 175mm " "				
	137	ADSON PERIOSTEAL ELEVATORS SHARPWIDTH 5mm 165mm " "				
	138	SUCTION CANNULA FOR NOSE, CURVED16CM, 5MM DIA " "				
	139	COTTLE OSTEOTOMES 4mm,180mm" "				
	140	COTTLE OSTEOTOMES 6mm,180mm" "				
	141	COTTLE OSTEOTOMES 8mm,180mm" "				
	142	COTTLE OSTEOTOMES 10mm,180mm" "				
	143	JENKINS GOUGES 4mm,140mm " "				
	144	JENKINS GOUGES 6mm,140mm " "				
	145	JENKINS GOUGES 8mm,140mm" "				
	146	JENKINS GOUGES 10mm,140mm " "				
	147	JOSEPH NASAL RASPATORIES 180mm" "				
	148	JOSEPH NASAL RASPATORIES 180mm" "				
	149	SCHNIDT TONSIL ARTERY FORCEPS SLIGHTLY CURVED 185MM " "				
	150	HALSEY NEEDLE HOLDERS SERRATED130MM " "				
	151	CRILE WOOD NEEDLE HOLDERS 150mm" "				
	152					
	153					
	154	**MYRINGOPLASTY SET - " " - CONSISTING OF:**				
	155					
	156	B.P HANDLE NO.3				
	157	HALSTED MOSQUITO ARTERY FORCEPS CD.125mm " "				
	158	SPONGE HOLDING DRESSING FORCEPS250mm" "				
	159	BACKHAUS TOWEL CLAMPS 110mm " "				
	160	METZENBAUM SCISSORS CURVED 200mm" "				
	161	HARTMANN EAR FORCEPS SERRATED JAWS, 1X2 TEETH 2 X 6MM SHAFT STRAIGHT 80MM - " "				
	162	HARTMANN EAR FORCEPS SERRATED JAWS 1 X 8MM SHAFT STRAIGHT 80MM - " "				
	163	MICRO EAR ALLIGATOR FORCEPS CURVED DOWN 45DEG JAW 0.8MM X 3.5MM SHAFT 80MM " "				
	164	TOYNBEE EAR SPECULUM ADULT SET OF 3				
	165	SENN MILER SKIN RETRACTOR 165mm" "				
	166	MAYO HEGARS NEEDLE HOLDERS 150mm" "				
	167	STD DISSECTING FORCEPS TOOTHED150mm " "				
	168	MAYOS SCISSORS ST. 160mm " "				
	169	HARTMANN - WULLSTEIN EAR FORCEPS FOR EXAMINATION EXTRA FINE PATTERN, 0.8 X 6M SHAFT STRAIGHT 80MM " "				
		TONSILLECTOMY SET - " " - CONSISTING OF:				
	170	SCHNIDT TONSIL ARTERY FORCEPS SLIGHTLY CURVED 185MM " "				
	171	TONSIL ARTERY FORCEPS 8" STRAIGHT " "				
	172	IRWIN MOORE TONSIL HOOK TYPE 180MM " "				
	173	BRAIN TISSUE GRASPING FORCEPS 3 X 3 PRONGS 155MM " "				
	174	WHITE TONSIL HOLDING FORCEPS 180MM " "				
	175	BEAVIOS PILLAR RETRACTOR DOUBLE END " "				
	176	EVES TONSIL SNARE 250MM " "				
	177	NEGUS KNOT TIER FLAT HANDLE 9" " "				
	178	LUC SEPTUM FORCEP WITH FENESTRATED JAW SHAFT 9MM X 12MM, 200MM " "				
	179	ST CLAIR THOMPSON ADEN.CURETTE FIB.HANDLE WITH CAGE 8mm 215mm " "				
	180	ST.CLAIR THOMSON ADEN.CURETTE FIB.HANDLE WITH CAGE 10mm 215mm				
	181	METZENBAUM SCISSORS CURVED 150mm" "				
	182	LANDOLT SUCTION CANNULA O.D. - 3MM SHAFT-8MM, 150MM " "				
	183	FINE DISSECTING FORCEPS TOOTHED200mm " "				
	184	FINE DISSECTING FORCEPS PLAIN200mm " "				
	185	DOYENS MOUTH GAG ANAESTHETIC" "				
	186	BACKHAUS TOWEL CLAMPS 150mm" "				
45		**ENT Nasal Set**	Each	**1**	**1**	SISCO/Venus/ or Equivalent
	1	**THYROIDECTOMY SET - " " - CONSISTING OF:**				
	2					
	3	MAIER SPONGE & DRESSING FORCEPSWITH RATCHET 265MM CD. " "				
	4	BACKHAUS TOWEL CLAMPS 110mm " "				
	5	BACKHAUS TOWEL CLAMPS 125mm" "				
	6	B.P.HANDLE NO.4 " "				
	7	B.P HANDLE NO.3				
	8	METZENBAUM SCISSORS TC TIP CD 180mm" "				
	9	METZENBAUM SCISSORS TC TIP CD200mm " "				
	10	MAYO-LEXER SCISSOR CURVED165mm,T/C TIP " "				
	11	DRESSING SCISSORS SH/BL ST. 150mm" "				
	12	STANDARD DISSECTING FORCEPS PLAIN150mm " "				
	13	STD DISSECTING FORCEPS TOOTHED150mm " "				
	14	STANDARD DISSECTING FORCEPS TOOTHED18cm " "				
	15	DEBAKEY DISSECTING FORCEP TRAUMANILJAWS ST. 2mm 150mm " "				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	16	HALSTED MOSQUITO ARTERY FORCEPS CD.125mm " "				
	17	HALSTEAD FORCEPS, CURVED, 1 X 2TEETH, 125MM " "				
	18	KOCHERS HAEMOSTATIC FORCEPS STRAIGHT 150MM " "				
	19	KOCHERS HAEMOSTATIC FORCEPS ST.200mm " "				
	20	BABY MIXTER LIGATURE FORCEPS 185mm" "				
	21	OVERHOLT GEISSENDOERFER, DISSECTING FORCEPS 210MM " "				
	22	OVERHOLT GEISSENDOERFER, DISSECTING FORCEPS 220MM " "				
	23	BRAUN TISSUE GRASPING FORCESP 4 X 4 PRONGS 155MM " "				
	24	BABCOCK TISSUE GRASPING FORCEPSATRAUMATIC JAW 150mm " "				
	25	ALLIS TISSUE GRASPING FORCEPSATRAUMATIC JAW 200mm " "				
	26	DESCHAMPS-BLUNT LIGATURE RIGHT210mm " "				
	27	DESCHAMPS-SHARP LIGATURE RIGHT210mm " "				
	28	PARYS RECTAL DISSECTOR 200MM " "				
	29	CRILE WOOD NEEDLE HOLDERS145mm T.C. TIP " "				
	30	MAYO HEGAR NEEDLE HOLDER T/C TIP200MM " "				
	31	DEBAKEY NEEDLE HOLDER STANDARD180MM T.C. TIP " "				
	32	VOLKMANN RETRACTOR SHARP 4 PRONGS220mm " "				
	33	ROUX RETRACTORS 165mm,19X22mm,23X30mm " "				
	34	ROUX RETRAVCTOR 165mm,25X26mm,28X38mm " "				
	35	ROUX RETRACTOR 165mm,28X29mm,33X45MM " "				
	36	KOCHERS RETRACTORS 230mm" "				
	37	JOLLS S/R TWIN CLAMP 155mm " "				
		S.M.R. SET - CONSISTING OF:				
	38	B.P.HANDLE NO.7 " "				
	39	ADSON PERIOSTEAL ELEVATORS CURVEDBLUNT WIDTH 6mm 170mm " "				
	40	THUDICHUM NASAL SPECULUM." " (SET OF 7)				
	41	LEMPERTS ENDURAL SPECULAM" "				
	42	TILLEY HARPOON TROCAR WITH FIBRE HANDLE 171MM " "				
	43	FINE SUCTION TIP." "				
	44	KILLIAN CLAUS SEPTUM GOUGE WITH NOTCH BAYONET SHAPED 170MM " "				
	45	LUC SEPTUM FORCEPS WITH FENESTRATED JAWS SHAFT - 9MM X 12MM, 200MM " "				
	46	JOSEPH NASAL RASPATORIES 180mm" "				
	47	TILLEY ANTRUM BURS FOR BREAKING DOWN THE FRONTO-ETHMOIDEL CELLS WITH FIBRE HANDLE - 6MM, 171MM " "				
	48	TILLY NASAL DRESSING FORCEPS 160mm" "				
	49	STD DISSECTING FORCEPS TOOTHED150mm " "				
	50	SCHADEL TOWEL CLAMPS 90mm " "				
	51	MAYO HEGARS NEEDLE HOLDERS 150mm" "				
	52	METZENBAUM SCISSORS CURVED 150mm" "				
	53	HOWARTH NASAL RASP DOUBLE ENDED230mm " "				
		MICRO LARYNGEAL SURGERY SET - " " - CONSISTING OF:				
	54	MICRO LARYNGEAL GRASPING FORCEPSSHAFT STRAIGHT 250MM " "				
	55	MICRO LARYNGEAL GRASPING FORCEPSSHAFT CURVED TO LEFT 250MM " "				
	56	MICRO LARYNGEAL GRASPING FORCEPSSHAFT CURVED TO RIGHT 250MM " "				
	57	MICRO LARYNGEAL CUP SHAPED FORCEPSCUP D:2MM SHAFT STR. 250MM " "				
	58	MICRO LARYNGEAL CUP SHAPED FORCEPSCUP D:2MM SHAFT CVD. TO LEFT 250MM				
	59	MICRO LARYNGEAL CUP SHAPED FORCEPSCUP D:2MM SHAFT CVD. TO RIGHT 250MM				
	60	MICRO LARYNGEAL CUP SHAPED FORCEPSCUP D:2MM SHAFT UPWARD ANGLED 250MM				
	61	MICRO LARYNGEAL SCISSOR SHAFTSTRAIGHT 250MM " "				
	62	MICRO LARYNGEAL SCISSOR SHAFTCURVED TO LEFT 250MM " "				
	63	MICRO LARYNGEAL SCISSOR SHAFTCURVED TO RIGHT 250MM " "				
	64	MICRO LARYNGEAL SCISSOR SHAFTUPWARD ANGLED 250MM " "				
	65	WEERDA CARTILAGE FORCEPS1 X 2 TEETH, 250MM " "				
	66	WEERDA LARYNGEAL NEEDLE HOLDER225MM " "				
	67	MICRO LARYNGEAL CUP SHAPED FORCEPSSTR. OVAL JAW 2 X 3MM, 250MM				
	68	LARYNGEAL CUTTING FORCEPS WITHFENESTRATED JAW SH. STR.250MM				
	69	LARYNGEAL BIOPSY PUNCH 90 DEG.ANGLED 250MM " "				
	70	HANDLE FOR USE WITH LARYNGEALINSTRUMENTS " "				
	71	MICRO LARYNGEAL SICKLE KNIFE SHAFT250MM " "				
	72	MICRO LARYNGEAL SICKLE KNIFESHAFT, HORIZONTAL 250MM " "				
	73	MICRO LARYNGEAL SICKLE KNIFESHAFT, VERTICAL 250MM " "				
	74	MICRO LARYNGEAL ROUND CUTTING KNIFE45 DEG. ANGLED SHAFT 250MM " "				
	75	MICRO LARYNGEAL HOOK 90 DEG. ANG.BLUNT SHAFT 250MM " "				
	76	MICRO LARYNGEAL PROBE 30 DEG.BACKWARD CURVED SHAFT 250MM " "				
	77	MICRO LARYNGEAL SUTURE GUIDE FORKSHAPED SHAFT 250MM " "				
46		**Laryngoscope fibreoptic ENT**	Each	**5**	**2**	SISCO or equivalent
	1	Should have swiveling blade tip facilitates difficult intubation.				
	2	The flexible tip with Macintosh Laryngoscope Blade should be adjustable through 70°.				
	3	A lever controls the tip angle during intubation to lift the epiglottis, giving a clear view of the vocal cords.				
	4	System should be capable of avoiding unnecessary pressure on the tongue and soft tissue.				
	5	Should have alternative of LED or Xenon Halogen Lamp illumination facility.				
	6	Should have Integrated Fiber Optics with 6000 or more individual micro-fibers for light transmission and illumination.				
	7	Should have High quality stainless steel construction.				
	8	Should have measures to prevent damage to teeth and soft tissue.				
	9	Should be capable of withstanding standard autoclave cycle.				
47		**Laryngoscope indirect**	Each	**2**	**2**	SISCO or equivalent
48		**Otoscope**	Each	**2**	**2**	Heine/Keeler
	1	Should be of compact and handy design				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	2	Should have bright Xenon Halogen lamp illumination with concentrated white light.				
	3	Should have 3 x magnifications				
	4	Casing surface should have minimal reflection.				
	5	Should have swiveling viewing window				
	6	Should have automatically Switch off facility when placed in pocket.				
	7	Should have high-quality sturdy and non-slip handle				
	8	Should be compatible with replaceable AA batteries				
49		**Head Light (cold light)**	Each	**2**	**2**	Heine/Keeler
	1	Should have comfortable head band fully adjustable spot selection				
	2	Should be bright white light without temperature increase				
	3	should be available with double outlet				
	4	The front cable adapter is suitable for all reputed companies Cable fitting.				
	5	Brilliant dual halogen illumination 24V-150/250W Halogen bulbs compact and light weight equipment.				
	6	Should have facility for easy replacement of lamps				
	7	Should have auto cut illumination control				
	8	Should have heat filter and low noise cooling fan				
	9	Length of Fiber Optic Cable should be more than 2.0 Meter				
50		**Sound Proof Room**	Each	**1**	**1**	Fabrication
	1	Sound proof Room fabrication to be compatible for Audiometer				
	2	Standards, Safety and Training				
	3	Should be FDA or CE or BIS approved product.				
	4	Manufacturer should have ISO 9001 certification for quality standards.				
	5	On site Comprehensive training for lab staff and support services till customer satisfaction with the system				
	6	Documentation				
	7	User / Technical / Maintenance manuals to be supplied in English.				
	8	Certificate of calibration and inspection.				
		Opthalmology				
51		**Snellen chart/Drum with remote**	Each	**1**	**1**	Appasamy/AOL/heine
	1	Features: Should have the following charts – Snellen's Charts (English and Tamil), Tumbling E chart, Landolt's broken ring chart.				
	2	**Digital LCD Visual Acuity Chart**				
	3	LCD Type - 17-inch LCD				
	4	Resolution - 1280 × 1024				
	5	(20' LCD Monitor) – with remote –				
	6	VA Chart Type - Snellen's Charts (English, Hindi and Numerals), Tumbling E chart, Landolt's broken ring chart, Contrast Sensitivity Chart, Picture Charts, Single Optotype Chart, LogMar Vision Chart, ETDRS Chart, Red/Green Testing				
	7	Isolation - Single Letter, Horizontal				
	8	Special Chart type - Dots, Astigmatism, Fixation, Red-Green, Amsler Grid, Color Blindness				
	9	Chart Change Over Device - Remote Control				
	10	Range - 6ft,10ft,20ft(2m,3m & 6m)				
	11	Standard Accessories - Remote Control, Multipurpose Screws(X2)				
	12	Floor stand to be provided				
	13	Should work on 230V,50 Hz power supply.				
	14	**Should be CE or ISO approved Product**				
52		**Trial lens sets with frames**	Each	**1**	**1**	Appasamy/AOL/heine
	1	Should be supplied with set of 226 trial lens with durable metal frame				
	2	**Technical Specification**				
	3	**Lens set**				
	4	Set of 226 trial lenses with polished metal rims in an elegant carrying case.				
	5	70 Spherical Concave Lenses: 0.12 to 20.00 Diopters (0.25D increments)				
	6	70 Spherical Convex Lenses: 0.12 to 20.00 Diopters (0.25D increments)				
	7	34 Cylindrical Concave Lenses: 0.12 to 6.00 Diopters (0.25D increments)				
	8	34 Cylindrical Convex Lenses: 0.12 to 6.00 Diopters (0.25D increments)				
	9	12 Prismatical Lenses: 0.5(2), 1(2), 2(2), 3, 4, 5, 6, 7, 8				
	10	6 Accessory Lenses: Red, Green, Slit, Dark, Aperture(2)				
	11	**Metal Frame**				
	12	Should be durable and light weight				
	13	Number of lenses which can be inserted in to left or right lensframe simulataneously:4 pieces				
	14	Degree of lens rotation around optical axis in the lens frame:360 degree				
	15	Horizontal and vertical bridge adjustments.				
	16	Free-rocking saddle bridge assures comfortable nose fit. Range of nose rest adjustment Length:0 ~ 14 mm,angle:0 ~ 30 degree				
	17	Separate PD adjustment for each eye to compensate for asymmetrical factors in facial structure. PD of both eye: 48 ~ 80 mm Left or right PD: 24 ~40 mm				
	18	Individual adjustments for temple length and angle.				
	19	Adjustment for rotating cylinders to correct axis.				
	20	Scales with large, easy-to-read numerals.				
	21	**Should be CE or ISO approved Product**				
53		**Log Mar Vision Charts**	Each	**1**	**1**	Appasamy/AOL/heine
	1	Should be made using high contrst letters on washable polystyrene				
	2	The progression of letter height is that any line is 1.2589 times greater than the line below. This multiplier is the root of ten or 0.1 log unit. Therefore, a three line worsening of visual acuity is equal to a doubling of the visual angle regardless of the initial acuity				
	3	The charts are designed for use at 4 metres which helps with smaller examining rooms				
	4	**Should be CE or ISO approved Product**				
54		**Opthalmoscope - Direct**	Each	**2**	**2**	Heine/Well allyn/Keeler
	1	Modular wall unit				
	2	Standard - 2 instrument bays				
	3	2 meter spiral cord handles with magnetic automatic on/off and ceramic rheostats.				
	4	Dismantable Direct Ophthalmoscope and Streak Retinoscope heads.				
	5	**Should be CE or ISO approved Product**				
55		**Slit Lamp**	Each	**1**	**1**	Appasamy/ Haagstraight/Topcon

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	1	Front lens f : 105 mm.				
	2	Angle of optical axes : 13°				
	3	Total Diameter of Magnification field: 5 Step magnification				
	4	Binocular tube f 132 for convergent viewing				
	5	Range of pupillary distance : 52-78 mm				
	6	Slit width: 0-12mm or better				
	7	Slit length adjustable in steps0.1 – 14mm				
	8	Slit angle continuous+90 to -90				
	9	Diaphragm Sizes0.2 to 14mm				
	10	Rotation:0-180 degrees				
	11	Light source-Tungsten bulb				
	12	Filters:Cobalt blue, red free, neutral, UV protection				
	13	**Should be CE or ISO approved Product**				
56		**Retino scope**	Each	**2**	**2**	Welch Allyn /Appasamy/ Biomedix/Topcon
	1	Sturdy and Simple in Construction,Compact , Working distance of 50 Cm				
	2	and a +-2.0D				
	3	**Should be CE or ISO approved Product**				
57		**Perimeter**	Each	**1**	**1**	Haag Streit/Appasamy/ /Topcon
	1	Operating Range – 50deg. To 104deg. F (10deg. To 40deg.C)				
	2	Operating Humidity – 35 to 85% (non-conductivity)				
	3	Target Size – Goldmann III Size				
	4	Method of Presentation – Rear Projection LED				
	5	Luminance Range – 0.01 to 1000 Apostilbs (50 to 10dB)				
	6	Number of Stimuli – 133				
	7	Luminance Accuracy - +/- 0.5dB				
	8	Colour – Pale Green				
	9	Duration – 0.2 to 0.5 sec in 0.2 sec increment				
	10	Interval – 0.3 to 4.9 sec in 0.2 sec increment				
	11	Spatial Angle - +/- 70deg. Horizontal, 55/-65 deg. Vertical				
	12	Fixed at – 31.5 Apostilbs				
	13	Luminance Accuracy - +/- 0.5dB				
	14	Electro-optical monitoring of eye position				
	15	HK fixation control				
	16	**Should be CE or ISO approved Product**				
58		**Opthalmic Dr Chair**	Each	**1**	**1**	Appasamy/ Biomedix/Topcon
	1	With full motorized recline facilities				
	2	With full motorized up & down movements for 300mm				
	3	With illuminating soft light for examination				
	4	With controls for ophthalmic chair				
	5	For "up& down" movement tool pedal is also provided as an additional option.				
	6	Back and forward by motorized system				
	7	Height – 7.6"				
	8	Length – after reclining 9.6"				
	9	**Should be CE or ISO approved Product**				
59		**Keratometre**	Each	**1**	**1**	Appasamy/ Biomedix/Topcon
	1	**KERATOMETRY**				
	2	Radius of curvature:5.5 to 10 mm (Increments: 0.01mm)				
	3	Corneal power:33.75 to 61.25 D when cornea equivalent refractive index is 1.3375 (Increments: 0.05D, 0.12D, 0.25D)				
	4	Axis:1° to 180° (Increments: 1°)				
	5	Corneal periphery:Measurement area: 30°				
	6	when radius of curvature is 8mm				
	7	**CORNEAL DIAMETER MEASUREMENT**				
	8	Corneal diameter:2.0 to 16.0 mm (Increments: 0.1mm)				
	9	Retroillumination:Available;				
	10	2 images can be stored in memory				
	11	Built-in printer				
	12	Should work on 230 V,50 Hz				
	13	Power-saving system should be available				
	14	**Acessories,Spare and Consumable**				
	15	Motorized table				
	16	Keratometry model eye (with contact lens holder)				
	17	Printing paper				
	18	Chin rest paper				
	19	Blower brush				
	20	Dust cover				
	21	**Should be CE or ISO approved Product**				
60		**Auto Refractometer**	Each	**1**	**1**	Canon/Nidek/Topcon
	1	**Objective Refraction Mode**				
	2	Sphere -30D to +20D (0.12D/0.25D step)				
	3	Cylinder – 00 – 10D (0.12 /0.25D step)				
	4	Axis 0 – 180 degree in one degree step				
	5	Minimum pupil diameter 2.0 mm				
	6	Target fixation Auto fog				
	7	**Other Parameters**				
	8	IPD measurement range – 35 mm – 85 mm in one mm step				
	9	Measurement start – Manual / Auto start (selectable)				
	10	Display – LCD colour monitor				
	11	Measurement recording – Built in printer (upto 5 measurement of each eye can be stored in memory)				
	12	Vertex distance – 0 mm, 12 mm, 13.75 mm (selectable)				
	13	Energy saving mode – Automatic power saving mode left unused for 5 – 10 minutes				
	14	Mounting table – Motorized, operated with switch				
	15	Portability – should be portable				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	16	**REFRACTOMETRY**				
	17	Sphere (SPH) -30 to +22 D				
	18	when VD=12mm (Increments: 0.12D and 0.25D)				
	19	Cylinder (CYL) 0 to ±10 D (Increments: 0.12D and 0.25D)				
	20	Axis (AX) 1˚ to 180˚ (Increments: 1˚)				
	21	Pupil distance (PD) 0 to 85 mm (Increments: 1mm)				
	22	Vertex distance (VD) 0/12/13.5 mm				
	23	Cylinder form –, +, +/–				
	24	Minimum pupil size2.5mm				
	25	Cylinder form –, +, +/–				
	26	Minimum pupil size2.5mm				
	27	**Should be CE or ISO approved Product**				
61		**Non contact tonomter**	Each	**1**	**1**	Topcon/ Canon
	1	Technical Specification				
	2	Non contact tonomter with pneumatic and with digital display				
	3	Measuring Range: 0 to 30 mm of Hg				
	4	Mode: Auto/Manual				
	5	Working distance : 11 mm				
	6	Measuring time : less than 3 ms				
	7	Fixation target: Internal target,fixed green LED				
	8	Alignment:One light alignment/Focus indicator				
	9	Safety lock:to avoid physical contact with eye				
	10	Hard copy: Thermal printer				
	11	With height adjustement and alignment detector				
	12	Coarse and fine logitudinal transverse and vertical adjustments				
	13	**Should be CE or ISO approved Product**				
		Dental Equipments				
62		**Dental Chair with accessories**	Each	**2**	**3**	Appa dental/ Adent/skan ray
	1	It should be Electrically operated Deluxe Multi programmable Remote controlled Dental Chair,controlled by both Hand & Foot				
	2	It should have Synchroinised movement with moulded seat,with unit consist operating light with two Intensity ,auto water connection for tumbler & ceramic Spittoon,High & Low motorized suction with Imported motor one Airotor,One Micromotor point,(Without motor and hand pieces)2 nos.				
	3	It should have imported Autoclavable 2 Nos .				
	4	It should have 3 way syringes X-ray viewer.				
	5	It should have S.S Instrument Tray with Remote control and Zero stool.				
	6	Product should have ISO or BIS approval				
63		**Dental X Ray**	Each	**1**	**1**	Profi-dental /Appa dental/ Adent/skan ray
	1	Should be a floor stand unit with scissor arm, fiber wheels and locking system				
	2	Should have a counter balanced arm mechanism.				
	3	Should have a X-ray tube current of minimum 4 to 8 mA in steps of 1mA				
	4	Should have X-Ray kv range: 50 to 70 KV selectable in steps of 1kv.				
	5	Should have a constant potential minimum 100Khz high frequency X-ray generator.				
	6	Should have an exposure timer of minimum .04 to 4 sec in steps of 10 m sec				
	7	Focal Spot size should not exceed 0.8 x 0.8 mm.				
	8	Should be compatible for digital radiograph.				
	9	The x ray unit should have option for selecting exposure parameters for Adult & Child.				
	10	X-ray tube head should have swing angulations of at least 290 degree in the vertical plane and 360 degree continuous rotations in the horizontal plane.				
	11	Leakage radiation should be less than 25 mR per hour at 1 meter.				
	12	X-ray tube head should have angle indication.				
	13	Should be supplied with cones.				
	14	Should work on 110-253 Vac/50 Hz - 60 Hz .				
	15	The quoted model and tube should be AERB type approved and relevant copies of the certificate should be attached with the bid.				
	16	Should have safety certificate from a competent authority CE/FDA (US)/STQC CB certificate /STQC S certificate or valid detailed electrical and /functional safety test report from ERTL				
	17	Product should have ISO or BIS approval				
64		**Dental Instruments & Accessories**	Each	**2**	**3**	Appa dental/ Adent/skan ray/: Clinix
		Endodontic motor and hand piece with speed range with Digital Apex locator				
		Hanau articulator with mounting jig and face bow (fully adjustable)-1.				
		Vibrator				
		Hand piece lubrication system				
		Orthodontic welder				
		PORTABLE FLASH AUTOCLAVE				
		ACRYLIZER				
		AMALGAMATOR FOR MIXING DENTAL SILVER AMALGAM				
		MANUAL X-RAY DEVELOPER				
		Brushless Micromotor Engine with Handpiece				
		Laboratory Equipments				
65		**Electric Colorimeter**	Each	**1**	**1**	Systronics/Coleparmer/Ika
	1	Filter : Seven Glass filter				
	2	Photometric Range : 0-100%T(Transmittance) 0- 2.0Abs(Absorbance)				
	3	With digital readout				
	4	Sample Container : Square cuvette 10x10x45(mm) Round cuvette 10(ID),12(OD),105(L)mm				
	5	Works on 230V,50 Hz				
	6	Acessories				
	7	Filter case-1 pc				
	8	Filter-7 Pc				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	9	Analog output cable-1 Pc				
	10	Power cord-1 Pc				
	11	Operation manual -1 copy				
	12	Bulbs-3 nos				
	13	Extra Cuvettes -10 nos				
	14	Should be CE or ISO approved product				
	15	Test and calibration Reports to be provided				
	16	Should be supplied with reagents, calibrator and controls for demonstration and installation				
66		**Semi -Auto analyser Bio Chem**	Each	**1**	**1**	Chemwell /Erba/ Mindray
	1	Should be microprocessor controlled general purpose bi-chromatic photometer system with at least 6 filters/grating system ranging from 340 to 630nm.				
	2	Temperature 37 self monitoring built-in incubation systems for temperature controlled absorbance reading.				
	3	Light source: Tungsten/ halogen or higher grade with 2 (two) additional bulb.				
	4	Should have end point, kinetic and two point kinetic measurement modes.				
	5	Should have flow cell measuring device having capability of measuring with 500 µl or less volume of reaction mixture.				
	6	Should have inbuilt printer.				
	7	Should have a measurement range from 0.001 to 2.500Abs or more				
	8	Should have facility for reading results on LCD display.				
	9	The system should have good repeatability and precision				
	10	Should have quality control – two control/test QC survey of at least 30 points, Levy Jenny plot.				
	11	Should have a filter half bandwidth of 10nm or lesser.				
	12	Should have a test programme memory of 50 or more.				
	13	Should be provided with sample carry over prevention facility.				
	14	Should be supplied with 1 variable (10-100µl) and one fixed volume 500µl pipettes.				
	15	Aspiration should be based on Bellow/Peristaltic Pump/ Vacuum pump.				
	16	Should provide 500 ml of reagents with calibrators for urea, Serum creatinine, Serum bilirubin, Plasma Glucose, Cholesterol, and Quality control 5ml one each for normal and abnormal for installation and demonstration. Should be supplied as and when required by users.				
	17	Should submit cost per ml of all reagents and consumables				
	18	Should be supplied with on line pure sine wave UPS of sufficient capacity for a minimum back of 30 minutes.				
	19	Should be provided with calibration certificate issued by the manufacturer at the time of installation and calibration certificate should be issued for the machine by the supplier during preventive maintenance visit in the warranty/AMC period if demanded by the end user.				
	20	Should have safety certificate from a competent authority CE / FDA (US) / STQC				
	21	CB certificate / STQC S certificate or valid detailed electrical and functional safety test report from ERTL. Copy of the certificate / test report shall be produced along with the technical bid.				
67		**Micro pipettes of different volumes (set of 10 pipettes)**	Each	**1**	**1**	Eppendorf/Thermofisher/Borosil
	1	Pipettors				
	2	Calibration / opening tool				
	3	Grease				
	4	Instructions for use				
	5	Pippetor holder				
	6	Tip				
	7	Identification stickers				
	8	Caps for colour coding				
	9	Filters (pipettors less than 10 micro litre)				
	10	Pipettes of following volumes – 5, 10, 20, 25, 50, 100 micro litres (Variation 1 channel +/- 0.3, +/- 0.4, +/- 0.8 and +/- 1.5)				
	11	Pipettes of following volumes – 200, 250, 500, 1000, 2000 and 5000 micro litres (Variation 1 channel +/- 2, +/- 5, +/- 10, +/- 20, +/- 50)				
	12	For multi-channel pipettes – 10 micro litre +/- 0.6 micro litre				
	13	For multi-channel pipettes – 250 micro litre +/- 4.0 micro litre				
68		**Shaker Water bath**	Each	**1**	**1**	Tanco /Remi/Cole parmer
		Technical Specification				
	1	Double Wall, both outer and Inner chamber are Stainless steel with insulation between outer and inner chambers.				
	2	Special type of transparent PP/PVC/acrylic cover in the shape of inverted V to avoid evaporation of water and draining of condensed water back into water bath.				
	3	Shaking speed (Approximately): 25 to 200 strokes/min.				
	4	Temperature Range: from Ambient to 100 $^{\circ}$C with accuracy of ± 1 $^{\circ}$C				
	5	Thermostatically controlled with Regulator.				
	6	Mercury thermometer must be provided				
	7	Digital temperature indicator cum Regulator				
	8	Removable stainless steel tray with the following capacities (Approximately) must be provided.				
	9	1.100 ml x 10-12 flask				
	10	2.250 ml x 4 - 6 flask				
	11	3.500 ml x 2 - 4 flask				
	12	4. Test tube racks.				
	13	Should work on 230 V,50 Hz				
69		**Hot Air oven**	Each	**1**	**1**	Tanco/Remi/Cole parmer
	1	Double Walled, inner wall made of aluminum and outer wall Mild Steel sheet.				
	2	Shelves: 3 to 5 stainless steel, perforated shelves, could be adjusted at any levels.				
	3	Heating Elements: placed at the bottom and sides.				
	4	Temperature control: Thermostatic control from 40 to 250 o C with Regulator and digital temperature-indicator.				
	5	Automatic timer 0 - 60 minutes.				
	6	Air circulating fan.				
	7	Volume : 50 L				
	8	**Standard,Safety and Training**				
	9	The manufacturer should have ISO certification.				
	10	**Documentation**				
	11	User Manual in english				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	12	Service Manual in english				
70		**Lab Incubator**	Each	**1**	**1**	thermo fisher heratherm/memmert/ NSW/ EPPENDORF
	1	**Technical Specification**				
	2	Capacity: 120 L				
	3	Interior chamber: SS 316 for easy cleaning and decontamination				
	4	Timer: 1 min. to 100 hours and hold position				
	5	Minimum turbulence and no cross contamination				
	6	Adjustable safety thermostat for temp setting at 1 deg C increment				
	7	Temp Accuracy : +/-1%				
	8	Internal glass door for the observation				
	9	With minimum two adjustable shelfs				
	10	Audiovisual Alarm to Indicate when temperature deviates more than 1°C from setpoint, and when program or time has finished. Equipment should have provision to mute the alarm.				
	11	Peltier heating with continuous air circulation and Heating by natural/forced convection for homogenous temperature distribution				
	12	Temperature range: +5° C to **60°C**				
	13	There should be a Membrane Keypad with LCD/LED Display to set and display operating parameters, current status, running time and alarm conditions for time and temperature.				
	14	The Equipment should have Interior lighting facility, and insulated door fitted with heavy hinges				
	15	Power Supply:230V,50 Hz				
	16	**System Configuration Accessories, spares and consumables**				
	17	Incubator as per specification				
	18	All consumables required for installation and standardization of system should be provided free of cost				
	19	Should be supplied with all the accessories required for the functioning of the equipment.				
	20	Power Cord				
	21	**Standard,Safety and Training**				
	22	The manufacturer should have ISO certification.				
	23	**Documentation**				
	24	User Manual in english				
	25	Service Manual in english				
71		**Hot plates**	Each	**1**	**1**	Tanco/Tarson/Remi
		Technical Specification				
	1	Dimensions (mm) (approximately) : 445x110x395				
	2	Glass ceramic area(mm) : 430x280				
	3	Heated zone (mm) : 165 and 145 x145				
	4	Stirrer : Inbuilt Stirring facility				
	5	Min/max speed (MIN) : 100/1000				
	6	Temperature control : Right heating arc, each temp sensor between 35 and 199ºc				
72		**Rotor / Shaker**	Each	**1**	**1**	Tanco/Remi OR EQUIVALENT
		Technical Specification				
	1	Double Wall, both outer and Inner chamber are Stainless steel with insulation between outer and inner chambers.				
	2	Special type of transparent PP/PVC/acrylic cover in the shape of inverted V to avoid evaporation of water and draining of condensed water back into water bath.				
	3	Shaking speed (Approximately): 25 to 200 strokes/min.				
	4	Temperature Range: from Ambient to 100 ^{o} C				
	5	Thermostatically controlled with Regulator.				
	6	Mercury thermometer must be provided				
	7	Digital temperature indicator cum Regulator				
	8	Removable stainless steel tray with the following capacities (Approximately) must be provided.				
	9	1.100 ml x 10-12 flask				
	10	2.250 ml x 4 - 6 flask				
	11	3.500 ml x 2 - 4 flask				
	12	4. Test tube racks.				
	13	Should work on 230 V,50 Hz				
73		**Counting chamber**	Each	**2**	**2**	Rotherm/ Tanco OR EQUIVALENT
	1	TCDC count will be performed by Haematology Auto analyzer. However, in the event of failure of the machine, the same should be performed manually with a neubeaur counting chamber which should have very thin marking on the glass (visible only under microscope)				
	2	The small marking shall be for RBC and the big markings for WBC counting				
	3	Weber Bright Line Counting Chamber				
74		**Paediatric Glucometer**	Each	**1**	**1**	J&J/Bayer/Roche
	1	Should be digital, battery operated				
	2	Code strips should be easily available				
	3	Should operate at room temperature				
	4	Package should come with disposable sterile lancet				
	5	Should give results within 1 minute				
	6	Should be able to store data for at least last 3 tests				
	7	Should come with CE marking				
75		**Glucometer**	Each	**2**	**3**	J&J/Bayer/Roche
	1	Should be digital, battery operated				
	2	Code strips should be easily available				
	3	Should operate at room temperature				
	4	Package should come with disposable sterile lancet				
	5	Should give results within 1 minute				
	6	Should be able to store data for at least last 3 tests				
	7	Should come with CE marking				
76		**Haemoglobinometer**	Each	**1**	**1**	Haemocontrol
	1	Should be digital, battery operated				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	2	Code strips should be easily available				
	3	Should operate at room temperature				
	4	Package should come with disposable sterile lancet				
	5	Should give results within 2-3 minutes				
	6	Should not be affected by haemoglobin variation				
	7	Cartridge should be self-contained				
	8	Should be able to store data for at least last 3 tests				
	9	Should be NGSP certified				
	10	Should come with CE marking				
	11	Accessories free of cost:				
	12	1.Micro Pipette - 2.5 ml : 1 No.				
	13	2..Lancing device - 1 Unit				
	14	3 Lancettes : 25 Nos				
	15	4. 1-heme cuvettes with rubber cap				
77		**Automated Microtome**	Each	**1**	**1**	Leica/Microm/Thermoshandon
	1	Fully automated motorized rotary microtome along with manual operation having microprocessor controlled panel with provision for motorized cutting via operating panel or foot pedal control.				
	2	Precise micrometer feed system via stepper motor permits precision sectioning selectable at least from 2.0-40/60 micron in 0.5 micron increments.				
	3	Trimming section selectable from 2 micron onwards.				
	4	The vertical specimen stroke length of 70mm, larger specimen can be sectioned. The specimen holder should be clamp type and hold 60mm size block.				
	5	Suitable knife holder for high profile and low profile should be provided.				
	6	The specimen retraction should occur on return stroke.				
	7	Knife angle position locking facility should be provided.				
	8	Cold light source.				
	9	Precise specimen orientation with zero point indication, with an orientation 6º X-Y axis helps in marking perfect orientation of the sample for sectioning.				
	10	Motorised coarse feed in two speeds 30 micron/sec and 90 micron/sec. Variable sectioning speed adjustable from 0.5 to 420 mm/sec.				
	11	Disposable blade holder with lateral displacement feature that can hold both high and low profile blades and knife holder which can accommodate 16 cm C&D type knifes.				
	12	Knife holder should be vibration free.				
	13	Integrated section waste tray.				
	14	**Accessories**				
	15	Microtome disposable blades (high profile coated) - 1 packets (50 blades/pack).				
	16	Microtome disposable blades (low profile coated) - 1packets (50 blades/pack).				
	17	C type knife 16 cm - 1 Nos				
	18	Cold plate (Dry type)				
78		**Elisa Reader cum washer**	Each	**1**	**1**	Biorad/Thermo/Eppendorf/
		Technical Specifications				
	1	Optical system				
	2	Digital light control				
	3	8 measurement channels including 1 reference.				
	4	Single and dual wavelength measurement with facility for kinetic measurement				
	5	8 s maximum measurement time for single and dual wavelength and 5 s(+/_1Sec.) for kinetic				
	6	Measurement Range 400-700nm				
	7	Indication Range 0-2.999 abs				
	8	Accuracy Plus/Minus 2% or Plus/Minus 0.005 abs				
	9	Resolution 0.001 abs				
	10	Inbuilt Filters: Narrow band interference				
	11	Should have the following filters – 405, 450, 492(+/_2nm), 540, 620 (+/-10nm) and 690 nm				
	12	Should measure end point, curves and kinetic.				
	13	SOFTWARE:				
	14	Storage of immediately preceding measurement At least 15 user programmable tests permanently stored				
	15	Time programmable between each measurement. Agitation programmable before each reading				
	16	Bidirectional printer interface.				
	17	Data memory not less than 300 plates/curves				
	18	Built in Windows based software programming software.				
	19	MEASUREMENT MODES				
	20	Plate shaking mode for sample mixing selectable speed and time)				
	21	Flexible blank mode setting				
	22	Matrix Modes: Matrix -/x/t, Matrix-/0-0 (Range),				
	23	Matrix-/f/(Floating cut off)				
	24	Difference Mode: Absorbance of each well in even numbered subtracted from those of odd numbered columns				
	25	Curve fit Modes: LIN/LIN.LIN/LOG.LOG/LOG or auto curve transformation with ability to add the standard curve; 8 to 12 way string orientation or kinetic modes				
	26	Table of optical densities, Delta DD, Graphic, Reaction rate/V-Max				
	27	Adjustable for different micro plate geometrics				
	28	Halogen Lamp 20 - 40 W.				
	29	16 digit alphanumeric fluorescent display				
	30	Membrane keyboard.				
79		**Electrolyte Analyser**	Each	**1**	**1**	Roche/Nova/Siemens
		System should measure Na, K and Ca, Li.				
		Facility for auto sampler tray for constant loading. Sample can be fed by capillary syringe or sample tube directly				
		Sample volume should be less than 100 micro-liters.				
		Auto Calibration Facility and provision for economy mode.				
		Quality control facility				
		Facility of flagging of abnormal results and user programmable ranges.				
		Stand by mode: user controlled and automatically controlled				
		Memory for last 100 messages.				
		Built in printer for printing the data.				
		RS.232.C (standard serial port) should be available				
		ISE Analyser-01				
		Na, K, Ca, , Li, Electrodes- 02 each (1 standard and 1 spare				
		Should be provided with reagents and consumables for 300 tests				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
80		**Glycosylated Haemoglobinometer**	Each	**1**	**1**	Biorad/J&J/ Roche/ERBA
	a	Fully automatic				
	b	User Friendly, easy to use				
	c	Multiple sample accommodation in primary tubes and sample vials. Whole blood primary tube sampling				
	d	Facility of result display with chromatogram in a printed format				
	e	Minimum interference from other labile HbA1C, Lipemic samples, other haemoglobin				
	f	variants				
	g	With Bar Code Facility.				
	h	With LCD Display.				
	i	With Built in printer.				
	j	With Data Storage facility.				
	k	With Service port for connectivity				
	l	With Suitable UPS for ½ hr capacity.				
	m	Consumables and specific reagents worth of 300 tests to be provided as per the requisition of the end user.				
81		**Haematology Analyser**	Each	**1**	**1**	Sysmex /CPC Diagnostics / XP 100/ Siemens / roche
	1	Should be a fully automated haematology analyser providing 18 parameters including a 3-part differential, with user definable settings to have either RDW-CV or RDW-SD.				
	2	The system should be capable of processing samples at a speed of 60 samples/hour.				
	3	The system should have large LCD display to have a review of all the results along with the three histograms of WBC, RBC and PLT on the screen.				
	4	The system should have around 200 samples test result memory.				
	5	The system should have auto probe wiper to clean the sample probe automatically after sample aspiration.				
	6	The system should use non cyanide based reagent for Hgb estimation.				
	7	The system should have an option to print the results with or without histograms, also with the option to print only basic 8 parameters.				
	8	System should have world reference" Electrical Impedence" method of cell counting for the reliability of the results, with an integrated temperature sensor for monitoring and compensating for shifts in room temperature.				
	9	The system should use the proven and approved "volumetric metering" system of cell counting, for WBC's , RBC's and PLT's for high precision of the results and stability of the calibration.				
	10	The system should have a system of count and aperture monitoring every 0.5sec for precision and reliability of the counts.				
	11	The system should be rotary valve ways for the precise sample alliquoting for dilutions.				
	12	The system should have automatic floating thresholds for the correct separation of WBC's, RBC's and PLT's.				
	13	The system should also have additional facility for manual discrimination in order to process veterinary samples.				
	14	The system should give the differential count as lymphocytes, mid population and neutrophils. While mid population should include eosinophils, basophils and monocytes.				
	15	System should not require any daily maintenance except automatic daily shut down.				
	16	The system should automatically give an alarm to the operator for doing the maintenance.				
	17	The system should use high intensity LED for Hgb estimation and not the lamp.				
	18	The system should have a low cost per test. All reagents required should be available locally from the company or its authorised distributor.				
	19	The company should have an original external software for the system to be provided.				
	20	Lastly and most importantly the manufacturer of the system should have a worldwide reputation for high quality and reliable systems and the Indian distributor should have a wide network of trained technical, service and application support persons.				
	21	Consumables and specific reagents worth of 3000 tests to be provided as per the requisition of the end user.				
82		**Laboratory Autoclaves**	Each	**2**	**2**	Natsteel/Yorco/Reico
	1	**Technical Specification**				
	1.1	Stand-alone bench top autoclave 20 Litres, automatic .Single door, self sealing with high-quality silicone gasket				
	1.2	Dimension should match to suit the voume of autoclave				
	1.3	The autoclave should have double wall sheet metal with suitable insulation in between walls.				
	1.4	Pre-set automatic cycles for unwrapped instruments, wrapped instruments/packs				
	1.6	Two automatic programmes, approx: 2.2 bar at 134 degree C and 1.1 bar at 121degree C.				
	1.7	The equipment should have automatic pressure control switch /automatic water control device to ensure that the equipment does not run dry.				
	1.8	System should have digital display for Temperature and Time.System should have analogue display for Pressure.				
	1.9	System should have audio visual alrm for low water level,and other system errors.				
	1. 10	Fit with 5 L water reservoir, automatic fill, autonomy for at least 10 cycles				
	1.11	Should be with 3 removable shelves				
	1.12	Should have Double safety door locking device				
	1.13	Should have safety feature protection against over-pressure and over-temperature				
	1.14	Audible and visual alert upon cycle interruption or completion				
	1.15	Unwrapped cycle time: cold 30 min, hot 20 min				
	1.16	Control panel with alpha-numerical display and cycle indicators				
	1.17	Should be complete with 3 instruments trays				
	1.18	Power Supply:230V,50 Hz				
	1.19	Power consumption: 3000 W(Approx)				
	2	**System Configuration Accessories, spares and consumables**				
	2.1	Autoclave-20L				
	2.2	1 x set of 3 matching instrument baskets				
	2.3	1 x set of 3 matching sterilizing drums				
	2.4	1 x roll of sterilization indicator				
	3	**Standard,Safety and Training**				
	3.1	The manufacturer should have ISO certification.				
	3.2	Equipment should have CE/BIS certification				
	4	**Documentation**				
	4.1	User Manual in english				
	4.2	Service Manual in english				
	4.3	Certificate of calibration and inspection from factory.				
83		**Ordinary Refrigerator**	Each	**2**	**4**	Samsung/Godrej/LG
	1	**Microprocessor Control:**				
	a	Microprocessor temperature control, digital temperature display, fan cooling air circulation, the temperature fluctuation inside cabinet + - 2^{o}C, the inside temperature will be kept between 2^{o}C to 8^{o}C				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	b	The freezer temperature should not be less than (-)18°C (minus 18°C)				
	c	With perfect visual and audible alarm system with sound buzzer and flashing alarm functions of over temperature alarm, under voltage alarm, sensor failure alarm, door open alarm etc.				
	d	Alarm silence, ring back and automatic reset function.				
	e	In build battery back up ensures control panel function during power failure.				
	f	In built voltage stabilizer ensure stable voltage ranging from Single phase 50Hz 150 Volt A.C to 250 Volt A.C but to be steady at 230 Volt 50 Hz A.C				
	2	**Refrigeration System**				
	a	Provide heavy duty, industrial-grade, hermetically sealed compressors.				
	b	Automatic defrost for optimum cooling capacity				
	c	Automatic condensate removal, no drain lines required.				
	d	Refrigerant may be used with Freon 134 (tetrafluoroethane)				
	e	Positive forced air circulation maintains temperature uniformity at all selves.				
	f	Directional air flow assures quick recovery after door opening.				
84		**Floatation Bath**	Each	**2**	**2**	Yorco/ Embee
		To be used for tissue culture , fermentation of tissue and processing				
		should be able to process wrinkle free specimen				
		should have round double walled single piece inner and outer chamber made of aluminium				
		rim should be wide enough to dry the wet slides				
		should have a capillary thermostat from ambient to 70 degree centi grade with accuracy of +- 2 degree celcius				
85		**Class – I Bio Safety Cabinet**	Each	**1**	**2**	Clean Air/ESCO/yorco
	1	**Operational Requirements**				
	1.1	Laminar Air Flow system with HEPA Filters is required.				
	2	**Technical Specifications**				
	2.1	Direction of flow of air should be horizontal.				
	2.2	HEPA Filter with Retention 0.22 Micron and Efficiency 99.97 with Ultra clean glass fiber paper having Epoxy coated CRCA frame casing with finely corrugated aluminum foils separators.				
	2.3	PRE Filter with Synthetic, non-woven polyester fibers having Casing of Enamel painted CRCA frame with Retention of 10 - 15 Micron and 90 % Efficiency.				
	2.4	Material of construction: Basic cabinet of complete CRCA sheet metal construction with powder-coated finish.				
	2.5	Working area should be 24 cu. ft 4ftX2ftX3ft with maximum variation of 6 inches with stainless steel platform.				
	2.6	Blower Assembly: DIDW type blower system with high RPM motor with variable speed, enclosed in a powder coated MS casing suitably suspended & connected to the filter chamber through flexible canvas duct.				
	2.7	Front Windows Acrylic, fixed by clamps.				
	2.8	Illumination with Fluorescent tubes with diffusers & 2 UV lamps.				
	2.9	Should be provided with the pressure gauge, control panel & gas burner inside				
	3	**System Configuration Accessories, spares and consumables**				
	3.1	Spare HEPA Filters and PRE Filters- 1 SET each				
	4	**Standards, Safety and Training**				
	4.1	Should be CE/BIS approved product.				
	4.2	Manufacturer should have ISO certification for quality standards.				
	5	**Documentation**				
	5.1	User/Technical/Maintenance manuals to be supplied in English.				
	5.2	Certificate of calibration and inspection.				
86		**Cyto Spin**	Each	**1**	**1**	Remi / Yorco
		Microcentrifufge with speed of 5000 rpm and RCF of 3900				
		24 X 1.5 ml angle head along with timer				
		Endoscopy Equipments				
87		**Endoscope (OGD)**	Each	**1**	**1**	Olympus/Pentax/Fujinon/Karlstorz
		Operational Requirements				
		COMPRISING OF 1. VIDEO ENDOSCOPE 2. VIDEO PROCESSOR WITH LIGHT SOURCE 3. FLAT PANEL (LCD) MONITOR 4. DIATHERMY COMPATIBLE WITH THE VIDEOSCOPE. 5. ENDOSCOPE STERILIZING SYSTEM.				
		Technical Specification				
		VIDEO UPPER GI SCOPE (DIAGNOSTIC)				
		a) Field of view 140 degree				
		b) Direction of view Forward viewing				
		c) Depth of field 2 to 100mm				
		d) Total length - 1340 to 1365mm				
		e) Working length more than 1000mm				
		f) Insertion tube outer diameter 9.8mm				
		g) Distal end diameter 9.8 to 10.3mm				
		h) Bending section tip deflection				
		i. Up – 210 degrees,				
		ii. Down – 90 to 120 degrees				
		iii. Left - 100 to 120 degrees				
		iv. Right – 100 to 120degrees				
		i) Instrument channel - Diameter – 2.8 to 3mm				
		UPPER GI SCOPE (THERAPEUTIC)				
		a) Field of view 140 degree				
		b) Direction of view Forward viewing				
		c) Depth of field 2 to 100mm				
		d) Total length - 1340 to 1365mm				
		e) Working length more than 1000mm				
		f) Insertion tube outer diameter 11 to 12mm				
		g) Distal end diameter 11 to 12mm				
		h) Bending section tip deflection				
		i. Up – 210 degrees				
		ii. Down – 90 to 120 degrees				
		iii. Left - 100 to 120 degrees				
		iv. Right – 100 to 120degrees				
		i) Instrument channel - Diameter – more than 3.5mm				
		VIDEO DUODENOSCOPE				
		a) Field of view 100 degree				
		b) Direction of view Side viewing (Retro 5 to 10 degrees)				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
		c) Depth of field 4 to 65mm				
		d) Total length - 1500 to 1600mm				
		e) Working length more than 1230mm				
		f) Insertion tube outer diameter 11.5 to 12.5mm				
		g) Distal end diameter 13 to 13.5mm				
		h) Bending section tip deflection				
		i. Up – 120 degrees,				
		ii. Down – 90 degrees				
		iii. Left - 90 degrees				
		iv. Right – 100 to 110degrees				
		i) Instrument channel - Diameter – more than 4mm				
		VIDEO COLONOSCOPE (SINGLE CHANNEL)				
		a) Field of view 140 degree				
		b) 2.Direction of view Forward viewing				
		c) 3.Depth of field 2 to 100mm				
		d) 4.Total length - 1600mm to 2000mm				
		e) 5.Working length more than 1300 mm to 1700mm				
		f) 6.Insertion tube outer diameter 11.5 to 13mm				
		g) 7.Distal end diameter 11.5 to 13mm				
		h) 8.Bending section tip deflection				
		i. Up – 180 degrees				
		ii. Down –180 degrees				
		iii. Left - 160 degrees				
		iv. Right – 160 degrees				
		i) Instrument channel - Diameter – more than 3.6mm				
		VIDEO COLONOSCOPE (TWO CHANNEL)				
		a) Field of view 140 degree				
		b) 2.Direction of view Forward viewing				
		c) 3.Depth of field 2 to 100mm				
		d) 4.Total length - 1600mm to 2100mm				
		e) 5.Working length more than 1300 mm to 1750mm				
		f) 6.Insertion tube outer diameter 12 to 13mm				
		g) 7.Distal end diameter 13 to 14mm				
		h) 8.Bending section tip deflection				
		i. Up – 180 degrees				
		ii. Down –180 degrees				
		iii. Left - 160 degrees				
		iv. Right – 160 degrees				
		i) Instrument channels - Diameter – First channel more than 3.6mm/ second channel more than 2.6mm.				
		VIDEO PROCESSOR WITH LIGHT SOURCE COMPATIBLE WITH THE ABOVE MENTIONED VIDEOSCOPE.				
		a) Colour system single CCD Colour.				
		b) Xenon lamp 100 – 300 W				
		c) Out put for high video image transfer				
		d) Convenient digital to digital recording of both still and moving images.				
		e) Picture and picture display for any combination of endoscopic images.				
		f) Convenient index display for documentation.				
		g) Scope ID function for endoscopy suite management.				
		h) External devices controls				
		i) 1 printer control connector, 2 external device control connectors.				
		j) Power supply : 220 – 240V AC				
		k) Should include Air feeding & water feeding system with detachable water container.				
		HIGH DEFINITION LCD COLOUR MONITOR (FLAT PANEL)				
		a) Full digital High Definition TV compatible high resolution LCD monitor				
		b) LCD Screen 19 or more inches in size				
		c) Power supply 220 – 240 V AC				
		d) Computer connector				
88		**Laparoscope operating major with accessories**	**Each**	**1**	**1**	Karlsorz/Stryker/ Olympus
		High Definition Laparoscopy System				
		a) High Definition Three Chip Camera System				
		b) Camera console 220 v with universal coupler & Autoclavable camera head				
		c) Pure Digital signal with high definition video(1280*1024 native resolution)				
		d) Resolution-2000 horizontal lines				
		e) 8 specialty settings				
		f) Integrated Flexible Scope filter				
		g) Signal to Noise ratio-70 db				
		h) Progressive scan technology both on camera head & console				
		i) Brightness Control on console & camera head				
		j) Aperture Control on console				
		k) Inbuilt 16 step digital Image Enhancer on console				
		l) Digital zoom & white balance on camera head				
		m) Integrated Gain/shutter/Enhancement with brightness control				
		n) Two peripheral control on camera head				
		Video Output				
		a) 2 DVI output				
		b) 2 SVHS & 1 RGB out put				
		c) One Composite out put				
		Automatic Light source				
		a) 220 V,300 W. Xenon Bulb(with one spare bulb)				
		b) Elliptical Bulb technology				
		c) Bulb Working life 5800hrs				
		d) Digital Bulb life counter on light source				
		e) Automatic /Manual Light Adjustment				
		f) Stand By Mode				
		g) Universal Jaw Assembly to adapt any make of fiber optic cable without adapter.				
		Fiber optic Cable				
		a) 6.5mm*7.5 feet Snap Fit cable				
		Monitor				
		a) 19'' Flat Panel Monitor Colour				
		Insufflator				
		a) 40Liter of high flow				
		b) Microprocessor controlled unit				
		c) Soft Approach Pressure control for safe recovery of abdominal pressure				
		d) Gas heating				
		e) LCD based central display monitor with multilingual text & graphics				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
		f) AV warning signal				
		Suction irrigation apparatus for Laparoscopic surgery				
		Laparoscopes, Fully Autoclavable with working length 300mm				
		a) Wide angled distortion free view				
		b) Universal adaptor for other light sources				
		c) Yellow Glass index for optimum evenness of focus & contrast				
		d) 0 degree, 10mm				
		e) 30 degree, 10 mm				
		f) 0 degree , 5mm				
		g) Flexible video telescope				
		Specifications				
		a) Laparoscopic hand instruments (reusable) with 310mm working length, take apart locking / unlocking mechanism, rotable with interchangeable handle with monoploar diathermy attachment (Except trocars and veress needle)				
		b) veress needle 12 cm length 4				
		c) Veress needle 15 cm length 4				
		d) Carbon-di-oxide gas tubing 4				
		e) Trocars sleeves 11 mm 4				
		f) Reducer 11/5 mm 2				
		g) Trocars sleeves 5.5 mm 4				
		h) Trocars (pyramidal tip) 10 mm 4				
		i) Trocars (pyramidal tip) 5 mm 4				
		j) Trocars washer 5 mm 100				
		k) Trocars washer mm 50				
		l) Laproscopic biopsy forceps 5 mm, 2				
		m) Maryland dissector 5mm with unipolar diathermy 2				
		n) Maryland dissector 5mm, high performance with bipolar				
		o) Cutting 2				
		p) Atraumatic graspers, 5mm 2				
		q) Metzenbaum scissors (5cm) with unipolar diathermy 2				
		r) Metzenbaum scissors (5cm) high performance with bipolar 2				
		s) cutting				
		t) Fan retractors 5 mm 2				
		u) Laproscopic cautery lead 4				
		v) Suction irrigation device with two way valve 2				
		w) L shaped hook electrode 5mm				
		x) L shaped hook 5mm , high performance with bipolar cutting2				
		y) Laproscopic bowel grasper 5mm, length 33-36 cm 2				
		z) Laproscopic spoon forceps 10mm length 33- 36 cm2				
		aa) Needle holder 5mm, 33 cm long 4				
		bb) Laproscopic suction cannuala, 10 mm 2				
		cc) Laparoscopic suction cannula 5 mm 2				
		dd) Clip applicator 10 mm Large, Medium, Small Clips				
		ee) Gall bladder extraction 5mm Large, Medium, Small Clips				
		ff) Hassan cannula				
		gg) Lap				
		hh) Eondotrainer				
		ii) Port closure needle				
		jj) Sterilization tray with cover 3 x 1				
		Medical Gas system				
89		**Medical Gas system**	Each	1	1	BOC/Praxair/MDD/NSP/ BS Medical/ Medigas
	1	**Fully Automatic Oxygen Control Panel (Indigenious)**				
		Design, Supply, installation and commissioning of centralized medical gas pipeline system (MGPS): Flow designing, selection of copper pipping and installation and commissioning of the system should be done as per HTM 20-22 system				
	1.1	The manifold control panel will have following features:				
	1.2	The panel will be enclosed in a metal cabinet with a hinged front cover. The panel – cover will be fitted with a lock to prevent unauthorized access and can be swung open for maintenance. Will have fully automatic changeover operation and requiring no manual action. Gas changeover system will be electro-pneumatically operated, in the event of electrical Tenderer failure gas supply will not be interrupted.				
	1.3	A visual indication of the state of the manifold will be provided by 3 gauges within the control panel which are clearly visible through the transparent cover. These gauges are provided to indicate the pressure of the right and left-hand banks, and the supply pressure from the control panel to the distribution system. The panel will be supplied with sensing facilities to provide visual signals and other ancillary services.				
	1.4	In addition the panel will be fitted with audio alarm indication for changeover of empty cylinder bank to filled cylinder bank and vice versa.				
	1.5	The automatic gas manifold control includes:				
	1.6	Two supply pressure gauges, One delivery pressure gauge				
	1.7	Pressure reduction in primary side by two stage incorporating two regulators				
	1.8	Line pressure regulators with bypass valve to facilitate easy maintenance				
	1.9	One line pressure relief valve				
	1.10	Instruction for changing the cylinders clearly identified on the front of the control cabinet				
	1.11	Rated capacity (Delivery) to suit hospital's requirement				
	2	**Oxygen Manifold (Indigenious)**				
	2.1	To provide one Oxygen manifold extendable type size 2x10 for bulk oxygen cylinders, Manifold will be suitable to withstand a working pressure of 140 Kg / cm2 and Will be Tested after Installation at 140 Kg/cm2 oxygen cylinder pressure. Manifold will also have high pressure copper annealed tail pipes with one end having Brass adaptor suitable for oxygen cylinders and other end suitable for Manifold Non-Return Valves. Manifold will also have 20 brass non-return valves for individual oxygen cylinder. Manifold middle frame of 2x10 size will be made with circumferential mild steel flat duly powder coated with black colour & along with chain for individual bulk O2 cylinder.				
	2.2	Oxygen Emergency Cylinder System. – Indigenous				
	2.3	To provide 4+4 cylinder emergency system with high flow Pressure Regulators, pig tail pipes, manifold of 4+4 cylinders with Top & middle frame for Oxygen.				
	2.4	Surface type front Loading Gas Outlets (BS Type) for O2, N2O, C Air & Vacuum				

Sd/- Dr. B. R. Satpathi 21.12.2013
Director of Health Services
Govt. of West Bengal

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	2.5	The medical gas terminal unit will be in accordance to HTM 2022 Standards. The wall mounted first fix assembly will consist of brass pipeline termination block with copper stub pipe permanently secured between a back plate and a gas specific plate which allows limited radial movement of the copper stub to align with the pipeline. The first fix will incorporate a maintenance valve (except for vacuum) and a test plug. The test plug provides an effective blank to enable carcass pressure testing. The second fix plastic components will be moulded from fire retardant polycarbonate with the pin index permanently moulded into the gas specific socket. The socket assembly retains a capsule assembly, a sealed containing the check valve and probe 'O' ring seal. This replaceable capsule assembly enables all working parts subject to wear and tear through usage to be replaced as a factory tested assembly, thereby reducing maintenance time. Medical gas terminal units will accommodate a variable plaster depth up to a maximum of 16mm.				
	2.6	Terminal units will be gas specific and only accept the correct medical gas probe. Gas specific components will be pin-indexed to ensure that a correct gas specific assembly is achieved so that in normal course of dismantling for repair or maintenance, parts from other gases cannot inadvertently be used. Wall mounted terminal units will incorporate an anti-rotation pin to engage with connected downstream medical equipment ensuring correct orientation.				
	2.7	Terminal units installed in booms or pendants will be attached to their respective flexible gas hose by a gas specific NIST fitting and anti-rotation pins will not be fitted. Terminal Units located in a rigid installation will be capable of single-handed insertion and removal of the correct medical gas probe.				
	2.8	The terminal units will have two years warranty from manufacturer, subject to the recommended minimum routine maintenance operations being carried out by correctly competent persons.				
	2.9	For aesthetic appeal each outlet will include a one piece ivory trim plate. The trim plate will be constructed of high impact, flame retardant Cycoloy.				
	2.10	The wall outlet can accommodate various finished wall thickness from 3/8" (10mm) to 1-1/4" (32mm).				
	2.11	Equipment is manufactured in USA and produced in an ISO 13485 registered facility.				
	2.12	Cycoloy is a registered trademark of GE Plastics.				
	2.13	**FEATURES:**				
	2.14	Accepts Ohmeda Diamond Gas Specific Adapters. Pin indexed to prevent interchangeability of gas services.				
	2.15	Each outlet is cleaned for medical gas service and pressure tested.				
	2.16	Less than 3 psi (21KPa) pressure drop through the outlet @ 120 1/min and 50 psig (345KPa) inlet pressure.				
	2.17	Inlet pipe can be swiveled 360 degrees for ease of installation.				
	2.18	Gas specific back bodies can accept either Quick connect or DISS front identification bodies.				
	2.19	Outlet can be adjusted up to 1 1/4" (32mm) wall thickness.				
	3	**Oxygen Flow meter & Humidifier Bottle(Indigenious)**				
	3.1	Back Pressure Compensated Flow meter will be of accurate gas flow measurement and control within a range of 0-13 litres per minute for use in a variety of respiratory therapy gas delivery system. The flow tube and shroud components will be made of good quality plastic. It Will be supplied with plastic transparent reusable humidifier bottle.				
	3.2	**High pressure tube for O2, N2O, Compressed Air & Vacuum, (Indigenious)**				
	4	**N2O System (Indigenious)**				
	4.1	Fully Automatic N2O Control Panel				
	4.2	The manifold control panel will have following features:				
	4.3	The panel will be enclosed in a metal cabinet with a hinged front cover. The panel – cover will be fitted with a lock to prevent unauthorized access and can be swung open for maintenance. Will have fully automatic changeover operation and requiring no manual action. Gas changeover system will be electro-pneumatically operated, in the event of electrical				
	4.4	A visual indication of the state of the manifold will be provided by 3 gauges within the control panel which are clearly visible through the transparent cover. These gauges are provided to indicate the pressure of the right and left-hand banks, and the supply pressure from the control panel to the distribution system. The panel will be supplied with sensing facilities to provide visual signals and other ancillary services.				
	4.5	In addition the panel will be fitted with audio alarm indication for changeover of empty cylinder bank to filled cylinder bank and vice versa.				
	4.6	The automatic gas manifold control includes:				
	4.7	Two supply pressure gauges, One delivery pressure gauge				
	4.8	Pressure reduction in primary side by two stage incorporating two regulators				
	4.9	Line pressure regulators with bypass valve to facilitate easy maintenance				
	4.10	One line pressure relief valve				
	4.11	Instruction for changing the cylinders clearly identified on the front of the control cabinet				
	4.12	Rated capacity (Delivery) to suit hospital's requirement				
	5	**Nitrous Oxide Manifold (Indigenious)**				
	5.1	To provide one N2O manifold extendable type size 4x4 for bulk N2O cylinders, Manifold will be suitable to withstand a working pressure of 140 Kg / cm2 and Will be Tested after Installation at 140 Kg/cm2 oxygen cylinder pressure. Manifold will also have high pressure copper annealed tail pipes with one end having Brass adaptor suitable for oxygen cylinders and N2O other end suitable for Manifold Non-Return Valves. Manifold will also have 16 brass non-return valves for individual N2O cylinder. Manifold middle frame of 4x4 size will be made with circumferential mild steel flat duly powder coated with black colour & along with chain for individual bulk N2O cylinder.				
	6	**N2O Three Cylinder Emergency System. (Indigenious)**				
	6.1	To provide three cylinder emergency system with high flow Pressure Regulators, pig tail pipes, manifold of three cylinders with Top & middle frame for N2O.				
	7	**Vacuum System(Indigenious)**				
	7.1	Vacuum Central System complete with duplex 15 VX model Ingersoll Rand Make Pump,				
	7.2	two vacuum pumps, air cooled type , Model 15 V X 1 0 H.P.(Ingersoll Rand make), each				
	7.3	pump having piston displacement - 149.6 Cfm. Free Air delivery to suction - approx. 90 %				
	7.4	of P.D. , maximum working pressure 29" of Hg or 730mm of Hg, single stage duplex cylinder,				
	7.5	fitted with M.I. channel frame complete with V-Belt drive, belt guard etc.				
	7.6	Vacuum system will also have followings:-				
	7.7	- Electric motor either BBL or crompton Greaves, 10 H.P., TEFC 440 volts ,3 phase. - 2 Nos.				
	7.8	- 2" BSP stainless steel ball valve with PTFE seat & quarter turn open able handle				
	7.9	for pump isolation				
	7.10	- Silencers at Vacuum pump discharge end				
	7.11	- Vacuum filters size 6" dia x 12" long with drain valve and housing chrome plated. - 2 Nos.				
	7.12	- One 3000 ltr water capacity vacuum receiver made of M.S. material as per - 1 No.				
	7.13	- IS-226 and code of construction IS-2825 with drain valve .				
	7.14	- Inter connection copper piping of suitable sizes				
	7.15	- Vacuum gauges				
	7.16	- 2" BSP vertical non return valve of brass/G.M.				
	8	**Ward Vacuum Unit (Indigenious)**				
	8.1	The vacuum unit will include vacuum regulator along with 0 - 760mm of Hg vacuum gauge of 2 1/2" size dial, 600 ml capacity reusable plastic collection bottle with overflow safety trap with plastic slide wall mounted type.				
	8.2	**Theatre Vacuum Unit (Indigenious)**				
	8.3	It will be trolley mounted. The unit will include one regulator having gauge and mounted on the trolley stand , having two reusable each 2000 ml plastic collection bottles mounted on the base of trolley unit and connected with regulator & low pressure tube inter-connections.				
	9	**Compressed Air System(Indigenious)**				
	9.1	The unit will have three stationary air cooled silenced (Reciprocating) Oil-Free Air Compressor with				
	9.2	critical maintenance free technology each having 50 scfm capacity.				

Sd/- Dr. B. R. Satpathi 21.12.2013

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	9.3	The system will have the following accessories.				
	9.4	Air reservoir as per international standards of minimum 1500 liters. -1 No.				
	9.5	with safety valve, drain valve and pressure gauge of 4 inch dial size.				
	9.6	Air Dryer, desiccant each of 50 scfm capacity for – 40 degree centigrade dew point.-1 Nos.				
	9.7	Inter connection air piping between the compressor, receiver and air dryer , NRV temperature				
	9.8	gauges. -1 Set After Cooler of matching capacity for reciprocating compressor				
	9.9	15Hp motor Crompton /Siemens /BBL make				
	9.10	Compressed Air Filtration System –				
	9.11	One set of four – stage filter (one as working and one standby) Will be provided as follows:				
	9.12	The filters will be made of die cast aluminum housing with epoxy powder paint on the outside and				
	9.13	anodized surface treatment inside to prevent corrosion and ensure extra long life.				
	9.14	The filters Will have maximum contaminant removal efficiency with minimum pressure drop.Total 4				
	9.15	stages of filters Will be used (stage 1 & 2 Will be installed before the desiccant dryer and balance two stages after it as mentioned below :				
	9.16	Stage – 1 : Coalescing filters for general purpose protection, removing liquid water and				
	9.17	oil aerosol to 0.1mg . cum.(0.1 ppm) and particles down to 1 micron.				
	9.18	Stage – 2 Particulate filters for dust protection, removing particles down to 1 micron				
	9.19	Stage – 3 : high efficiency coalescing filters, removing liquid water and oil aerosol to				
	9.20	0.01 mg/cu.m (0.01 ppm) and particles down to 0.01 micron				
	9.21	Stage- 4 : active carbon filter for removal of oil vapors and hydrocarbon odours with				
	9.22	maximum remaining oil content of 0.003 mg/cum. (0.003 ppm) Will be installed after stage 3 filter				
	9.23	Combined Electrical Control Panel for Air Compressors & Vacuum Pumps				
	9.24	Common Electrical Control Panel for Air-Compressors and Vacuum Pumps, cubicle type, complete				
	9.25	with Mains Incomer, Bus Bar arrangement, Voltmeter with VSS, Phase indicating lights, Phase				
	9.26	loss/Phase Reversal indicating light, individual MCBs for all starters, individual Ammeters for all				
	9.27	motors, Single Phasing Preventer, Contactors, Overload Relays, Control Circuit MCB, Start/Stop				
	9.28	Push buttons, Auto/Manual switches, Pump "ON" and Pump "TRIP" indicating lights, Sequencing				
	9.29	Relays (Separate for Air Compressors and Vacuum pumps) with overriding feature.				
	9.30	The Sequencing Relays must be door mounted. It will have all indications like Mains ON, Input ON,				
	9.31	Pump Next in Turn, Pump "A"/Pump "B" ON, , Pump "A"/Pump "B" Fault etc, Audio Alarm in case of				
	9.32	Fault and having an option of locking the sequencing arrangement on either pump. Sequencing				
	9.33	relay also must have an option for parallel operation of both pumpsets in case the need arises. The				
	10	**Air-Compressors (Indigenious)**				
	10.1	The powder coated Panel enclosure. All terminals, switches and lights must be duly marked. Internal wiring must be duly ferruled. Incomer shall be of adequate size so that it is suitable for the total load of the system.				
	10.2	Copper pipes (material): Copper Pipes used will be solid drawn, seamless, deoxidized, non arsenical, half hard, tempered and degreased, manufactured as per EN 737/BS 2871 part I, Table-X of 1971 and chemical composition as per BS-6017 of 1981, Table 2, Cu-DHP.				
	10.3	To provide Manufacturer's Test Certificate of copper pipes for physical properties and chemical composition. Further, the pipes will be tested by a reputed third party i.e. Lloyds Register Services and certificates for the same will also be furnished.				
	11	**Pipe sizes will be used as per HTM 2022 standards:**				
	11.1	76mm ODX 1.2mm thk, 54mm OD X 1.2mm thk, 42mm OD X 1.2 mm thk, 28mm OD X 0.9 mm thk				
	11.2	22mm OD X 0.9 mm thk, 15mm OD X 0.9 mm thk, 12mm OD X 0.7 mm thk				
	11.3	Pipeline Installation: Before erection, all copper pipes, valves, fittings like bends, tees, reducers etc. will be cleaned for dirt, and Will be degreased.				
	11.4	Proper pipe cutters, and bending machine will be used during installation of copper pipes.				
	11.5	All copper pipes and fittings like bends, Tees, reducers and straight couplings Will be as per BS 864 and joined by silver brazing method for copper to copper. Inert gas welding technique Will be used by passing Nitrogen gas inside the copper pipes during silver brazing, in order to avoid carbon deposition inside the copper pipes. Copper pipes of the diameter up to 42mm OD Will be installed on the wall with the help of plastic saddles at the required span, as per HTM-2022 of U.K. and metallic white powder coated clamps Will be used for pipe sizes above 54mm OD. Wherever the pipes cross brick walls, it will be covered with plastic pipes. All pipes will be installed without springing or forcing. All pipes will be protected against mechanical injury in a manner satisfactory to authorities having jurisdiction.				
	11.6	Test: After erection, all the pipes will be cleaned or purged with the help of dry nitrogen gas, & Will be tested with dry nitrogen at a pressure of 10 Bar for 48 hours.				
	11.7	Painting: All installed pipes will be painted with two coats of synthetic enamel paint & colour codification as per IS-2379 of 1963.				
	12	**Isolation Valve (Indigenious)**				
	12.1	It will be wall mounted, Aluminum box with lockable front glass panel having ball type valves with PTFE seat Brass body with Nickel plating valves having quarter turn handle opening. Sizes suitable for 15 mm OD copper pipe to 42 mm OD copper pipes will have screwed ends will have brass adopter suitable for copper pipe , these valves will be manufactured by an ISO 9001 certified company.				
	13	**Medical Gas Alarm (Main & Area)(Indigenious)**				
	13.1	The medical gas alarms will have displays for various fault indications and capable of monitoring a maximum of 4 to 5 medical gas services by means of pressure switches, which detect deviations from the normal operating limits of either pressure or medical vacuum.				
	13.2	Each gas service will be displayed by coloured 'Normal' 'Low' and 'High Pressure' conditions. Medical vacuum systems will be displayed in the 'Normal' and 'Low Vacuum' conditions only. Failure indicators will be displayed by flashing lights and normal indications will be steady.				
	13.3	An audible warning will sound simultaneously with any failure indication and a mute facility will be provided. A maintenance 'Mute' switch will be provided internally to the panel for use during maintenance, which results in prolonged pipeline or plant shutdown. This facility will automatically reset when the gas service returns to normal.				
	13.4	The alarm panel will have a 'test' facility to prove the integrity of the internal circuits, LED's and audible warning. The alarm panel will incorporate a volt free normally closed relay to allow for interconnection to either a medical gas central alarm system or an event recording circuit of a building management system.				
	14	**Bed Head Panel (Indigenious)**				
	14.1	The panel will integrate the mechanical , electronic and data systems at the patient bed side with an aim to facilitate easier access to doctors, enhance the comfort of the patient and of aesthetics of the ward.				
	14.2	The bed head panel (horizontal) is made from high strength extruded aluminum profiles with powder coating with a choice of colou to suit the interior décor of the hospital. It will be custom built to house gas and electrical outlets				
	14.3	Bed head panels will be supplied with powder coating on aluminum with a choice of colour to suit the interior décor of the hospital's ICU etc.				
	14.4	Each bed head panel 5 feet long for ICU Beds will be following :				
	14.5	- Provision for One Oxygen outlets, One vacuum outlet, One C.Air outlet.				
	14.6	- 4 no. Electrical Sockets & I.V Pole				
		Mortuary				
90		**Cold Storage Mortuary Cabinet (6 bodies)**	Each	**2**	**4**	Bluestar/Freezer India/Yorco
		Operational Requirements				
		Technical Specification				
	1	SS chamber of 6 cabinets				
	2	Each cabinet is for storing one cadaver				

Sd/- Dr. B. R. Satpathi 21.12.2013

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	3	Temp -2 to +5 degree celsius				
	4	Digital temp. controller				
	5	81 1/2" High x 55" Wide x 34.6" Deep				
	6	Epoxy coated wire shelves				
	7	Door mounted security lock				
	8	Top-mounted, non-CFC refrigeration system (R404A)				
	9	Air Cooled Condensor				
	10	Automatic Defrost				
	11	Digital Thermometer LED				
	12	Perimeter anti-condensate door opening heater wires to prevent "freeze-out"				
	13	Door activated interior fluorescent light				
	14	Condensation is automatically evaporated in a collection pan.				
	15	Cabinet interior and exterior door and sides are fabricated of premium grade stainless steel.				
	16	Galvanized exterior top and bottom corrosion proof powder coated.				
		General Furniture specification - Common to all				
		Procedures for Quality Assurance (ISO 9001:2008, ISO 14001:2004, OHSAS 18001:2007 & ISO 13485:2009). Ensures all products are with improved comfort, accessibility, safety and hygiene to patients and care takers.				
		MS tubular parts, linkages, flats are pretreated in-house, shot blasted and epoxy powder coated as per ISI Standards - 50 to 60 microns. SS parts are with matt finish.				
		Main frame of beds are of 60 mm x 30 mm x 16 gauge ERW MS Rectangular tube. The sheet top is of 18 gauge of CRCA MS sheets. This ensures stability of the bed				
		The sheets are perforated with uniformly spaced holes in each section. Enhances breathing of mattress – ensures better hygiene and durability of mattress				
		Perforation are burr free and have no sharp edges - ensures safety for house keeping & nursing care staff				
		Finishing & Workmanship must be of high standards as it of prime importance in medical furniture.				
		MS parts pass the 8 dip tank pre treatment for preparation of metal surface to absorb powder coating. Followed by Phosphate coating for corrosion resistance. The phosphate layered parts are passed through oven at temperature of 180 to 200 degree to ensure the parts are completely dry before entering the epoxy powder coating chamber. Test certificate for Phosphate coating can be shared on request				
		To ensure highest quality of powder coating, in-house laboratory test for: Impact test, bend test and salt spray test is conducted on MS parts as it comes out of epoxy powder coating conveyor				
91		**General Beds**		**240**	**440**	Janak/Godrej/Meditek
		Specifications				
	1	Overall Approx Dimension 2090 mm L X 910 mm W X 600 mm H Bed frame				
	2	approx Dimension 1980 mm L X 910 mm W. Pretreated and Powder				
	3	coated Finish.				
	4	PU foam mattress				
	5	Collapsable saline rod SS with stand				
	6	Weight should be minimum of 35 kg				
	7	Bed with crank system for positional adjustment				
92		**Bassinets**		**25**	**40**	Janak/Godrej/Meditek
	1	Crib Carrier with 125mm dia synthetic Body Castors two with brake and two without brake and 3" PU Foam Mattress with PVC Rexine				
	2	Weight should be minimum of 15 kg				
93		**Pre OP Beds**		**6**	**12**	Janak/Godrej/Meditek
		Specifications				
	1	Comfort bed with four sections having screw machanism fited with four 125mm nonrusting imported castors 2 brake				
	2	Pretreated and powder coated M.S body frame				
	3	Diemensions : 2180mm(L)*1010mm(W). 600mm(H) (without mattress)				
	4	Laminated head and foot board with SS frame				
	5	Collapsible Type safety side railswith pre-treated and powder coated M.S tube				
	6	PU foam mattress with four sections				
	7	S.S telescopic I.V pole				
	8	Back rest, Knee rest, Trendelenburg / Reverse Trendelenburg functions. No Height Adjustable.				
	9	Collapsable saline rod SS with stand				
	10	Weight should be minimum of 90 kg				
94		**Post-Op Beds**		**6**	**12**	Janak/Godrej/Meditek
		Specifications				
	1	Comfort bed with four sections having screw machanism fited with four 125mm nonrusting imported castors 2 brake				
	2	Pretreated and powder coated M.S body frame				
	3	Diemensions : 2180mm(L)*1010mm(W). 600mm(H) (without mattress)				
	4	Laminated head and foot board with SS frame				
	5	Collapsible Type safety side railswith pre-treated and powder coated M.S tube				
	6	PU foam mattress with four sections				
	7	S.S telescopic I.V pole				
	8	Back rest, Knee rest, Trendelenburg / Reverse Trendelenburg functions. No Height Adjustable.				
	9	Collapsable saline rod SS with stand				
	10	Weight should be minimum of 90 kg				
	11	Post op Bed with 4 cranks system including height adjustment				
95		**Private Rooms Beds**		**20**	**20**	Janak/Godrej/Meditek
		Specifications				
	1	Fowler bed withFour sections having screw mechanism				
	2	Pretreated and powder coated M.S body frame				
	3	Diemensions : 2095mm(L)*920mm(W)*600mm(H)				
	4	Polymer moulded head and foot board				
	5	PU foam mattress with four sections				
	6	Back rest & Knee rest functions				
	7	Collapsable saline rod SS with stand				
	8	Weight should be minimum of 60 kg				
96		**Semi Private Beds**		**40**	**40**	Janak/Godrej/Meditek
		Specifications				
	1	Fowler bed withFour sections having screw mechanism				
	2	Pretreated and powder coated M.S body frame				
	3	Diemensions : 2095mm(L)*920mm(W)*600mm(H)				
	4	Laminated head and foot board with S.S frame				
	5	PU foam mattress with four sections				
	6	Back rest & Knee rest functions				
	7	Collapsable saline rod SS with stand				
	8	Weight should be minimum of 60 kg				
97		**Examination Couches**		**20**	**30**	Janak/Godrej/Meditek

Sd/- Dr. B. R. Satpathi 21.12.2013

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
		Specifications				
	1	Examination couch with two sections having adjustable Headrest				
	2	Pretreated and powder coated M.S body frame with fixed Upholstered Top				
	3	Diemensions : 1830mm(L)*610mm(W)*825mm(H)				
	4	Leg Fitted with Rubber feet.				
	5	Weight should be minimum of 30 kg				
	6	Examination table supplied with inbuilt storage/ cabinets				
		Examination table supplied with foot step				
98		**Bed side lockers**		**330**	**550**	Janak/Godrej/Meditek
		Specifications				
	1	pre-treated and powder coated M.S. body frame				
	2	Machine pressed CRCA steel sheet locker box with door				
	3	Superimposed SS top with raised edge on three sides. MS tubular legs with rubber feet.				
	4	Approx. size 400mm square. Height 820mm				
	5	Weight should be minimum of 10 kg				
99		**Crib attachment**		25	40	Janak/Godrej/Meditek
		Clamp system for fixation of crib attachment for safety of the baby				
		Weight should be minimum of 5 kg				
100		**SS Food Trolley adj. ht**		**330**	**550**	Janak/Godrej/Meditek
		Specifications				
	1	Wardcare Adjustable Bedside Table with Gear Mechanism fitted with four non-rusting twin wheel castors, 50mm di				
	2	Pretreated and powder coated M.S body frame with two section Laminated Top				
	3	Diemensions Top: 810mm(L)*325mm(W)				
	4	MS tubular telescopic stem with geared SS handle for height adjustment from approx. 760mm to 1050mm				
	5	MS rectangular tubular base frame mounted on four twin wheel non rustingcastors, 50mm dia.				
	6	Weight should be minimum of 15 kg				
101		**Strecher trolley**		**30**	**50**	Janak/Godrej/Meditek
		Specifications				
	1	Stretcher Trolley with Single Section fitted with four imported non-rusting castors, 125mm dia., two with brake .. (OPTIONAL 200mm Dia without Brake facilities instead of 125mm dia)				
	2	Pretreated and powder coated M.S body frame				
	3	Diemensions : 2030mm(L)*560mm(W)*820mm(H)				
	4	Removable stretcher top made of aluminium sheet supported on tubular frame				
	5	Stretcher Trolley with side rail, cage for oxygen cylinder and IV rod				
	6	Weight should be minimum of 35 kg (excluding the weight of side rail, cage for oxygen cylinder and IV rod)				
102		**Bed side screen**		**180**	**220**	Janak/Godrej/Meditek
		Specifications				
	1	Three Fold fitted with six swivel, twin wheel non rusting castors, 50mm dia without brake				
	2	Pretreated and powder coated M.S body frame				
	3	Diemensions : 1680mm(H)*2450mm(W)				
	4	Supplied with hooks and springs with curtains				
	5	Middle Span 1210 mm wide, Side Span 610mm wide each.				
	6	Bed side screen with denser/thicker linen material				
103		**Multipurpose Stool with SS top**		**330**	**550**	Janak/Godrej/Meditek
		Specifications				
	1	Approx Dimension : 300 mm Square				
	2	Height 510mm. Framework of Mildsteel pressed bent angles				
	3	Superimposed Stainless steel Top				
	4	Leg Fitted with rubber feet				
	5	Weight should be minimum of 3.5 kg				
104		**Drug trolley SS**		**50**	**60**	Janak/Godrej/Meditek
		Specifications				
	1	Crash Cart fitted with four imported castors,125mm dia, 2 with brake				
	2	S.S. frame packed in corrugated carton				
	3	Diemensions : 960mm(L)*500mm(W)*1545mm(H)				
	4	Six coloured removable bins and two polystyrene lockable storage units with three drawers each				
	5	The top drawers have containers of different sizes				
	6	Complete with corner buffers, powder coated oxygen cylinder holder, cardiac massage board, SS IV rod and SS shelves				
	7	Weight should be minimum of 30 kg				
105		**Minor OT table**		**4**	**5**	Janak/Godrej/Meditek
	1	Operating Table ,Universal & Flexible in use				
	2	Specially Designed to Provide Complete Flexibility for Patient				
	3	Positioning required for Modern Surgeries.				
	4	Features				
	5	It should have Five Sectional X-Ray Translucent Top.				
	6	It should have Standard positioning for patient articulation.				
	7	It should be Most Suitable for General Surgery				
	8	Laproscopic & Gynaec & other major surgeries.				
	9	It should have Complete Rust Proof Design.				
	10	It should have Mobile base with floor locking.				
	11	Should be supplied with the following:				
	12	Antistatic Waterproof Rubber Mattress 50 mm. thick				
	13	Pair of S.S Arm Board with Mattress				
	14	Anesthetic Frame				
	15	Pair of Padded lateral support				
	16	Pair of Padded shoulder support				
	17	Pair of Lithomy Crutches.				
	18	Accessory Clamps				
	19	Minor OT Table with following facilities: 1) '0' positioning facility. 2) Base lock through remote control. 3) Two remote system.				
		Should have CE certified				
106		**Delivery Table**		**4**	**5**	Janak/Godrej/Meditek/hospitech
	1	Approx. Size-Body section-1000L x 800W x 750H mm, Leg Section-900Lmm.				

Sd/- Dr. B. R. Satpathi 21.12.2013

Sl.	Dept	Description of item/ Equipment	Quantity			Suggested makes / Equivalent
			Unit	5 Storeyed	10 Storeyed	
	2	Bed, Labour and Delivery made in 2 section, body section with legs mounted on rubber tips, Leg section swivel castors with brakes.				
	3	Leg section can be completely recessed under the body section.Supports for legs holders with solid mechanism to fix leg holders at requested height & width.				
	4	Filled mattress-pad and cover mattress pad in both section.				
	5	Supplied with 2 knee crutches adjustable in height & width.				
	6	Delivery Table supplied with foot step and seamless mattress				
	7	Entire Labor table shouls be made of SS 304				
	8	Weight should be minimum of 68 kg				
		Office Furnitures				**Indicative Model (Godrej make)**
107		**Executive Chair**		8	12	Bravo High Back
108		**Executive Table**		8	12	Godrej make Finesse 5026 +ERU3619+pedestal
109		**Office Table**		70	100	Godrej make Enterprise 1350
110		**Office Chair**		200	320	Godrej make Fiona MB
111		**Visitor Chair**		200	250	Bravo Visitor
112		**Side Table**		90	120	PISA
113		**Full ht Storage**		70	100	GAIN 2100X450
114		**Conference Table**		1	2	Senate (Each seater)
115		**Library Rack**		5	12	Double sided Steel book rack
116		**White Board**		6	10	Sq Mtr
117		**Notice Board**		4	4	Sq Mtr
118		**Low ht Storage**		30	24	VSDU 2
119		**Slottet angle rack MS**		20	40	Office Rack 7 feet
120		**Slotted angle MS rack**		20	40	Office Rack 7 feet
121		**Over head cupboard**		2	3	OHSU
122		**Dining table 4Seater**		6	8	Cantina SS top with 4 Chair
123		**Dining Chair**				
124		**Consultant Table**		60	88	Mayfair 1350 +ERU 3016+ Pedestal
125		**3 seater perfo Chair**		90	145	Nano perch
126		**Glass storwel**		1	2	Glassdoor storwel
127		**full ht Storage**		1	3	GAIN 2100X450
128		**15 seater conf table**		1	1	Senate
129		**2 seater sofa**		5	6	Midas 2 seater
130		**center table**		5	6	PISA
131		**Bed For infants 750X400**		20	30	CRIB for infants
132		**Injection trolley**		16	20	
	1	or Instrument trolley with bowl and tray Weight 16 kg or more approx. with ± 10% tolerance Injection trolley with 4 (four) instrument trays (SS 304) of following sizes would be preferred: a) 4"X8" with cover b) 10"X12" with cover c) 8"X8" without cover d) 8"X10" without cover				
	2	Weight should be minimum of 15 kg				
133		**Dresser trolley**		6	8	Instrument trolley
		Weight should be minimum of 15 kg				
134		**Chair with Arm**		120	160	Model EASE
135		**Chair without arm**		80	120	CH 1112
136		**Chair Revolving**		20	30	BRAVO Mid back
137		**Visitor chair 3 seater**		200	400	Nano Perch 3seater
138		**Weighing Machine adult**		20	30	**Omron make**
139		**Weighing Machine Baby**		10	16	**Omron make**
140		**Sectrtariate table**		15	25	LEAD
141		**Half Sectrtariate Table**		20	30	Enterprise 1650
142		**Almirah Big 6.5'**		60	100	St plain
143		**Alimirah 6ft**		40	60	KD plain
144		**Almirah Small**		30	50	
145		**Stel rack Large**		30	50	
146		**Steel Rack medium**		20	30	Std 6feet
147		**Steel rack Small**		20	30	Std 3.5 feet
148		**File cabinet**		20	30	4 Door VFC
149		**Detachable side rails**		60	80	
150		**Table dispensing**		16	18	Insight 1800
151		**Bed side screen**		240	350	Bed side screen
152		**Water purifier**		20	40	

Section 5.8
PAYMENT SCHEDULE

Sec 5.8 PAYMENT SCHEDULE

PAYMENT SCHEDULE FOR 5 STORIED BUILDING

(Subject to statutory deductions)

SL. NO.	ACTIVITIES OF THE PROJECT[2]	% OF TOTAL PROJECT
1	On Approval of Concept Plan, Architectural Plan, Structural details including Soil investigation and working Drawing as required.	**0.50**
2	On Approval of other services, design details e.g. S & P works, Water Supply, Fire, Power, Electrical facilities, Waste water disposal, Bio-Medical waste Treatment & disposal, Design of Gas pipe line, Roads, Pavement, Drains, Land Scaping etc. including approval of the drawing from statutory bodies like Municipality, Panchayat, Fire, Pollution control Board etc.	**0.50**
3	On completion of as built Drawing.	**0.50**
4	On completion of Foundation (Pile/raft/strip/combined/isolated footing) including dismantling of Existing Structures where required. a) On completion of 50 % (upto 50 %) b) On completion of balance 50 % (upto 100 %)	 **5.50** **5.50**
5	On completion of balance Foundation (including Pile cap) upto Plinth Level (Structural portion only).	**8.50**
6	On completion of balance structural portion of the entire building from Ground Floor to Top Floor including stair roof & roof treatment. a) On completion of 50 % (upto 50 %) b) On completion of balance 50 % (upto 100 %)	 **7.50** **7.50**
7	On completion of Brick-work (inside & outside) of the entire building from Ground Floor to Top Floor including Stair Roof. a) On completion of 50 % inside Plaster (upto 50 %) b) On completion of balance 50 % inside Plaster(upto 100 %)	 **3.25** **3.25**
8	On completion of Plaster etc (inside & outside) of the entire building from Ground Floor to Top Floor including Stair Roof. a) On completion of 50 % inside Plaster (upto 50 %) b) On completion of balance 50 % inside Plaster(upto 100 %) c) On completion of outside Plaster (upto 100 %)	 **2.00** **2.00** **1.00**
9	On completion of Flooring work in all respect of the building from Ground Floor to Top Floor. a) On completion of 50 % (upto 50 %) b) On completion of balance 50 % (upto 100 %)	 **1.75** **1.75**
10	On completion of Finishing works like Fixing of Doors & Windows with Grills etc complete.	**1.50**
11	On completion of internal Painting works etc. from Ground Floor to Top Floor including Stair Room. a) On completion of 50 % (upto 50 %) b) On completion of balance 50 % (upto 100 %)	 **0.75** **0.75**
12	On completion of Staircase, Hand railling etc of the entire building.	**1.00**
13	On completion of External Painting etc. from Ground Floor to Top Floor	**0.75**

	including Stair Room.	
14	On completion of External Pipeline with Over Head Tank etc. of the entire building.	**1.75**
15	On completion of Internal Pipeline etc. of the entire building.	**1.75**
16	On completion of the Fitting & Fixtures of the Sanitary & Plumbing works of the entire building.	**1.75**
17	On completion of Fire Fighting arrangement with Fire hydrant etc. for the entire building.	**1.75**
18	On completion of the Civil works of the Sub-Station building/Generator Room etc.	**0.50**
19	On completion of Tube-Well with Pump etc. for the entire Project.	**0.50**
20	On completion of Underground Reservoir (Fire/Drinking) for the entire project.	**1.00**
21	On completion of the arrangement of supply of Medical Gas etc.	**2.00**
22	On completion of Effluent Treatment Plant etc. of the entire Project.	**2.00**
23	On completion of Rood, Pavement, Drain etc of the entire Project.	**3.25**
24	On completion of Landscaping & Site clearance of the entire Project.	**2.00**
25	On completion of internal electrical installation including controlling system, cabling, earthing, wiring for P.A. system, Fire alarm, SIGNAGE, Nurses call, telephone etc.	**3.50**
26	On completion of SITC of Sub-Station including HT & LT Panel.	**2.50**
27	On completion of supply & installation of building Panels and Floor Panels(both for normal and emergency), distribution of cables from Sub-Station to building and vertical risers from building Panel to Floor Panels, MCCB, MCB including all connections.	**2.50**
28	On completion of HVAC & Mortuary Cooler & other mechanical system.	**2.50**
29	On completion of SITC Lift.	**3.00**
30	On completion of all devices for Fire detection system including all controlling system excluding hydrant.	**0.75**
31	On supply, installation & testing SITC DG-set.	**2.00**
32	On completion of installation, testing of video-conference, LAN, Telecommunication services & IT-systems.	**2.00**
33	On completion of supply, installation & testing of SITC of all fittings & fixtures.	**2.25**
34	On completion of supply, installation & testing of SITC of lighting conductor, solar system, SIGNAGE, electrical landscaping for both internal & external, equipments of nurses call system.	**5.00**
TOTAL =		***100.00***

WEST BENGAL MEDICAL SERVICES CORPORATION LTD.

BIDDING DOCUMENT FOR

Planning, Design and Construction of 1(One) Tertiary Healthcare Hospital alongwith Supply of Medical Equipments and Hospital Furniture in the State of West Bengal on Turnkey basis

(Bid Reference No. : WBMSCL/NIT-41 /2015)

Section 6

General Conditions of Contract

General Conditions

1

General Provisions

1.1

Definitions

In the Conditions of Contract ("these Conditions"), which include Particular Conditions and these General Conditions, the following words and expressions shall have the meanings stated. Words indicating persons or parties include corporations and other legal entities, except where the context requires otherwise.

1.1.1

The Contract

1.1.1.1 **"Contract"** means the Contract Agreement these Conditions, the Employer's Requirements, the Tender, and the further documents (if any) which are listed in the Contract Agreements.

1.1.1.2 **"Contract Agreement"** means the contract agreement referred to in Sub-Clause 1.6 [Contract Agreement], including any annexed memoranda.

1.1.1.3 **"Employer's Requirements"** means the document entitled Employer's Requirements, as included in the Contract, and any additions and modifications to such document in accordance with the Contract. Such document specifies the purpose, scope, and/or design and/or other technical criteria, technical specification, technical requirement for the Works.

1.1.1.4 **"Tender"** means the Contractor's signed offer for the Works and all other documents which the Contractor submitted therewith (other than these Conditions and the Employer's Requirements, if so submitted), as included in the Contract.

1.1.1.5 **"Performance Guarantees"** and **"Schedule of Payments"** mean the documents so named (if any), as included in the Contract.

1.1.2

Parties and Persons

1.1.2.1 **"Party"** means the Employer or the Contractor, as the context requires.

1.1.2.2 **"Employer"** means the person named as employer in the Contract Agreement and the legal successors in title to this person.

1.1.2.3 **"Contractor"** means the person(s) named as contractor in the Contract Agreement and the legal successors in title to this person(s).

1.1.2.4 **“Employer’s Representative”** means the person named by the Employer in the Contract or appointed from time to time by the Employer under Sub-Clause 3.1 [The Employer’s Representative], who acts on behalf of the Employer.

1.1.2.5 **“Contractor’s Representative”** means the person named by the Contractor in the Contract or appointed from time to time by the Contractor under Sub-Clause 4.3 [Contractor’s Representative], who acts on behalf of the Contractor.

1.1.2.6 **“Employer’s Personnel”** means the Employer’s Representative, the assistants referred to in Sub-Clause 3.2 [Other Employer’s Personnel] and all other staff, labour and other employees of the Employer’s and of the Employer’s Representative, and any other personnel notified to the Contractor, by the Employer or the Employer’s Representative, as Employer’s Personnel. Employer’s Representative is authorized to carry out on behalf of the Employer general supervision, day to day instructions along with approval of materials and workmanship. In case of dispute, the decision of Employer’s Representative is final and binding.

1.1.2.7 **“Contractor’s Personnel”** means the Contractor’s Representative and all personnel whom the Contractor utilises on Site, who may include the staff, labour and other employees of the Contractor and any other personnel assisting the Contractor in the execution of the Works.

1.1.3
Dates, Tests, Periods and Completion

1.1.3.1 **Deleted**

1.1.3.2 **"Commencement Date"** means the date notified under Sub-Clause 8.1 [Commencement of Works], unless otherwise defined in the Contract Agreement.

1.1.3.3 **"Time for Completion"** means the time for completing the Works or a Section (as the case may be) under Sub-Clause 8.2 [Time for Completion], as stated in the Particular Conditions (with any extension under Sub-Clause 8.5 [Extension of Time for Completion]), calculated from the Commencement Date.

1.1.3.4 **"Tests on Completion"** means the tests which are specified in the Contract or agreed by both Parties or instructed as a Variation, and which

are carried out under Clause 9 [Tests on Completion] before the Works or a Section (as the case may be) are taken over by the Employer.

1.1.3.5 **"Taking-Over Certificate"** means a certificate issued under Clause 10 [Employer's Taking Over].

1.1.3.6 **"Tests after Completion"** means the tests (if any) which are specified in the Contract and which are carried out under Clause 12 [Tests after Completion] after the Works or a Section (as the case may be) are taken over by the Employer.

1.1.3.7 **"Defects Notification Period"** means the period for notifying defects in the Works or a Section (as the case may be) under Sub-Clause 11.1 [Completion of Outstanding Work and Remedying Defects], calculated from the date on which the Works or Section is completed as certified under Sub-Clause 10.1 [Taking Over of the Works and Sections]. This period shall be three year.

1.1.3.8 **"Performance Certificate"** means the certificate issued under Sub-Clause 11.9 [Performance Certificate].

1.1.3.9 **"day"** means a calendar day and **"year"** means 365 days.

1.1.4
Money and Payments

1.1.4.1 **"Contract Price"** means the agreed amount stated in the Contract Agreement for the planning, design, execution and completion of the Works and the remedying of any defects, and includes adjustments (if any) in accordance with the Contract.

1.1.4.2 **"Cost"** means all expenditure reasonably incurred (or to be incurred) by the Contractor, whether on or off the Site, including overhead and similar charges, but does not include profit.

1.1.4.3 **"Final Statement"** means the statement defined in Sub-Clause 14.11 [Application for Final Payment].

1.1.4.4 **Deleted.**

1.1.4.5 **"Currency"** means Indian National Rupees (INR).

1.1.4.6 **Deleted.**

1.1.4.7 **“Defects Liability Period”** means three years from the date of issuance of Taking Over Certificate

1.1.4.8 **"Statement”** means a statement submitted by the Contractor as part of an application for payment under Clause 14 [Contract Price and Payment].

1.1.5 Works and Goods

1.1.5.1 **"Contractor’s Equipment"** means all apparatus, machinery, vehicles and other things required for the execution and completion of the Works and the remedying of any defects. However, Contractor’s Equipment excludes Temporary Works, Employer’s Equipment (if any), Plant, Materials and any other things intended to form or forming part of the Permanent Works.

1.1.5.2 **"Goods"** means Contractor’s Equipment, Materials, Plant and Temporary Works, or any of them as appropriate.

1.1.5.3 **"Materials"** means things of all kinds (other than Plant) intended to form or forming part of the Permanent Works, including the supply-only materials (if any) to be supplied by the Contractor under the Contract.

1.1.5.4 **"Permanent Works"** means the permanent works to be planned, designed and executed by the Contractor under the Contract.

1.1.5.5 **"Plant"** means the apparatus, machinery and vehicles intended to form or forming part of the Permanent Works.

1.1.5.6 **"Section"** means a part of the Works specified in the Particular Conditions as a Section (if any).

1.1.5.7 **"Temporary Works"** means all temporary works of every kind (other than Contractor’s Equipment) required on Site for the execution and completion of the Permanent Works and the remedying of any defects.

1.1.5.8 **"Works"** mean the Permanent Works and the Temporary Works, or either of them as appropriate.

1.1.5.9 “**Product”** means and include, without limitation, such medical equipments, furniture, beds, components, intermediate products and the products which the Contractor is required to supply, install and commission in terms of this Contract.

1.1.5.10 **“Services”** means and include services ancillary to the supply of products including without limiting to transportation and supply at the point of consignee and such other obligations as required under this Contract.

1.1.6 Other Definitions

1.1.6.1 **"Contractor’s Documents"** means the calculations, computer programs and other software, drawings, manuals, models and other documents of a technical nature supplied by the Contractor under the Contract; as described in Sub-Clause 5.2 [Contractor’s Documents].

1.1.6.2 **"Country"** means India.

1.1.6.3 **Deleted.**

1.1.6.4 **"Force Majeure"** is defined in Clause 19 [Force Majeure].

1.1.6.5 **"Laws"** means all national (or state) legislation, statutes, ordinances and other laws, and regulations and bye-laws of any legally constituted public authority.

1.1.6.6 **"Performance Security”** means the security (or securities, if any) under Sub-Clause 4.2 [Performance Security].

1.1.6.7 **"Site"** means the places where the Permanent Works are to be executed and to which Plant, Materials and Products are to be delivered, and any other places as may be specified in the Contract as forming part of the Site.

1.1.6.8 **"Variation"** means any change to the Employer’s Requirements or the Works, which is instructed or approved as a variation under Clause 13 [Variations and Adjustments],

1.2 Interpretation

In the Contract, except where the context requires otherwise:

(a) words indicating one gender include all genders;

(b) words indicating the singular also include the plural and words indicating the plural also include the singular;

(c) provisions including the word "agree", "agreed" or "agreement" require the agreement to be recorded in writing, and

(d) "written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record. The marginal words and other headings shall not be taken into consideration in the interpretation of these Conditions.

1.3
Communications

Wherever these Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices and requests, these communications shall be:

(a) in writing and delivered by hand (against receipt), sent by mail or courier, or transmitted using any of the agreed systems of electronic transmission as stated in the Particular Conditions; and

(b) delivered, sent or transmitted to the address for the recipient's communications as stated in the Contract. However:

(i) if the recipient gives notice of another address, communications shall thereafter be delivered accordingly; and

(ii) if the recipient has not stated otherwise when requesting an approval or consent, it may be sent to the address from which the request was issued.

Approvals, certificates, consents and determinations shall not be unreasonably withheld or delayed.

1.4
Law and Language

The Contract shall be governed by the laws of India only.

The language in the contract shall be English only. The language for communication for the purpose of this Contract shall be English only.

In addition to this, any document, which is in any language other than English, shall be translated to English and certified.

If there are versions of any part of the Contract which are written in more than one language, the version which is in English shall prevail.

The Contractor shall familiarize himself with the local laws and administration of West Bengal and comply by them.

1.5
Priority of Documents

The documents forming the Contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, the priority of the documents shall be in accordance with the following sequence:

(a) the Contract Agreement,

(b) the Particular Conditions of Contract,
(b) these General Conditions of Contract,
(c) the Employer's Requirements,
(d) the bidding documents and any other documents forming part of the Contract.

1.6 Contract Agreement

The Contract shall come into full force and effect on the date stated in the Contract Agreement. The costs of stamp duties and similar charges (if any) imposed by law in connection with entry into the Contract Agreement shall be borne by the Contractor.

1.7 **Deleted.**

1.8 Care and Supply of Documents

Each of the Contractor's Documents shall be in the custody and care of the Contractor, unless and until taken over by the Employer. Unless otherwise stated in the Contract, the Contractor shall supply to the Employer six copies of each of the Contractor's Documents.

The Contractor shall keep, on the Site, a copy of the Contract, publications named in the Employer's Requirements, the Contractor's Documents, and Variations and other communications given under the Contract, The Employer's Personnel shall have the right of access to all these documents at all reasonable times.

If a Party becomes aware of an error or defect of a technical nature in a document which was prepared for use in executing the Works, the Party shall promptly give notice to the other Party of such error or defect.

1.9 Confidentiality

Both Parties shall treat the details of the Contract as private and confidential, except to the extent necessary to carry put obligations under it or to comply with applicable Laws. The Contractor shall not publish, permit to be published, or disclose any particulars of the Works in any trade or technical paper or elsewhere without the previous agreement of the Employer.

1.10 Employer's Use of Contractor's Documents

As between the Parties, the Contractor shall retain the copyright and other intellectual property rights in the Contractor's Documents and other design documents made by (or on behalf of) the Contractor.

The Contractor shall be deemed (by signing the Contract) to give to the Employer a non-terminable transferable non-exclusive royalty-free licence to copy, use and

communicate the Contractor's Documents, including making and using modifications of them. This licence shall:

(a) apply throughout the actual or intended working life (whichever is longer) of the relevant parts of the Works,

(b) entitle any person in proper possession of the relevant part of the Works to copy, use and communicate the Contractor's Documents for the purposes of completing, operating, maintaining, altering, adjusting, repairing and demolishing the Works, and

(c) in the case of Contractor's Documents which are in the form of computer programs and other software, permit their use on any computer on the Site and other places as envisaged by the Contract, including replacements of any computers supplied by the Contractor.

The Contractor's Documents and other design documents made by (or. on behalf of) the Contractor shall not, without the Contractor's consent; be used, copied or communicated to a third party by (or on behalf of) the Employer for purposes other than those permitted under this Sub-Clause.

1.11
Contractor's Use of Employer's Documents

As between the Parties, the Employer shall retain the copyright and other intellectual property rights in the Employer's Requirements and other documents made by (or on behalf of) the Employer. The Contractor may, at his cost, copy, use, and obtain communication of these documents for the purposes of the Contract.

They shall not, without the Employer's consent, be copied, used or communicated to a third party by the Contractor, except as necessary for the purposes of the Contract.

1.12
Confidential Details

The Contractor shall not be required to disclose, to the Employer, any information which the Contractor described in the Tender as being confidential, The Contractor shall disclose any other information which the Employer may reasonably require in order to verify the Contractor's compliance with the Contract.

1.13
Compliance with Laws

The Contractor shall, in performing the Contract, comply with applicable Laws. Unless otherwise stated in the Particular Conditions:

(a) the Contractor shall have obtained (or shall obtain) the planning, zoning or similar permission for the Permanent Works, and any other permissions described in the

Employer's Requirements as having been (or being) obtained by the Contractor; and the Contractor shall indemnify and hold the Employer harmless against and from the consequences of any failure to do so. However, the Employer shall assist and/or facilitate (without any recourse or liability) obtaining of all permits, licences, approval, clearances, No Objection Certificates and the like, as required by the Laws and shall sign such documents as may be required by statute. The cost for obtaining the sanctions and/or permission in respect of such permit, licence, approval, No Objection Certificate, clearance and the like, shall be paid by the Contractor, which shall be reimbursed by the Employer within 60 days from the date of submission of necessary documents claiming reimbursement including supporting documents; and

(b) the Contractor shall give all notices, pay all taxes, duties and fees, and obtain all permits, licences and approvals, as required by the Laws in relation to the planning, design, execution and completion of the Works and the remedying of any defects; and the Contractor shall indemnify and hold the Employer harmless against and from the consequences of any failure to do so. However, the Employer shall assist and/or facilitate (without any recourse or liability) obtaining of all permits, licences and approval, as required by the Laws and shall sign such documents as may be required by statute.

2
The Employer

2.1
Right of Access to the Site

The Employer shall give the Contractor right of access to, and possession of, all parts of the Site within 7 days of the issuance of Letter of Acceptance / Notification of Award. The right and possession may not be exclusive to the Contractor. If, under the Contract, the Employer is required to give (to the Contractor) possession of any foundation, structure, plant or means of access, the Employer shall do so in the time and manner stated in the Employer's Requirements. However, the Employer may withhold any such right or possession until the Performance Security has been received.

If the Contractor suffers delay as a result of a failure by the Employer to give any such right or possession within such time, the Contractor shall give notice to the Employer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8,5 [Extension of Time for Completion].

After receiving this notice, the Employer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

However, if and to the extent that the Employer's failure was caused by any error or delay by the Contractor, including an error in, or delay in the submission of, any of the Contractor's Documents including submission of Performance Security, the Contractor shall not be entitled to such extension of time.

2.2 Permits, Licences or Approvals

It will be the duty of the Contractor to apply for and obtain any permits, licences, approvals, clearances or No Objection Certificates required by the Laws of the Country, which the Contractor is required to obtain under Sub-Clause 1.13 [Compliance with Laws] for the delivery of Goods, including clearance through customs, and for the export of Contractor's Equipment when it is removed from the site.

2.3 Employer's Personnel

The Employer shall be responsible for ensuring that the Employer's Personnel and the Employer's other contractors on the Site:

(a) co-operate with the Contractor's efforts and

(b) take actions similar to those which the Contractor is required to take under Sub-Clause 4.8 [Safety Procedures] and under Sub-Clause 4.24 [Protection of the Environment].

2.4 **Deleted.**

2.5 Employer's Claims

If the Employer considers himself to be entitled to any payment under any Clause of these Conditions or otherwise in connection with the Contract, and/or to any extension of the Defects Notification Period, he shall give notice and particulars to the Contractor. However notice is not required for payments due under Sub-Clause 4.25 [Electricity, Water and Gas] or for other services requested by the Contractor.

The notice shall be given as soon as practicable after the Employer became aware of the event or circumstances giving rise to the claim. A notice relating to any extension of the Defects Notification Period shall be given before the expiry of such period.

The particulars shall specify the Clause or other basis of the claim, and shall include substantiation of the amount and/or extension to which the Employer considers himself to be entitled in connection with the Contract. The Employer shall then proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) the amount (if any) which the Employer is entitled to be paid by the Contractor, and/or (ii) the extension (if any) of the Defects Notification Period in accordance with Sub-Clause 11.3[Extension of Defects Notification Period.

The Employer may deduct this amount from any moneys due, or to become due, to the Contractor. The Employer shall only be entitled to set off against or make any deduction from an amount due to the Contractor, or to otherwise claim against the Contractor, in accordance with this Sub-Clause or with sub-paragraph (a) and/or (b) of Sub-Clause 14.6 [Interim Payments].

Whenever any claim or claims for payment of a sum of money arises out of or under the Contract or against the Contractor, the Employer's Representative or the Employer shall be entitled to withhold and also have a lien to retain such sum or sums in whole or in part from the Security Deposit and Performance Guarantee, if any deposited by the Contractor, pending finalization or adjudication of any such claim. In the event of the Security Deposit and Performance Guarantee, being insufficient to cover the claimed amount or amounts or if no Security Deposit and Performance Guarantee has been taken from the Contractor, the Employer's Representative or the Employer shall be entitled to withhold and have a lien to retain to the extent of such claimed amount or amounts referred to above, from any sum or sums found payable or which may at any time thereafter become payable to the Contractor under the same Contract or any other Contract with the Employer's Representative of the Employer or any Contracting person through the Employer's Representative pending finalization of/adjudication of any such claim.

It is an agreed term of the Contract that the sum of money or moneys so withheld or retained under the lien referred by the Employer's Representative or the Employer will be kept withheld or retained as such by the Employer's Representative or the Employer till the claim arising out of or under the Contract is determined by the arbitrator (if the Contract is governed by the arbitration clause) or by the competent court, as the case may be and that the Contractor will have no claim for interest or damages whatsoever on any account in respect of such withholding or retention under the lien referred to above and duly notified as such to the Contractor. For the purpose of this clause, where the Contractor is a limited company, the Employer's Representative or the Employer shall be entitled to withhold and also have a lien to retain towards such claimed amount or amounts in whole or in part from any sum found payable to any limited company.

3

The Employer's Administration

3.1

The Employer's Representative

The Employer may appoint an Employer's Representative to act on his behalf under the Contract. In this event, he shall give notice to the Contractor of the name, address, duties and authority of the Employer's Representative.

The Employer's Representative shall carry out the duties assigned to him, and shall exercise the authority delegated to him, by the Employer. Unless and until the Employer notifies the Contractor otherwise, the Employer's Representative shall be deemed to have the full authority of the Employer under the Contract, except in respect of Clause 15 [Termination by Employer].

If the Employer wishes to replace any person appointed as Employer's Representative, the Employer shall give the Contractor not less than 14 days' notice of the replacement's name, address, duties and authority, and of the date of appointment.

3.2
Other Employer's Personnel

The Employer or the Employer's Representative may from time to time assign duties and delegate authority to assistants, and may also revoke such assignment or delegation. These assistants may include a resident engineer, and/or independent inspectors appointed to inspect and/or test items of Plant and/or Materials. The assignment, delegation or revocation shall not take effect until a copy of it has been received by the Contractor.

Assistants shall be suitably qualified persons, who are competent to carry out these duties and exercise this authority, and who are fluent in the language for communications defined in Sub-Clause 1.4 [Law and Language].

3.3
Delegated Persons

All these persons, including the Employer's Representative and assistants, to whom duties have been assigned or authority has been delegated, shall only be authorised to issue instructions to the Contractor to the extent defined by the delegation. Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by a delegated person, in accordance with the delegation, shall have the same effect as though the act had been an act of the Employer. However:

(a) unless otherwise stated in the delegated person's communication relating to such act, it shall not relieve the Contractor from any responsibility he has under the Contract, including responsibility for errors, omissions, discrepancies and non-compliances;
(b) any failure to disapprove any work, Plant or Materials or Products shall not constitute approval, and shall therefore not prejudice the right of the Employer to reject the work, Plant or Materials Products; and
(c) if the Contractor questions any determination or instruction of a delegated person, the Contractor may refer the matter to the Employer, who shall promptly confirm, reverse or vary the determination or instruction.

3.4
Instructions

The Employer may issue to the Contractor instructions which may be necessary for the Contractor to perform his obligations under the Contract. Each instruction shall be given in writing and shall state the obligations to which it relates and the Sub-Clause (or other term of the Contract) in which the obligations are specified. If any such instruction constitutes a Variation, Clause 13 [Variations and Adjustments] shall apply.

The Contractor shall take instructions from the Employer, or from the Employer's Representative or an assistant to whom the appropriate authority has been delegated under this Clause.

3.5
Determinations

Whenever these Conditions provide that the Employer shall proceed in accordance with this Sub-Clause to agree or determine any matter, the Employer shall consult with the Contractor in an endeavour to reach agreement. If agreement is not achieved, the Employer shall make a reasonable determination in accordance with the Contract, taking due regard of all relevant circumstances and after giving an opportunity to the Contractor of being heard.

The Employer shall give notice to the Contractor of each agreement or determination, with supporting particulars. Each Party shall give effect to each agreement or determination, unless the Contractor gives notice, to the Employer, of his dissatisfaction with a determination within 14 days of receiving it. Either Party may then refer the dispute to arbitration in accordance with Sub-Clause 20.3 [Arbitration].

4
The Contractor
4.1
Contractor's General Obligations

The Contractor shall plan, design, execute and complete the Works and commissioning of Products in accordance with the Contract, and shall remedy any defects in the Works or the Products. When completed, the Works or the Products shall be fit for the purposes for which the Works are intended as defined in the Contract.

The Contractor, after obtaining any necessary consent from any relevant authority, shall submit to the Employer, proposals showing the layout of pedestrian routes, lighting, signs, and guarding any road opening or traffic diversion which may be required in connection with the execution of the Works and which the Contractor intends to construct. Any consent given by the Employer to such proposals shall not relieve the Contractor of any obligation under the Contract or absolve the Contractor from any liability for or arising from such proposals or the implementation thereof.

The Contractor's proposals for erection of all ancillary and Temporary Works shall be in

conformity with the proposals submitted along with the tender and modifications thereto as approved by the Employer.

The Contractor shall submit drawings, supporting design calculations where called for by the Employer and other relevant details of all such works to the Employer for approval at least 14 days before he desires to commence such works. Approval by the Employer of any such proposal shall not relieve the Contractor of his responsibility for the adequacy of such works.

No extra payment will be made for complying with the provisions of this clause and the cost of the work under this element shall be deemed to be included in the Price Bid.

The Contractor shall provide the Plant and Contractor's Documents specified in the Contract, and all Contractor's Personnel, Goods, consumables and other things and services, whether of a temporary or permanent nature, required in and for this plan, design, execution, completion and remedying of defects.

The Works shall include any work which is necessary to satisfy the Employer's Requirements, or is implied by the Contract, and all works which (although not mentioned in the Contract) are necessary for stability or for the completion, or safe and proper operation, of the Works.

The Contractor shall be responsible for the adequacy, stability and safety of all Site operations, of all methods of construction and of all the Works.

The Contractor shall, whenever required by the Employer, submit details of the arrangements and methods which the Contractor proposes to adopt for the execution of the Works. No significant alteration to these arrangements and methods shall be made without this having previously been notified to the Employer.

The Contractor shall survey and fix the alignment, set out the buildings maintaining vertical & horizontal clearances and keeping in view important site references and obligatory locations in consultation with the Employer. GTS bench mark, temporary bench marks and three control points on all straights & other details shall be obtained by the Contractor. However, the Employer shall assist and/or facilitate (without any recourse or liability) in such obtaining of GTS bench mark, temporary bench marks etc.

The Contractor shall establish at his cost, at suitable points, additional reference lines and bench marks as may be necessary. The Contractor shall remain responsible for the sufficiency and accuracy of all his benchmarks and reference lines. He shall take precautions to see that lines, points and bench marks fixed by the Employer are not disturbed by his work and shall make good any damage thereto.

4.2

Performance Security

The Contractor shall obtain (at his cost) a Performance Security for proper performance, equal to 10% of Contract value on the eve of signing the Contract Agreement.

.

The Performance Security should be submitted in the form of a Bank Guarantee from a scheduled commercial bank/ financial institution approved by Reserve Bank of India.

The Contractor shall ensure that the Performance Security is valid and enforceable until the Contractor has executed and completed the Works and remedied any defects. If the terms of the Performance Security specify its expiry date, and the Contractor has not become entitled to receive the Performance Certificate by the date 28 days prior to the expiry date, the Contractor shall extend the validity of the Performance Security until the Works have been completed and all defects have been remedied.

The Employer shall not make a claim under the Performance Security, except for amounts to which the Employer is entitled under the Contract in the event of:

(a) failure by the Contractor to extend the validity of the Performance Security as described in the preceding paragraph, in which event the Employer may claim the full amount of the Performance Security,

(b) failure by the Contractor to pay the Employer an amount due, as either agreed by the Contractor or determined under Sub-Clause 2.5 [Employer's Claims] or Clause 20 [Claims, Disputes and Arbitration], within 42 days after the signing of the Contract or determination,

(c) failure by the Contractor to remedy a default within such reasonable period as may be specified by the Employer in its notice after receiving the Employer's notice requiring the default to be remedied, or

(d) circumstances which entitle the Employer to termination under Sub-Clause 15.2 [Termination by Employer], irrespective of whether notice of termination has been given.

The Employer shall return the Performance Security to the Contractor within 21 days after the Contractor has become entitled to receive the Performance Certificate.

4.3

Contractor's Representative

The Contractor shall appoint the Contractor's Representative and shall give him all authority necessary to act on the Contractor's behalf under the Contract.

Unless the Contractor's Representative is named in the Contract, the Contractor shall, prior to the Commencement Date, submit to the Employer for consent the name and particulars of the person the Contractor proposes to appoint as Contractor's Representative. If consent is withheld or subsequently revoked, or if the appointed person fails to act as Contractor's Representative, the Contractor shall similarly submit the name and particulars of another suitable person for such appointment.

The Contractor shall not, as far as practicable, without the prior consent of the Employer, revoke the appointment of the Contractor's Representative or appoint a replacement.

The Contractor's Representative shall, on behalf of the Contractor, receive instructions under Sub-Clause 3.4 [Instructions].

The Contractor's Representative may delegate any powers, functions and authority to any competent person, and may at any time revoke the delegation. Any delegation or revocation shall not take effect until the Employer has received prior notice signed by the Contractor's Representative, naming the person and specifying the powers, functions and authority being delegated or revoked.

The Contractor's Representative and all these persons shall be fluent in the language for communications defined in Sub-Clause 1.4 [Law and Language].

4.4 **Deleted.**

4.5 **Deleted.**

4.6 **Deleted.**

4.7 **Deleted.**

4.8 **Safety Procedures**

4.8.1. **Codes etc to be complied with**

The Contractor shall ensure and arrange at his cost fire and the safety provisions, as per safety code of Indian Standards Institution, safety manuals of the Employer, if any, and such provisions as are locally in force from time to time for all labour, directly or indirectly employed in the works for performance of this Contract. The Contractor will indemnify the Employer from any consequence arising due to Contractor's failure in respect of safety provisions.

Following Codes may be referred to in this connection:

IS 5916 Safety code for construction involving use of hot bituminous materials.
IS 7293 Safety code for working with construction machinery
IS 7969 Safety code for handling and storage of building materials.
IS 8989 Safety code for erection of concrete framed structures.
IS 13415 Protective barriers in and around buildings - Code of Safety
IS 13416 Preventive measures against hazards at work places - Recommendations (Parts - 1 to 5)

4.8.2 First Aid & Industrial Injuries

4.8.2.1 First aid facilities at easily accessible place shall be provided by the Contractor as per the applicable labour laws or Rules of the Authority controlling the area where work is carried out.

4.8.2.2. The Contractor shall make arrangements with hospitals for ambulance service and for treatment of industrial injuries to meet eventualities leading to the need for such facilities. The Employer's Representative shall be informed of their telephone numbers and addresses of the Hospitals.

4.8.2.3 Details of all critical industrial injuries shall be reported promptly to the Employer's Representative.

4.8.2.4 Report shall cover type, nature, cause, physician's report and action for prevention of those types again.

4.8.3 General Safety Rules

4.8.3.1 Smoking within plant, restricted areas, closed areas, near storage place of lubricant oil and fuel etc. is strictly prohibited.

4.8.3.2 The Contractor shall erect and maintain barricades required in connection with his operation to guard or protect

(a) Excavation

(b) Hoisting/lifting

(c) Slab openings

(d) Hazardous areas

(e) Employer's existing property likely to be subjected to damage by the Contractor's operations

(f) Unloading spots

4.8.4 Accidents - Precautions at Worksite

No materials on the sites shall be so stacked or placed as to cause danger or inconveniences to any person or to the public. The Contractor shall provide all necessary fencing and lights to protect the public from accidents and shall be bound to bear expenses of defense of every suit, action or other proceedings at law, that may be brought by any person, for injury sustained, owing to neglect of the above precautions and to pay any damages and costs which may be awarded in any such suit, action or proceeding, to any such person or which may, with the consent of the Contractor be paid to compromise any claim by any such person.

4.8.5 Electrical Equipments - Precautions

All temporary and permanent electrical installations, power distribution and supply required for execution of Work shall be carried out conforming to existing industrial and domestic safety rules and regulations. Important specific points to be noted are as under,

(i) Meter room and main switches should be freely accessible at all times and fully protected against all weather conditions.

(ii) Power distribution system shall be identifiable with display marking on switches.

(iii) All power distribution shall be carried out with coated, adequately insulated and of appropriate current/load rating cables. It shall be securely routed for this purpose. No loose, naked, hanging wires shall be permitted.

(iv) Over load protection devices shall be installed whenever and wherever heavy current/load consuming construction plant or machinery susceptible to hazard is in use and as directed by the Employer's Representative.

(v) Metallic plugs and sockets shall be used in field work. Switch board shall be in close proximity so as to have quick control over the supply.

(vi) Proper and adequate earthing connection should be provided for all installations, plant and machinery and distribution system.

(vii) Hand lamps and inspection lamps shall be adequately insulated and guarded with wire mesh and should have proper plugs for use.

(viii) Security and illuminatory light shall be secured firmly and protected to withstand all weather conditions.

4.8.6 Maintenance of Safety Devices

All scaffoldings, ladders and other safety devices mentioned or described herein shall be maintained in a safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate maintenance facilities shall be provided at or near places at work.

4.8.7 Personal Safety

(a) All necessary personal safety equipment as considered adequate by the Employer's Representative shall be available for use of persons employed on the Site and maintained in a condition suitable for immediate use and the Contractor shall take adequate steps to ensure proper use of equipment by those concerned.

(b) Workers employed on mixing asphaltic materials, cement, and lime mortars/concrete shall be provided with protective footwear and protective gloves.

(c) Those engaged in handling any materials which are injurious to eyes shall be provided with protective goggles.

(d) Workers employed on erection works, etc. shall be provided with helmets, safety belts etc.

(e) Workers employed on concrete finishing, welding, painting and other works above 2 metres height shall be provided with a suitable safety belt, as per the applicable Factory Rules.

4.8.8 Storing Fuel, Oil and Lubricant

The Contractor shall take approval from the Safety Officer of the Employer for storing the lubricants, oil and fuel at site for running the machinery required for the construction.

4.8.9 Fire Extinguishing

Suitable, sufficient number of fire extinguishers for all types of fire, shall be provided at work site. In addition, sufficient number of fire buckets filled with water and sand shall also be provided. The fire fighting equipment as outlined above shall be

dispersed in a suitable and purposeful manner.

4.8.10 Fire Precautions

The Contractor shall comply with regulations of the controlling authority in force at the Site of the Works relating to the precautions to be taken against fire hazards.

4.8.11 Protection arrangements at work site

Adequate protection against any form of damage or deterioration shall be provided for in all sections of the Works. This shall include protective tapes, casings, guard rails and the likes, which shall be provided as necessary. Particular care shall be taken to protect finished surfaces during the execution of adjacent in-situ work. The Contractor shall carryout all steps necessary and comply with the directions and instructions of the Employer's Representative to his satisfaction.

4.8.12 Safety Arrangements for labour

The Contractor shall, at his own expense, arrange for the safety provisions as given above and as required by the Employer's Representative, in respect of all labour directly or indirectly employed for performance of the work and shall provide all facilities in connection therewith. In case the Contractor fails to make arrangements to provide necessary facilities as aforesaid, the Employer's Representative shall be entitled to do so and recover the cost thereof, from the Contractor.

4.8.13 Safety Manual

The Contractor shall submit a Safety Manual indicating the safety measures proposed to be adopted in light of above provisions, for approval of the Employer's Representative.

4.8.14 Accidents - Reporting

The Contractor shall, within twenty four (24) hours of the occurrence of any accident on, or about the Site, or in connection with the execution of the Works, report such accident to the Employer's Representative and to the appropriate authority wherever such report is required by law. The Contractor will indemnify the Employer from all accident cases.

4.8.15 Security Measures

The Contractor shall be responsible at his cost for security of Works for the duration

of the Contract and shall provide and maintain continuously adequate security personnel to fulfill these obligations. The requirements of security measures shall include, but not limited to, maintenance of Law and order at site, provision of all lighting, guard, flagmen, and other measures necessary for protection of Works within the camps and elsewhere at site, for all materials delivered to the site and all persons employed in connection with the Works continuously throughout working and non-working periods including nights, Sundays, holidays, for the duration of the Contract. At work sites in close proximity of traffic corridors where public are likely to come close to the work area, suitable fencing as directed by the Employer's Representative should be provided.

4.8.16 The Contractor shall not disturb the ongoing activities of adjacent Institute, if any. He shall take care that his activities do not result in any kind of accidents, spread of any infection etc in the campus. At the same time he shall as well ensure that his personnel are safe and do not get any infection from the hospital activities.

4.9

Quality Assurance

The Contractor shall institute a quality assurance system / manual to demonstrate compliance with the requirements of the Contract. The system shall be in accordance with the details stated in the Contract. The Employer shall be entitled to audit any aspect of the system. The Employer, at its sole discretion, may direct the Contractor to send the sample for quality check to any national or regional institution in respect of each of the sites. The system / manual should cover the following items as minimum :

i) Q.A. Plan for Basic Construction Materials indicating the details of tests to be undergone before use in works.

ii) Q.A. Plan for site activities indicating the details of tests to be conducted at the various stages of construction for various activities.

iii) In house/on site testing facilities to be developed for materials, site activities and calibration of equipments.

iv) Site documents to be maintained including records of results of tests for materials and workmanship, inventory record on availability of vital materials and their consumption vis-à-vis design requirements, site inspection records, quality audit record, safety audit record, site progress record, etc.

v) Check lists for source approval of materials etc., check lists for site activities and proforma for recording results of tests.

vi) Method statements for important construction activities.

Details of all procedures and compliance documents shall be submitted to the Employer for information before each design and .execution stage is commenced. When any document of a technical nature is issued to the Employer, evidence of the prior approval by the Contractor himself shall be apparent on the document itself.

Compliance with the quality assurance system shall not relieve the Contractor of any of his duties, obligations or responsibilities under the Contract.

4.10
Site Data

The Employer shall have made available to the Contractor for his information, prior to signing of the Contract, all relevant data in the Employer's possession in respect of the Site. Such relevant data shall be indicative only and not exhaustive.

The Contractor shall be responsible for verifying and interpreting all such data. The Employer shall have no responsibility for the accuracy, sufficiency or completeness of such data. The Employer reserves the right to obtain reports on soil testing or other site data from independent agencies, tally the same with the reports submitted by the Contractor and to appoint any committee comprising of such persons as may be decided by the Employer for determining the tolerance limit of variance and suggest necessary changes, which shall be binding on the Contractor.

The responsibility of Contractor under this sub-clause is full and final and no claim by the Contractor for additional payment or extension of time shall be allowed on the ground of any misunderstanding or misapprehension by the Contractor or that incorrect or insufficient information was given to the Contractor or that he failed to obtain correct and sufficient information.

4.11
Sufficiency of the Contract Price

The Contractor shall be deemed to have satisfied himself as to the correctness and sufficiency of the Contract Price.

Unless otherwise stated in the Contract, the Contract Price covers all the Contractor's obligations under the Contract (including those under Provisional Sums, if any) and all things necessary for the proper planning, design, execution and completion of the Works and the remedying of any defects.

4.12
Unforeseeable Difficulties

Except as otherwise stated in the Contract:

(a) the Contractor shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Works;

(b) by signing the Contract, the Contractor accepts total responsibility for having foreseen all difficulties and costs of successfully completing the Works; and

(c) the Contract Price shall not be adjusted to take account of any unforeseen difficulties or costs.

4.13 Rights of Way and Facilities

The Contractor shall bear all costs and charges for special and/or temporary rights-of-way which he may require, including those for access to the Site. The Contractor shall also obtain, at his risk and cost, any additional facilities outside the Site which he may require for the purposes of the Works.

4.14 Avoidance of Interference

The Contractor shall not interfere unnecessarily or improperly with:

(a) the convenience of the public, or

(b) the access to and use and occupation of all roads and footpaths, irrespective of whether they are public or in the possession of the Employer or of others.

The Contractor shall indemnify and hold the Employer harmless against and from damages, losses and expenses (including legal fees and expenses) resulting from any such unnecessary or improper interference.

The Contractor shall maintain a safe environment for patients, personnel and public around, if any.

The Contractor shall ensure that his employees do not leave the Site at any time without the permission of the Employer's Representative.

The Contractor shall ensure that the vehicles, machines and equipments, which he uses, are safe and do not cause any harm to patients, students, personnel or public around, if any.

All equipment shall operate under all conditions of load without any sound or vibration, which is objectionable and beyond the limits specified by the relevant laws. In case of rotating machinery sound or vibration noticeable outside the room in which it is installed

or annoyingly noticeable inside its own room shall be considered objectionable. The Contractor at his own expense shall correct such conditions.

Existing roads and other public roads may be used by the Contractor at his risk and cost to carry out construction activities, with prior approval of the competent authority. The Contractor's heavy construction traffic or tracked equipment shall not travel on any public road or bridge, unless the Contractor has made arrangements with the authority concerned and has obtained the approval of the Employer's Representative to such arrangements. The Contractor shall include in his price the cost of strengthening any such public road or bridge if he considers it would be necessary The Contractor shall repair any damage to the road or bear the cost thereof due to movement of contractor's plants and equipment, vehicles etc. to the specifications and satisfaction of road authorities as well as of Employer's Representative.

The Contractor shall plan transportation of construction materials to work site in accordance with traffic regulations enforced by local traffic authorities from time to time and in such a way that road accidents are avoided and minimum in convenience is caused.

No claim whatsoever shall be entertained on this account. The transportation of certain equipments and materials and launching may not be possible during day and may have to be carried out within time schedule specified by traffic police.

The Contractor must note that the Works at most of the sites have to be executed inside a premise of a working hospital. Hence no part of his works shall interfere or damage or cause harm to the existing activities of the neighboring institute.

The Contractor shall ensure that the noise levels are not high and do not disturb the patients inside the hospital and academic activities.

Proper barricading shall be provided to ensure the safety of works and public.

4.15

Access Route

The Contractor shall be deemed to have been satisfied as to the suitability and availability of access routes to the Site. The Contractor shall use reasonable efforts to prevent any road or bridge from being damaged by the Contractor's traffic or by the Contractor's Personnel. These efforts shall include the proper use of appropriate vehicles and routes.

Except as otherwise stated in these Conditions:

(a) the Contractor shall (as between the Parties) be responsible for any maintenance which may be required for his use of access routes;

(b) the Contractor shall provide all necessary signs or directions along access routes, and shall obtain any permission which may be required from the relevant authorities for his use of routes, signs and directions;

(c) the Employer shall not be responsible for any claims which may arise from the use or otherwise of any access route,

(d) the Employer does not guarantee the suitability or availability of particular access routes, and

(e) Costs due to non-suitability or non-availability, for the use required by the Contractor, of access routes shall be borne by the Contractor.

4.16
Transport of Goods and Products

Unless otherwise stated in the Particular Conditions:

(a) the Contractor shall give the Employer not less than 21 days' notice of the date on which any Plant or a major item of other Goods or Products will be delivered to the Site;

(b) the Contractor shall be responsible for packing, loading, transporting, receiving, unloading, storing and protecting all Goods, Products and other things required for the Works;

(c) the Contractor shall be responsible for making all transport arrangements and for payment of freight and insurance costs for the shipment and delivery of Goods and Products and other things required for the Works and

(d) the Contractor shall indemnify and hold the Employer harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from the transport of Goods and Products, and shall negotiate and pay all claims arising from their transport.

4.17
Inspection of Goods and Products

All Goods and Products may be subjected to inspection and testing by the Employer or its designated representatives at all times and places including the period of manufacture and in any event prior to final acceptance by the Employer.

Neither the carrying out of any inspection of the Goods or Products nor any failure to undertake any such inspections shall relieve the Contractor of any of their warranties or the performance of any obligations under the Contract.

For such Products as may be specified by the Employer from time to time, the Contractor shall obtain prior appproval of the makes and models of the Products to be supplied, not less than 15 days prior to the scheduled supply of such Products. To facilitate the Employer in giving such approval, all technical details and specifications of the various makes and models of the Products to be supplied shall be provided by the Contractor to the Employer.

For Goods or Products supplied from within India.

a) For Goods or Products supplied from within India, the Employer retains the right to perform pre-shipment inspection at the manufacturer's premises, if necessary or any place where the Goods or Products have been commissioned and are currently in use and an independent quality control laboratory testing at its own cost.

b) The Employer will retain the right to perform further inspections and quality testing at any time till the satisfactory installation of Goods or Products, as it deems fit, at its own cost.

Should any inspected or tested Goods or Products fail to conform to the specifications, the Employer shall reject them and the Contractor shall replace the rejected Goods or Products free of cost to the Employer, within a period of 45 (forty-five) days or such other period as may be specified by the Employer, of intimating such rejection.

4.18. Acceptance and Rejection of Goods and Products

Under no circumstances shall the Employer be required to accept any Goods or Products that do not conform to the specifications of or requirements of the Contract. The Employer may condition acceptance of the Goods and Products upon the successful completion of acceptance tests, as may be specified in the Contract or otherwise agreed in writing by the Parties. In no case shall the Employer be obligated to accept any Goods or Products unless and until the Employer has inspected the Goods or Products following commissioning of the Goods or Products in accordance with the requirements of the Contract. The Goods or Products shall be deemed to be accepted only after the Employer provides written acceptance.

Notwithstanding any other rights of, or remedies available to, the Employer under the Contract, in case any of the Goods or Products is defective or otherwise does not conform to the specifications or other requirements of the Contract, the Employer may, at its sole option, reject or refuse to accept the Goods or Products, and the Contractor agrees promptly to replace such Goods or Products with Goods or Products of equal or better quality.

4.19.

Consumables

relating to Products

Rates and specifications of consumables relating to Products along with the names of the suppliers, as applicable shall be obtained by the Contractor and shall be forwarded to the Employer at the time installation of the Products. However, the Contractor shall not be required to procure such consumables.

4.20.

Title

Unless otherwise expressly provided in the Contract, title in and to the Plants, Materials, Products shall pass from the Contractor to the Employer upon delivery of such Plants, Materials and Products and their acceptance by the Employer in accordance with the requirements of the Contract.

4.21

Warranties

Products Warranties:

Without limitation of any other warranties stated in or arising under the Contract, the Contractor warrants and represents that:

(a) The Products, including all packaging and packing thereof, conform to the specifications of the Contract, are fit for the purposes for which such Products are ordinarily used and for the purposes expressly made known in writing by the Employer to the Contractor, and shall be of even quality, free from faults and defects in design, material, manufacture and workmanship under normal use in the conditions prevailing in the country of final destination;

(b) If the Contractor is not the original manufacturer of the Products, the Contractor shall provide the Employer with the benefit of all manufacturers warranties in addition to any other warranties required to be provided hereunder;

(c) The Products are of the quality, quantity and description required by the Contract;

(d) The Products are free from any right of claim by any third-party and unencumbered by any title or other rights, including any liens or security interests and claims of infringement of any intellectual property rights, including, but not limited to, patents, copyright and trade secrets.

(e) Unless otherwise indicated in the Technical Specifications, this warranty shall remain valid for 3 (three) years after the Products have been commissioned at the final destination indicated in the Contract subject to issue of certificate regarding date of commissioning issued by the Employer.

(f) During the warranty, free comprehensive annual maintenance and repairs services including testing and calibration, labour and spares shall be provided by the Contractor during the period of warranty. If necessary, the Contractor shall engage qualified person to carry out maintenance, repair etc.

(g) If the Contractor, having been notified, fails to remedy the defect(s) within the stipulated period, the Employer may proceed to take such remedial action as may be necessary, at the Contractor's risk and expense and without prejudice to any other rights which the Employer may have against the Contractor under the Contract.

The Contractor shall visit each installation site as recommended in the manufacturers technical/ service/ operational manual, but at least once in three months during the warranty period for preventive maintenance.

The Products shall be new and unused. The Contractor shall remain responsive to the needs of the Employer for any services that may be required in connection with any of the Contractors warranties under the Contract. During any period in which the Contractors warranties are effective, upon notice by the Employer that the Products do not conform to the requirements of the Contract, the Contractor shall replace the defective Products with Products of the same or better quality or fully reimburse the Employer for the purchase price paid for the defective Products; and if having been notified by any means, the Contractor fails to replace the defective Products within 30 days or such other period as may be specified by the Employer, The Employer may proceed to take such remedial action as may be necessary, at the Contractors risk and expense and without prejudice to any other rights which the Employer may have against the Contractor under the Contract.

4.22
Comprehensive Maintenance
Contract (Including Spare parts)

The Employer, may, at his own and sole discretion enter into a Comprehensive Maintenance Contract (CMC) with the Contractor/Supplier, three months prior to the completion of Warranty Period, at the price quoted in the Price Bid, for a period as specified in the Tender after the expiry of the warranty period provided that this service shall not relieve the Contractor of any warranty obligations under this Contract. Wherever the Technical Specifications lay down a different period of CMC, this latter period shall prevail. The CMC will commence from the date of expiry of warranty period. The CMC includes preventive maintenance including testing & calibration as per technical/service/ operational manual, labour and spares.

The CMC includes repairs of entire system, preventive maintenance, testing & calibration, labour and spares and all software updates.

The Comprehensive Annual Maintenance and Repair Charges (after Warranty period) shall be paid quarterly in four equal installments.

Details of CMC requirements or otherwise, as spelt out in the Employer's Requirement, will prevail over those given in this section.

4.23

Contractor's Equipment The Contractor shall be responsible for all Contractor's Equipment. When brought on to the Site, Contractor's Equipment shall be deemed to be exclusively intended for the execution of the Works.

For any imported equipments or part thereof offered by the Contractor, he will have to make his own arrangements for import formalities and procurement of equipments without involving the Employer in any way for any clearance certificates /licenses /assistance.

The Employer may, at his sole discretion, assist (but is not obligated to) the Contractor, where required, in obtaining clearance through the Customs for Constructional Plant, Materials and other things required for the Works.

The Contractor shall obtain all permits / licenses and pay for any and all fees required for the inspection, approval and commissioning of their installation.

4.24
Protection of the Environment

The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations.

The Contractor shall maintain ecological balance by preventing deforestation, water pollution and defacing of natural landscape. The Contractor shall so conduct his construction operations as to prevent any avoidable destruction, scarring or defacing of natural surrounding in the vicinity of work. In respect of ecological balance, the Contractor shall observe the following instructions for which no extra payments will be made.

(a) Where destruction, scarring, damage or defacing may occur as a result of operations relating to Permanent or Temporary Works, the same shall be repaired, replanted or otherwise corrected at Contractor's expense. All work areas shall be smoothened and graded in a manner to conform to natural appearance of the landscape as directed by the Employer's Representative.

(b) All trees and shrubbery, which are not specifically required to be cleared or removed for construction purposes, shall be preserved and shall be protected from any damage that may be caused by Contractor's construction operations and equipment or by their Employees/Workers. The removal of trees or shrubs will be permitted only after prior approval of the Employer's Representative. Special care shall be exercised where trees or shrubs are exposed to injuries by construction equipment, blasting, excavating, dumping, chemical damage or other operation and

the Contractor shall adequately protect such trees by use of protective barriers or other methods approved by the Employer's Representative. Trees shall not be used for anchorage. The Contractor shall be responsible for injuries to trees and shrubs caused by his operations and Employees/Workers. The terms "injury" shall include, without limitation, bruising, scarring, tearing and breaking of roots, trunks or branches. All injured trees and shrubs shall be restored as nearly practicable, without delay, to their original condition at Contractor's expense.

(c) Where trees have to be necessarily cut for progressing temporary or permanent works, the Contractor shall arrange for compensatory afforestation as may be required by Environmental Rules and Regulations.

(d) In the conduct of construction activities and operation of equipments, the Contractor shall utilize such practicable methods and devices as are reasonably available to control, prevent and otherwise minimize air/ noise pollution.

(e) Excessive emission of dust into the atmosphere will not be permitted during manufacture, handling and storage of concrete aggregates/fly ash/ earth/building materials and the Contractor shall use such methods and equipment as are necessary for collection and disposal or prevention of dust during these operations. The Contractor's method of storing and handling cement shall also include means of eliminating atmospheric discharge of dust. Equipment and vehicles that give objectionable emission of exhaust gases shall not be operated. Burning of materials resulting from cleaning of trees branches, combustible construction materials and rubbish may be permitted only when atmospheric conditions for burning are considered favourable.

(f) Special care must be exercised in ensuring that the labour housed in labour camp within the work site area do not indulge in any activity like drinking alcohol, taking drugs etc and other activities that may affect the ecological balance such as cutting of shrubs for fuel, creating open air nuisance etc.

The Contractor shall not cut or destroy any tree in the campus to the maximum extent possible. In case any tree is to be cut he shall obtain prior permission from the competent authority under the relevant laws and shall plant equal number of saplings or adhere to the requirements of the prevailing Environmental laws / terms of the permission, whichever is more stringent. The Employer may assist the Contractor in obtaining such permission, including signing necessary documents. The Contractor shall use all means to minimize the effluents from his construction work and transportation activity or any other activity in the course of the execution of the Works.

4.25
Electricity, Water and

Gas

The Contractor shall, except as stated below, be responsible for the provision of all power, water and other services he may require.

The Contractor shall be entitled to use for the purposes of the Works such supplies of electricity, water, gas and other services as may be available on the Site. The Contractor shall at his risk and cost, provide any apparatus necessary for his use of these services and for measuring the quantities consumed.

The quantities consumed and the amounts due (at these prices) for such services shall be agreed or determined in accordance with Sub-Clause 2.5 [Employer's Claims] and Sub-Clause 3.5 [Determinations], The Contractor shall pay these amounts to the Employer.

4.26
Employer's Equipment

The Employer shall not supply any material, tools, plant, machinery or equipment. The Contractor has to arrange all tools, plant, equipment as well as construction materials required for the work.

4.27
Progress Report

Unless otherwise stated in the Particular Conditions, fortnightly progress reports shall be prepared by the Contractor and submitted to the Employer in six copies. The first report shall cover the period up to the end of the first calendar month following the Commencement Date. Reports shall be submitted fortnightly thereafter, each within 7 days after the last day of the period to which it relates.

Reporting shall continue until the Contractor has completed all work which is known to be outstanding at the completion date stated in the Taking-Over Certificate for the Works.

Each report shall include:

(a) charts and detailed descriptions of progress, including each stage of design, Contractor's Documents, procurement, manufacture, delivery to Site, construction, erection, testing, commissioning and trial operation;

(b) photographs and videographs showing the status of manufacture and of progress on the Site;

(c) for the manufacture of each main item of Plant and Materials, the name of the manufacturer, manufacture location, percentage progress, and the actual or expected dates of;

(i) commencement of manufacture,

(ii) Contractor's inspections,

(iii) tests,

(iv) shipment and arrival at the Site, and

(v) installation

(d) the details described in Sub-Clause 6.10 [Records of Contractor's Personnel and Equipment];

(e) copies of quality assurance documents, test results and certificates of Materials;

(f) list of Variations, notices given under Sub-Clause 2.5 [Employer's Claims] and notices given under Sub-Clause 20.1 [Contractor's claims];

(g) safety statistics, including details of any hazardous incidents and activities relating to environmental aspects and public relations; and

(h) comparisons of actual and planned progress, with details of any events or circumstances which may jeopardize the completion in accordance with the Contract, and the measures being (or to be) adopted to overcome delays.

4.28
Security of the Site

Unless otherwise stated in the Particular Conditions:

(a) the Contractor shall be responsible for keeping unauthorised persons off the Site, and

(b) authorised persons shall be limited to the Contractor's Personnel and the Employer's Personnel; and to any other personnel notified to the Contractor, by (or on behalf of) the Employer, as authorised personnel of the Employer's other contractors on the Site.

4.29
Contractor's Operations on Site

The Contractor shall confine his operations to the Site, and to any additional areas which may be obtained by the Contractor and agreed by the Employer as working areas. The Contractor shall take all necessary precautions to keep Contractor's Equipment and Contractor's Personnel within the Site and these additional areas, and to keep them off adjacent land.

During the execution of the Works, the Contractor shall keep the Site free from all unnecessary obstruction, and shall store or dispose of any Contractor's Equipment or surplus materials. The Contractor shall clear away and remove from the Site any wreckage, rubbish and Temporary Works which are no longer required. All surface and sub-soil drains at the site shall be maintained in a clean, sound and satisfactory state of performance

Upon the issue of the Taking-Over Certificate for the Works, the Contractor shall clear away and remove all Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works. The Contractor shall leave the Site and the Works in a clean and safe condition. However, the Contractor may retain on Site, during the Defects Notification Period, such Goods as are required for the Contractor to fulfill obligations under the Contract

.

4.30 Watching and Lighting

The Contractor shall in connection with the Works, provide and maintain at his own cost all lights, guards, fencing and watching when and where necessary or as required by the Employer's Representative or by any duly constituted authority, for the protection of the Works, or for the safety and convenience of the public or others.

4.31 Way leaves etc.

The Contractor shall bear all costs and charges for special or temporary way leaves required by him in connection with access to the Site. The Contractor shall also provide at his own cost any additional accommodation outside the Site required by him for the purposes of the Works.

4.32 Site Office for the Employer

The Contractor will provide free of cost temporary furnished accommodation for the Employer's Representative and his staff, at the site of work, in terms of Section 5 (Employers Requirements). On expiry of the maintenance period, the Site Office shall be dismantled and site cleared unless the Employer directs otherwise. The furniture will be returned to the Contractor at whatever conditions they are an expiry of maintenance period.

4.33
Fossils, Discoveries
Items of Value

All fossils, coins, articles of value or antiquity, and structures and other remains or items of geological or archaeological interest found on the Site shall be placed under the care and authority of the Employer. The Contractor shall take reasonable precautions to prevent Contractor's Personnel or other persons from removing or damaging any of these findings.

The Contractor shall, upon discovery of any such finding, promptly give notice to the Employer, who shall issue instructions for dealing with it and shall take step in accordance with law upon intimating the competent authority. If the Contractor suffers delay and/or incurs Cost from complying with the instructions, the Contractor shall give a further notice to the Employer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.5 [Extension of Time for Completion], and

After receiving this further notice, the Employer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

The Contractor must note that the project may involve some items of demolition. If during such works, the Contractor finds any items of Salvage Value, which can be sold, he shall indicate the same in the fortnightly progress report submitted to the Employer and sell it off only after the approval from the Employer. The payments shall be adjusted accordingly as per the decision of the Employer's Representative.

4.34 Production of Vouchers etc by the Contractor

The Contractor shall, whenever required produce or cause to be produced for examination by the Employer's Representative any quotation, invoice, cost or other account, book of accounts, voucher, receipt, letter, memorandum, paper of writing or any copy of or extract from any such document and also furnish information and returns verified in such manner as may be required in any way relating to the execution of this Contract or relevant for verifying or ascertaining cost of execution of this Contract and the decision of the Employer's Representative on the question of relevancy of any documents, information or return being final and binding on the parties. The Contractor shall similarly produce vouchers etc. if required to prove to the Employer's Representative that the materials supplied by him, are in accordance with the specifications laid down in the Contract.

The obligations imposed by the Employer as above are without prejudice to the obligations of the Contractor under any statute, rules or orders binding on the Contractor.

5
Design

5.1
General Design Obligations

The Contractor shall be deemed to have scrutinised the Employer's Requirements (including design criteria and calculations, if any). The Contractor shall be responsible

for the design of the Works and for the accuracy of such Employer's Requirements (including design criteria and calculations), except as stated below.

The Employer shall not be responsible for any error, inaccuracy or omission of any kind in the Employer's Requirements as originally included in the Contract and shall not be deemed to have given any representation of accuracy or completeness of any data or information, except as stated below, Any data or information received by the Contractor, from the Employer or otherwise, shall not relieve the Contractor from his responsibility for the design and execution of the Works.

The Contractor shall submit its structural drawing upto plinth level and concept architectural design as vetted by the institutions recommended by the Employer or any structural and architectural firm having a minimum of 20 years of experience in such field, which is empanelled with any metropolitan municipal body in India and make a Microsoft Power Point presentation to the Employer or its designated representatives or the approval authority within 35 days from the date of issue of Letter of Acceptance / Notification of Award.

If the Employer's Representative has reasonable cause for being dissatisfied with the Contractor's drawings or documents the Employer shall, within a period of 14 days from the date of submission, require the Contractor in writing to make such amendments thereto as the Employer may consider necessary. The Contractor shall make and be bound by such amendments at no additional expense to the Employer and shall resubmit the amended drawings or documents for the Employer's approval for the execution of Works within the next 7days. The Employer shall then intimate the Contractor its in-principle approval to such amended drawings or documents within the next 7 days. The Employer, at its sole discretion may approve such design, drawing or documents in a phased manner so as to expedite the Works.

No extension of time or extra payment shall be given to the Contractor to comply with the above.

Should it be found at any time after notification of consent that the relevant drawings or documents do not comply with the Contract or do not agree with drawings or documents in relation to which the Employer has previously notified his consent, the Contractor shall, at his own expense, make such alterations or additions as, in the opinion of the Employer, are necessary to remedy such non-compliance or non-agreement and shall submit all such varied or amended drawings or documents for the consent of the Employer.

In no circumstances, the Contractor shall commence the construction work beyond 75 days from the date of Notification of Award / Letter of Acceptance.

5.2

Contractor's Documents The Contractor's Documents shall comprise the technical documents specified in the Employer's Requirements, documents required to satisfy all regulatory approvals, and the documents described in Sub-Clause 5.6 [As-Built Documents] and Sub-Clause 5.7 [Operations Maintenance and Service Manuals] and shall include the following :

(a) Detailed drawings including the structural working drawings, architectural working drawings, electrical working drawing including air-conditioning, fire fighting, medical gas pipeline lay out plan, drainage, pavement drawing, sanitary and water supply, bio-medical waste disposal etc.
(b) Consolidated statement in a tabular form for the Standards and Specifications being followed in the design and for materials to be used including that for flooring, internal and external finishes
(c) List of suppliers from whom the materials are proposed to be procured
(d) Tests required to be carried out in the Contract
(e) Outline safety plan for the site and an outline quality plan

Unless otherwise stated in the Employer's Requirements, the Contractor's Documents shall be written in English only.

The Contractor shall include in his design, in additions to space and operational needs, considerations of provisions for infection control, life safety, and protection of affected person during construction and the progress of the Project as detailed out in Employer's Requirements.

The Contractor shall also include in his design provision of landscaping, parking and setting things back into the shape as the original as said in Employer's Requirements.

The Contractor shall satisfy himself that the Design Data, in the case of submissions up to and including the proposed Design, comply with the Employer's Requirements and is in accordance with, and incorporates the Contractor's Technical Proposals.

In the case of submissions subsequent to the proposed Design, the Design Data shall be in accordance with Employer's Requirements and the accepted Design.

The Contractor shall prepare all Contractor's Documents, and shall also prepare any other documents necessary to instruct the Contractor's Personnel.

If the Employer's Requirements describe the Contractor's Documents which are to be submitted to the Employer for review, they shall be submitted accordingly, together with a notice as described below. In the following provisions of this Sub-Clause, (i) "review period" means the period required by the Employer for review, and (ii) "Contractor's Documents" exclude any documents which a required to be submitted for review.

Unless otherwise stated in the Employer's Requirements, each review period shall not exceed 21 days, calculated from the date on which the Employer receives a Contractor's Document and the Contractor's notice. This notice shall state that the Contractor's Document is considered ready, both for review in accordance with this Sub-Clause and for use. The notice shall also state that the Contractor's Document complies with the Contract, or the extent to which it does not comply.

The Employer may, within the review period, give notice to the Contractor that a Contractor's Document fails (to the extent stated) to comply with the Contract. If a Contractor's Document so fails to comply, it shall be rectified, resubmitted and reviewed in accordance with this Sub-Clause, at the Contractor's cost.

For each part of the Works, and except to the extent that the Parties otherwise agree:

(a) execution of such part of the Works shall not commence prior to the expiry of the review periods for all the Contractor's Documents which are relevant to its design and execution;

(b) execution of such part of the Works shall be in accordance with these Contractor's Documents, as submitted for review; and

(c) if the Contractor wishes to modify any design or document which has previously been submitted for review, the Contractor shall immediately give notice to the Employer. Thereafter, the Contractor shall submit revised documents to the Employer in accordance with the above procedure.

Any such agreement (under the preceding paragraph) or any review (under this Sub-Clause or otherwise) shall not relieve the Contractor from any obligation or responsibility.

5.3
Contractor's Undertaking

The Contractor undertakes that the design, the Contractor's Documents, the execution and the completed Works will be in accordance with:

(a) the Laws in the Country, and

(b) the documents forming the Contract, as altered or modified by Variations.

5.4
Technical Standards and Regulations

The design, the Contractor's Documents, the execution and the completed Works shall comply with the Country's technical standards, building, construction and environmental

laws, Laws applicable to the product being produced from the Works, and other standards specified in the Employer's Requirements, applicable to the Works, or defined by the applicable Laws.

All these Laws shall, in respect of the Works and each Section, be those prevailing when the Works or Section are taken over by the Employer under Clause 10 [Employer's Taking Over].

If changed or new applicable standards come into force in the Country after the Letter of Acceptance/ Notification of Award, the Contractor shall give notice to the Employer and (if appropriate) submit proposals for compliance. In the event that:

(a) the Employer determines that compliance is required, and

(b) the proposals for compliance constitute a variation,

then the Employer shall initiate a Variation in accordance with Clause 13 [Variations and Adjustments].

In the case of any class of work for which there is no such specification as referred to in Sub-Clause 5.2 above, such work shall be carried out in accordance with the Bureau of Indian Standards Specifications. In case there is no such specification in Bureau of India Standards, the work shall be carried out as per manufacturer's specifications. In case there are no such specifications as required above, the work shall be carried out in all respects in accordance with the instructions and requirements of the Employer's Representative.

5.5

Training

The Contractor shall carry out the training of Employer's Personnel in the operation and maintenance of the Works to the necessary staffs and/or employees of the Employer, as may be indicated by the Employer in writing within 30 days of installation of the equipments. The Contractor shall also provide relevant manual of each of the equipments. If the Contract specifies training which is to be carried out before taking-over, the Works shall not be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 [Taking Over of the Works and Sections] until this training has been completed. During each preventive maintenance service, training to be imparted to the Employer's staff, as may be specified by the Employer.

5.6

As-Built Documents

The Contractor shall prepare, and keep up-to-date, a complete set of "as-built" 'records of the execution of the Works, showing the exact as-built locations, sizes and details of the work as executed. These records shall be kept on the Site and shall be used

exclusively for the purposes of this Sub-Clause. Six copies shall be supplied to the Employer prior to the commencement of the Tests on Completion.
In addition, the Contractor shall supply to the Employer as-built drawings of the Works, showing all Works as executed, and submit them to the Employer for review under Sub-Clause 5.2 [Contractor's Documents]. The Contractor shall obtain the consent of the Employer as to their size, the referencing system, and other relevant details.

Prior to the issue of any Taking-Over Certificate, the Contractor shall supply to the Employer the specified numbers and types of copies of the relevant as-built drawings, in accordance with the Employer's Requirements, The Works shall not be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 [Taking Over of the Works and Sections] until the Employer has received these documents.

5.7
Operation, Maintenance and Service Manuals

Prior to commencement of the Tests on Completion, the Contractor shall supply to the Employer provisional operation, maintenance and service manuals (both in physical and electronic copies) in sufficient detail for the Employer to operate, maintain, dismantle, reassemble, adjust and repair the Plant.

The Works shall not be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 [Taking Over of the Works and Sections] until the Employer has received final operation and maintenance manuals in such detail, and any other manuals specified in the Employer's Requirements for these purposes.

5.8
Design Error

If errors, omissions, ambiguities, inconsistencies, inadequacies or other defects are found in the Contractor's Documents, they and the Works shall be corrected at the Contractor's cost, notwithstanding any consent or approval under this Clause.

6
Staff and Labour

6.1
Engagement of Staff and Labour

The Contractor shall make arrangements for the engagement of all staff and labour, local or otherwise, and for their payment, housing, feeding and transport.

6.2
Rates of Wages and

Conditions of Labour

The Contractor shall pay rates of wages, and observe conditions of labour, which, are not lower than those established for the trade or industry where the work; is carried out. If no established rates or conditions are applicable, the Contractor shall pay rates of wages and observe conditions which are not lower than the general level of wages and conditions observed locally by employers whose trade or industry is similar to that of the Contractor. The Contractor must familiarize himself and comply with relevant labour laws like Minimum Wages Act, 1948 and Contract Labour (Regulation and Abolition) Act, 1970, etc. No extra payment whatsoever shall be made to the Contractor to comply with the rules and laws.

6.3
Persons in the Service of Others

The Contractor shall not recruit, or attempt to recruit, staff and labour from amongst the Employer's Personnel.

6.4
Labour Laws

The Contractor shall comply with all the relevant labour laws applicable to the Contractor's Personnel, including Laws relating to their employment, health, safety, welfare, immigration and emigration, and shall allow them all their legal rights.

The Contractor shall require his employees to obey all applicable Laws, including those concerning safety at work.

6.5
Working Hours

No work shall be carried out on the Site on locally recognised days of rest, or outside normal working hours, unless:

(a) otherwise stated in the Contract,

(b) the Employer gives consent, or

(c) the work is unavoidable, or necessary for the protection of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Employer.

Where work is permitted outside normal working hours by the Employer's Representative to facilitate the Contractor's Work operations, temporary lighting equipment as per approved layout shall be provided, installed, maintained for the duration of the contract and removed after completion of work by and at the expense of the Contractor.

No extra payment will be made to the Contractor for the provision of temporary lighting and fire prevention measures

6.6
Facilities for Staff and Labour

The Contractor shall provide and maintain all necessary accommodation and welfare facilities for the Contractor's Personnel. The Contractor shall also provide facilities for the Employer's Personnel as stated in the Employer's Requirements. The Contractor at his cost shall maintain all accommodation in a clean and sanitary condition.

The Contractor shall hot permit any of the Contractor's Personnel to maintain any temporary or permanent living quarters within the structures forming part of the Permanent Works.

The Contractor shall prepare and submit compliance reports of adherence to labour laws as and when desired by the Employer's Representative.

6.7
Health and Safety

The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's Personnel. In collaboration with local health authorities, the Contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times at the Site and at any accommodation for Contractor's and Employer's Personnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics.

The Contractor shall appoint an accident prevention officer at the Site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents. Throughout the execution of the Works, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority.

The Contractor shall send, to the Employer, details of any accident as soon as practicable after its occurrence. The Contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the Employer may reasonably require.

6.8
Contractor's Superintendence

Throughout the design and execution of the Works, and as long thereafter as is necessary to fulfill the Contractor's obligations, the Contractor shall provide all necessary superintendence to plan, arrange, direct, manage, inspect and test the work.

Superintendence shall be given by a sufficient number of persons having adequate knowledge of the language for communications (defined in Sub-Clause 1.4 [Law and Language]) and of the operations to be carried out (including the methods and

techniques required, the hazards likely to be encountered and methods of preventing accidents), for the satisfactory and safe execution of the Works.

6.9
Contractor's Personnel

The Contractor's Personnel shall be appropriately qualified, skilled and experienced in their respective trades or occupations. The Employer may require the Contractor to remove (or cause to be removed) any person employed on the Site or Works, including the Contractor's Representative if applicable, who:

(a) persists in any misconduct or lack of care,

(b) carries out duties incompetently or negligently,

(c) fails to conform with any provisions of the Contract, or

(d) persists in any conduct which is prejudicial to safety, health, or the protection of the environment.

If appropriate, the Contractor shall then appoint (or cause to be appointed) a suitable replacement person.

6.10
Records of Contractor's Personnel and Equipment

The Contractor shall submit, to the Employer, details showing the number of each class of Contractor's Personnel and of each type of Contractor's Equipment on the Site. Details shall be submitted each calendar month, in a form approved by the Employer, until the Contractor has completed all work which is known to be outstanding at the completion date stated in the Taking-Over Certificate for the Works.

6.11
Disorderly Conduct

The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst the Contractor's Personnel, and to preserve peace and protection of persons and property on and near the Site.

6.12
Removal from Site of Undesirable Person

The Employer's Representative may require the Contractor to dismiss or remove from the site of the work any person or persons in the Contractor's employ upon the work who may be incompetent or misconduct himself and the Contractor shall forthwith comply with such requirements.

6.13
Unauthorised Occupation

of Building during Construction

It shall be the responsibility of the Contractor to see that the building under construction is not occupied by any body unauthorisedly during construction, and is handed over to the Employer's Representative with vacant possession of complete building. If such building though completed is occupied illegally, then the Employer's Representative shall have the option to refuse to accept the said building/ buildings in that position. Any delay in acceptance on this account will be treated as the delay in completion and for such delay a levy upto 5% of tendered value of work may be imposed by the Employer's Representative whose decision shall be final both with regard to the justification and quantum and be binding on the Contractor.

However, the Employer's Representative, through a notice, may require the Contractor to remove the illegal occupation any time on or before construction and delivery.

7
Plant, Materials, and Workmanship

7.1
Manner of Execution

The Contractor shall carry out the manufacture of Plant, the production and manufacture of Materials, and all other execution of the Works:

(a) in the manner (if any) specified in. the Contract,
(b) in a proper workmanlike and careful manner, in accordance with recognised good practice, and;
(c) with properly equipped facilities and non-hazardous Materials, except as otherwise specified in the Contract,

7.2
Samples

The Contractor shall submit samples to the Employer, for review in accordance with the procedures for Contractor's Documents described in Sub-Clause 5.2 [Contractor's Documents], as specified in the Contract and at the Contractor's cost. Each sample shall be labelled as to origin and intended use in the Works.

7.3
Inspection

The Employer's Personnel shall at all reasonable times:

(a) have full access to all parts of the Site and to all places from which natural Materials are being obtained, and:

(b) during production, manufacture and construction (at the Site and, to the extent specified in the Contract, elsewhere), be entitled to examine, inspect, measure and test the materials and workmanship, and to check the progress of manufacture of Plant and production and manufacture of Materials.

The Contractor shall give the Employer's Personnel full opportunity to carry out these activities, including providing access, facilities, permissions and safety equipment. No such activity shall relieve the Contractor from any obligation or responsibility.

In respect of the work which Employer's Personnel are entitled to examine, inspect, measure and/or test, the Contractor shall give notice to the Employer whenever any such work is ready and before it-is covered up, put out of sight, or packaged for storage or transport. The Employer shall then either carry out the examination, inspection, measurement or testing without unreasonable delay, or promptly give notice to the Contractor that the Employer does not require to do so. If the Contractor fails to give the notice, he shall, if and when required by the Employer, uncover the work and thereafter reinstate and make good, all at the Contractor's cost.

7.4

Testing

This Sub-Clause shall apply to all tests specified in the Contract, other than the Tests after Completion (if any).

The Contractor shall provide all apparatus, assistance, documents and other information, electricity, equipment, fuel, consumables, instruments, labour, materials, and suitably qualified and experienced staff, as are necessary to carry out the relevant tests as per IS Code efficiently. The Contractor shall agree, with the Employer, the time and place for the specified testing of any Plant, Materials and other parts of the Works.

The Employer may, under Clause 13 [Variations and Adjustments], vary the location or details of specified tests, or instruct the Contract varied or additional tests show that the tested Plant, Materials or workmanship is not in accordance with the Contract, the cost of carrying out this Variation shall be borne by the Contractor, notwithstanding other provisions of the Contract.

The Employer shall give the Contractor not less than 24 hours' notice of the Employer's intention to attend the tests. If the Employer does not attend at the time and place agreed, the Contractor may proceed with the tests, unless otherwise instructed by the Employer, and the tests shall then be deemed to have been made in the Employer's presence.

If the Contractor suffers delay and/or incurs Cost from complying with these instructions or as a result of a delay for which the Employer is responsible, the Contractor shall give notice to the Employer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.5 [Extension of Time for Completion].

After receiving this notice, the Employer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

The Contractor shall promptly forward to the Employer duly certified reports of the tests. When the specified tests have been passed, the Employer shall endorse the Contractor's test certificate, or issue a certificate to him, to that effect. If the Employer has not attended the tests, he shall be deemed to have accepted the readings as accurate.

7.5
Rejection

If, as a result of an examination, inspection, measurement or testing, any Plant, Materials, Goods design or workmanship is found to be defective or otherwise not in accordance with the Contract, the Employer may reject the Plant, Materials, Goods, design or workmanship by giving notice to the Contractor, with reasons. The Contractor shall then promptly make good the defect and ensure that the rejected item complies with the Contract.

If the Employer requires this Plant, Materials, Goods, design or workmanship to be retested, the tests shall be repeated under the same terms and conditions. If the rejection and retesting cause the Employer to incur additional costs, the Contractor shall subject to Sub-Clause 2.5 [Employer's Claims] pay these costs to the Employer.

7.6
Remedial Work

Notwithstanding any previous test or certification, the Employer may instruct the Contractor to:

(a) remove from the Site and replace any Plant or Materials or Goods which is not in accordance with the Contract,

(b) remove and re-execute any other work which is not in accordance with the Contract, and

(c) execute any work which is urgently required for the safety of the Works, whether because of an accident, unforeseeable event or otherwise.

If the Contractor fails to comply with any such instruction, which; complies with Sub-Clause 3.4'[Instructions], the Employer shall be entitled to employ and pay other persons to carry out the work. Except to the extent that the Contractor would have been entitled to payment for the work, the Contractor shall subject to Sub-Clause 2.5 [Employer's Claims] pay to the Employer all costs arising from this failure.

7.7
Ownership of Plant and

Materials Each item of Plant and Materials shall, to the extent consistent with the Laws of the Country, become the property of the Employer, free from liens and other encumbrances, when it is delivered to the Site.

7.8
Royalties Unless otherwise stated in the Employer's Requirements, the Contractor shall pay all royalties, rents and other payments for:

(a) natural Materials obtained from outside the site, and

(b) the disposal of material from demolitions and excavations and of other surplus material (whether natural or man-made), except to the extent that disposal areas within the Site are specified in the Contract.

8 Commencement, Delays and Suspension

8.1
Commencement of Works

(a) The date of commencement of the Works shall be the date of the handing over possession of the Site.

(b) The Contractor shall however commence the design and execution of the Works as soon as is reasonably practicable after the date of Letter of Acceptance / Notification of Award , and shall then proceed with the Works with due expedition and without delay.

8.2
Time for Completion

Time for Completion of the entire project is 15 months in case of Tertiary Heath Care Hospital consisting of G+4 stories

The Contractor shall complete the whole of the Works, and each Section (if any), within the Time for Completion for the Works or Section (as the case may be), including:

(a) achieving the passing of the Tests on Completion, and

(b) completing all work which is stated in the Contract as being required for the Works or Section to be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 [Taking Over of the Works and Sections].

8.3

Programme

Activities in the initial works program would be arranged as per the Works Break Down Structure (WBS) of the work developed by the contractor in consultation with and approved by the Employer's Representative.

As soon as possible after the Contract is concluded the Contractor shall submit a Net Work (PERT/CPM) Time and Progress Chart for each activity and milestone and get it approved by the Employer's Representative. The Chart shall be prepared in direct relation to the time stated in the Contract documents for completion of items of the Works. It shall indicate sequence of various activities of the phased requirement of plant and equipment to be deployed by the Contractor, the forecast of the dates of commencement and completion of various trades of sections of the Work and may be amended as necessary by agreement between the Employer's Representative and the Contractor within the limitations of time imposed in the Contract documents, and further to ensure good progress during the execution of the Work, the Contractor shall in all cases in which the time allowed for any Work, exceeds one month (save for special jobs for which a separate programme has been agreed upon) complete the work as per milestone**s** approved by the Employer**.**

After the work has started, the Contractor shall deliver in every fortnight to the Employer an update of the construction programme showing changes, if any, in planning or progress scheduling and reflecting the progress of all the activities of the network and the project status as at the end of previous month.

If the Contractor falls behind the approved construction programme by more than one month, he shall, within fourteen days of the date of such information, submit for approval, a revision of the construction programme showing the proposed measures, including augmentation of plant, labour and material resources to complete the works on time.

Whenever the Contractor proposes to change the construction program he shall immediately advise the Employer's Representative in writing and, if the Employer's Representative considers the change a major one, the Contractor shall submit a revised program for approval.

Detailed Network Plan (Works Programme)

Detailed Network Plan shall be prepared by the Contractor for each and every activity within the same time frame and in the same sequence as indicated in the master network plan. Activity at this level shall not be more than 15 days duration, except for summary items like procurement/ mobilization etc. Such programme shall be according to such computer programme as determined by the Employer from time to time and for the time being in the latest version of Microsoft Projects. A copy of the same shall also

be installed at a designated computer of the Employer. The data shall be updated fortnightly in the designated computer at the office of the Employer by the Contractor. The Employer shall compare the projected progress and the actual progress and if upon comparison finds that the actual progress is not satisfactory, the Employer shall issue instruction to the Contractor to meet the projected progress within a particular time period.

The Employer's monitoring team will have access to all the data/information of the Contractor, required for the assessment of the progress and monitoring. If necessary, the monitoring team will visit the Vendor/Contractor's works in order to assess the status of critical activities.

The Employer will hold periodic Project Status Review Meetings. The Contractor shall depute his Engineers/Managers at appropriate level as decided by the Employer to attend the Review Meetings.

The Contractor shall provide additional inputs whenever there is a possible slippage in the completion schedule. Such additional inputs may require supplementing of equipment, personnel, work in excess of the normal work per day, and work in excess of the normal work per week or other resources. Provisions under Sub-Clause 8.7 will be applicable in cases of delays due to Contractor.

8.4 Execution of Work

8.4.1 Mobilisation

Period of Mobilisation shall be 7 days counting from the stipulated date of start of work as mentioned in Letter of Acceptance/ Notification of Award by the Employer's Representative. The Contractor shall carry out following activities within this period stated. It shall submit to the Employer's Representative within the same 7 day period, the stipulated date of start, the proposed layout of locating offices, stores, godowns, yards, water, electric network etc. for approval of the Employer's Representative.

Minimum following activities shall be completed within the mobilization period of 1 4 days or such extended period as approved by the Employer's Representative.

- Site office of the Contractor
- Line out including establishing of grid line levels and its approval from the
- Employer's Representative.
- Tapping electric and water connections
- One cement godown and steel yard

- Obtaining insurance policies as per the Contract
- Obtaining labour licences, as required
- Obtaining approval of local authorities and complying with any statutory requirements prior to actual start of Work.
- Establishing water and electric network within site.
- Submitting construction programme as detailed in Sub-Clause 8.3 and its approval by the Employer's Representative.

8.4.2 Setting out of Works

The Contractor shall be responsible for the true and proper setting-out of the Works in relating to original points, lines and levels of reference given by the Employer's Representative in writing and for the correctness, subject as above mentioned, of the position, levels, dimension and alignment of all parts of the Works and for the provision of all necessary instruments, appliances and labour in connection therewith. If, at any time during the progress of the Works, any error shall appear or arise in the position, levels, dimensions or alignment of any part of the Works, the Contractor, on being required so to do by the Employer's Representative shall, at his own cost, rectify such error to the satisfaction of the Employer's Representative. The checking of any setting-out or of any line or level by the Employer's Representative shall not in any way relieve the Contractor of his responsibility for the correctness thereof and the Contractor shall carefully protect and preserve all bench-marks, sight-rails, pegs and other things used in setting-out the works. The Contractor shall use latest equipments like Total Station/Theodolite and Auto level etc for setting out the works.

8.4.3 Deleted.

8.4.4 Temporary Works

8.4.4.1 The Contractor is entirely responsible for the design, construction, maintenance and removal of all Temporary Works employed in carrying out the Contract. Within a reasonable time (and in any case not less than fifteen days) before he intends to commence construction of any temporary works, the Contractor shall submit full particulars including drawings of the same, for the approval of the Employer's Representative. The Employer's Representative 's approval will in no way relieve the Contractor of his responsibility for the safety of the Works, operators, adjoining property, structures or services and compliance with appropriate regulations and codes of practice. Documents for temporary works supporting adjoining buildings, property and public utilities and roads shall also be submitted to the appropriate authority for their approval if requested /required.

8.4.4.2 The Temporary Works shall be designed and constructed in such a manner as to

enable the permanent structures to be built around them without detriment to their effectiveness and due allowance will be deemed to have been made for all necessary adjustments thereto to enable the Works to proceed.

8.4.4.3 Timber shoring, boards, struts or similar items shall not be left in position upon completion of the Works without the written consent of the Employer's Representative.

8.4.4.4 All services or utilities on or adjoining the site which are required to be maintained operational shall be protected from movement, subsidence or damage from any cause whatsoever by adequate temporary props, struts, shores and protective screens to the approval of the Employer's Representative and the agent of the service or utility.

8.4.4.5 The Contractor shall make safe and reinstate all areas affected by temporary works.

8.4.4.6 The Contractor shall use properly designed and manufactured steel staging platforms for carrying out work above 3.0m height. All required staging for supporting, centering, shuttering of beams, slab, masonry work, etc. shall be carried out strictly as per the Supplier's instructions or approved arrangement. It is to be noted that designing of such work shall be carried out by the Contractor and shall be submitted for approval of the Employer's Representative. No work above 3.0 m shall be permitted without compliance of this condition.

8.4.5 Plant, Temporary Works & Materials - Exclusive Use

All constructional plants, temporary works and materials provided by the Contractor shall, when brought on to the site, be deemed to be exclusively intended for the execution of the Works and the Contractor shall not remove the same or any part thereof, except for the purpose of moving it from one part of the site to another, without the consent, in writing, of the Employer's Representative, which shall not be unreasonably withheld.

8.4.6 Use of Site only for Works

The Contractor shall not use any portion of the Site for purpose not connected with the Works without the prior written approval of the Employer's Representative. He shall maintain permanent and Site access roads free of spillage and shall not interfere with the flow of traffic. Also same shall apply to terraces and other developed areas.

8.4.7 Name Board at Site

The Contractor shall prepare and display name board at site as per design approved by the Employer's Representative. It shall have

- Name of Works
- Name of Employer
- Name of Consulting Architect (if any)
- Name of Project Management Consultant (if any)
- Name of Contractor

8.4.8 Site Drainage/Cleaning/Nuisance

8.4.8.1 All water which may accumulate on the Site during the progress of the works or in trenches and excavation, shall be removed from the site to the satisfaction of the Employer's Representative at the Contractor's cost.

8.4.8.2 The Site shall be maintained free from rubbish. Proper stacking of scaffolding materials, shuttering material, bricks/brick bats, steel pieces, etc. needed for work on day to day basis shall be organized, Heaps in unplanned manner and disorderly fashion shall not be permitted. The Employer's Representative's decision in this matter shall be final.

8.4.8.3 The Contractor shall not, at any time, cause or permit any nuisance on the site or do anything which shall cause unnecessary disturbance or inconvenience to the Employer, tenants or occupants of other properties near the site and to the public in general.

8.4.9 Disposal of Rubbish

(i) The Contractor shall cart away from site and deposit where directed by the Employer's Representative all refuse, etc. arising from the Works both as it accumulates and at completion of the Works at the direction of the Employer's Representative.

(ii) It is the responsibility of the Contractor to obtain a certificate from the local authorities concerned to the effect that all rubbish arising out of Contractor's activities at the construction site or any other offsite activities borrow pits and/or disposal area (s) has been properly disposed off.

8.4.10 Shift Working

The Contractor shall be allowed to work in three shifts with prior approval of the Employer's Representative.

8.4.11 Urgent Repairs

If, by reason of any accident or failure, or other event occurring to, in, or in connection with the Works or any part thereof, either during the execution of the Works or during the period of Maintenance, any remedial or other Work or repair shall, in the opinion of the Employer's Representative, be urgently necessary for the safety of the Works and the Contractor is unable or unwilling at once to do such work or repair, the Employer may employ and pay other persons to carry out such work or repair as the Employer's Representative may consider necessary. If the Work or repair so done by the Employer is work which, in the opinion of the Employer's Representative, the Contractor was liable to do at his own expense under the Contract, all expenses properly incurred by the Employer in so doing shall be recoverable from the Contractor by the Employer or may be deducted by the Employer from any moneys due or which may become due to the Contractor. Provided always that the Employer's Representative, shall, as soon after the occurrence of any such emergency as may be reasonably practicable, notify the Contractor thereof in writing.

8.4.12 Contractor to search

The Contractor shall, if required by the Employer's Representative in writing, search under the directions of the Employer's Representative for the cause of any defect, imperfection or fault appearing during the progress of the Works or within the Period of Maintenance (Defect Liability period). If such defect, imperfection or fault shall be one for which the Contractor is liable, the cost of the work carried out in searching as aforesaid shall be borne by the Contractor and he shall in such case repair, rectify and make good such defect, imperfection or fault at his own expense in accordance with the provisions of Clause 17 hereof.

8.5
Extension of Time for Completion

The Contractor at the discretion of the Employer may be granted subject to Sub-Clause 20,1 [Contractor's Claims] an extension of the Time for Completion if and to the extent that completion for the purposes of Sub-Clause 10.1 [Taking Over of the Works and Sections] is or will be delayed by any of the following causes:

(a) a Variation (unless an adjustment to the Time for Completion has been agreed under Sub-Clause 13.3 [Variation Procedure]),

(b) any delay, impediment or prevention caused by or attributable to the Employer, the Employer's Personnel, or the Employer's other contractors on the Site.

If the Contractor is of the opinion that he should be allowed an extension of the Time for Completion, the Contractor shall give notice to the Employer in accordance with Sub-Clause 20.1 [Contractor's Claims] pointing out the grounds for such extension. Extension of Time shall only be granted by the Employer, if the Employers finds the grounds to be reasonable and acceptable. When determining each extension of time under Sub-Clause 20.1, the Employer shall review previous determinations and may increase, but shall not decrease, the total extension of time.

8.6
Rate of Progress

If, at any time:

(a) actual progress is too slow to complete within the Time for Completion, and/or

(b) progress has fallen (or will fall) behind the current programme under Sub-Clause 8.3 [Programme],

+ other than as a result of a cause listed in Sub-Clause 8.4 [Extension of Time for Completion], then the Employer may instruct the Contractor to submit, under Sub-Clause 8.3 [Programme], a revised programme and supporting report describing the revised methods which the Contractor proposes to adopt in order to expedite progress and complete within the Time for Completion.

Unless the Employer notifies otherwise, the Contractor shall adopt these revised methods, which may require increases in the working hours and/or in the numbers of Contractor's Personnel and/or Goods, at the risk and cost of the Contractor. If these revised methods cause the Employer to incur additional costs, the Contractor shall subject to Sub-Clause 2.5 [Employer's Claims] pay these costs to the Employer, in addition to delay damages (if any) under Sub-Clause 8.7 below.

8.7
Delay Damages and Bonus

If the Contractor fails to maintain the required progress in terms hereof, or to complete the work and clear the site on or before the Date for Completion or extended date of completion, he shall, without prejudice to any other right or remedy available under the law to the Employer on account of such breach, pay as agreed compensation the amount calculated at the rates stipulated below.

This will also apply to items or group of items for which a separate period of

completion has been specified.

Compensation for delay of work @1.50% of tendered value per month of delay to be computed on per day basis.

Provided always that the total amount of compensation for delay to be paid under this condition shall not exceed 10% of the tendered value of work or of the tendered value of the item or group of items of work for which a separate period of completion is originally given.

The penalty shall not relieve the Contractor from his obligation to complete the Works or from any other of his obligations and liabilities under the Contract.

The Contractor shall co-ordinate his program to the extent feasible with the program of other Contractors to be engaged at the Site or in the vicinity of the Site as furnished by the Employer's Representative so that the project can be completed in time as per the overall program.

The amount of compensation may be adjusted or set-off against any sum payable to the Contractor under this or any other Contract with the Employer. In case, the Contractor does not achieve a particular milestone as approved by the Employer or the rescheduled milestone(s), the amount shown against that milestone shall be withheld, to be adjusted against the compensation levied at the final grant of Extension of Time. Withholding of this amount on failure to achieve a milestone, shall be automatic without any notice to the Contractor. However, if the Contractor catches up with the progress of Work on the subsequent milestone(s), the withheld amount shall be released. In case the Contractor fails to make up for the delay in subsequent milestone(s), amount mentioned against each milestone missed subsequently also shall be withheld. However, no interest, whatsoever, shall be payable on such withheld amount.

In case, the Contractor completes the entire Works (and not a part) ahead of scheduled completion time, a bonus @1% (one percent) of the tendered value per month computed on the basis of every completed month, shall be payable to the Contractor, subject to a maximum limit of 3% (three percent) of the tendered value. The amount of bonus, if payable, shall be paid along with draft final statement after completion of Works.

8.8

Suspension of Work

The Employer may at any time instruct the Contractor to suspend progress of part or all of the Works. During such suspension, the Contractor shall protect, store and secure such part or the Works against any deterioration, loss or damage.

The Employer may also notify the cause for the suspension. If and to the extent that the cause is notified and is the responsibility of the Contractor, the following Sub-Clauses 8.9 and 8.11 shall not apply.

8.9
Consequences of Suspension

If the Contractor suffers delay for complying with the Employer's instructions under Sub-Clause 8.8 [Suspension of Work], and/or from resuming the work, the Contractor shall give notice to the Employer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.5 [Extension of Time for Completion], and

After receiving this notice/the Employer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

The Contractor shall not be entitled to an extension of time for, or to payment of the Cost incurred in, making good the consequences of the Contractor's faulty design, workmanship or materials, or of the Contractor's failure to protect, store or secure in accordance with Sub-Clause 8.8 [Suspension of Work].

8.10 **Deleted.**

8.11
Prolonged Suspension

If the suspension under Sub-Clause 8.8 [Suspension of Work] has continued for more than 84 days, the Contractor may request the Employer's permission to proceed. If the Employer does not give permission within 28 days after being requested to do so, the Contractor may, by giving notice to the Employer, treat the suspension as an omission under Clause 13 [Variations and Adjustments] of the affected part of the Works. If the suspension affects the whole of the Works, the Contractor may give notice of termination under Sub-Clause 16.2 [Termination by Contractor].

8.12
Resumption of Work

After the permission or instruction to proceed is given, the Parties shall jointly examine the Works and the Plant and Materials affected by the suspension. The Contractor shall make good any deterioration or defect in or loss of the Works or Plant or Materials, which has occurred during the suspension.

9

Tests on Completion

9.1

Contractor's Obligations The Contractor shall carry out the Tests on Completion in accordance with this Clause and Sub-Clause 7.4, [Testing] after providing the documents in accordance with Sub-Clause 5.6 [As-Built Documents] and Sub-Clause 5.7 [Operation and Maintenance Manuals] including tests prescribed in NBC 2005 & IS and / or instructed by Employer's Representative.

The Contractor shall give to the Employer not less than 21 days' notice of the date after which the Contractor will be ready to carry out each of the Tests on Completion. Unless otherwise agreed, Tests on Completion shall be carried out within 14 days after this date, on such day or days as the Employer shall instruct.

The Tests on Completion shall be carried out in the following sequence:

(a) pre-commissioning tests, which shall include the appropriate inspections and ("dry" or "cold") functional tests to demonstrate that each item of Plant or Materials or Products can safely under-take the next stage, ;

(b) commissioning tests, which shall include the specified operational tests to demonstrate that the Works or Section can be operated safely and as specified, under all available operating conditions; and

(c) trial operation, which shall demonstrate that the Works or Section perform reliably and in accordance with the Contract.

During trial operation, when the Works are operating under stable conditions, the Contractor shall give notice to the Employer that the Works are ready for any other Tests on Completion, including performance tests to demonstrate whether the Works conform with criteria specified in the Employer's Requirements and with the Performance Guarantees.

Trial operation shall not constitute a taking-over under Clause 10 [Employer's Taking Over]. Unless otherwise stated in the Particular Conditions, any product produced by the Works during trial operation shall be the property of the Employer.

In considering the results of the Tests on Completion, appropriate allowances shall be made for the effect of any use of the Works by the Employer on the performance or other characteristics of the Works. As soon as the Works, or a Section, have passed each of the Tests on Completion described in sub-paragraph (a), (b) or (c), the Contractor shall submit a certified report of the results of these Tests to the Employer.

9.2

Delayed Tests

If the Tests on Completion are being unduly delayed by the Contractor, the Employer may by notice require the Contractor to carry out the Tests within 21 days after receiving the notice. The Contractor shall carry out the Tests on such day or days within that period as the Contractor may fix and of which he shall give notice to the Employer.

If the Contractor fails to carry out the Tests on Completion within the period of 21 days, the Employer's Personnel may proceed with the Tests at the risk and cost of the Contractor. These Tests on Completion shall then be deemed to have been parried but in the presence of the Contractor and the results of the Tests shall be accepted as accurate.

9.3
Retesting

If the Works, or a Section, fail to pass the Tests on Completion, Sub-Clause 7.5 [Rejection] shall apply, and the Employer or the Contractor may require the failed Tests, and Tests on Completion on any related work, to be repeated under the same terms and conditions.

9.4
Failure to Pass Tests on Completion

If the Works, or a Section, fail to pass the Tests on Completion repeated under Sub-Clause 9.3 [Retesting], the Employer shall be entitled to:

(a) order further repetition of Tests on Completion under Sub-Clause 9.3;

(b) if the failure deprives the Employer of substantially the whole benefit of the Works or Section, reject the Works or Section (as the case may be), in which event the Employer shall have the same remedies as are provided in sub-paragraph (c) of Sub-Clause 11.4 [Failure to Remedy Defects]; or

(c) issue a Taking-Over Certificate.

In the event of sub-paragraph (c), the Contractor shall proceed in accordance with all other obligations under the Contract, and the Contract Price shall be reduced by such amount as shall be appropriate to cover the reduced value to the Employer as a result of this failure. Unless the relevant reduction for this failure is stated (or its method of calculation is defined) in the Contract, the Employer may require the reduction to be (i) agreed by both Parties (in full satisfaction of this failure only) and paid before this Taking-Over Certificate is issued, or (ii) determined and paid under Sub-Clause 2.5 [Employer's Claims] and Sub-Clause 3.5 [Determinations].

10
Employer's Taking Over

10.1
Taking Over of the Works and Sections

Except as stated in Sub-Clause 9.4 [Failure to Pass Tests on Completion], the Works shall be taken over by the Employer when (i) the Works have been completed in accordance with the Contract, including the matters described in Sub-Clause 8.2 [Time for Completion] and except as allowed in sub-paragraph (a) below, and (ii) a Taking-Over Certificate for the Works has been issued, or is deemed to have been issued in accordance with this Sub-Clause.

The Contractor may apply by notice to the Employer for a Taking-Over Certificate not earlier than 14 days before the Works will, in the Contractor's opinion, be complete and ready for taking over. If the Works are divided into Sections, the Contractor may similarly apply for a Taking-Over Certificate for each Section.

The Employer shall, within 28 days after receiving the Contractor's application:

(a) issue the Taking-Over Certificate to the Contractor, stating the date on which the Works or Section were completed in accordance with the Contract, except for any minor outstanding work and defects which will not substantially affect the use of the Works or Section for their intended purpose (either until or whilst this work is completed and these defects are remedied); or

(b) reject the application, giving reasons and specifying the work required to be done by the Contractor to enable the Taking-Over Certificate to be issued. The Contractor shall then complete this work before issuing a further notice under this Sub-Clause.

If the Employer fails either to issue the Taking-Over Certificate or to reject the 'Contractor's application within the period of 28 days, and if the Works or Section (as the case may be) are substantially in accordance with the Contract, the Taking-Over Certificate shall be deemed to have been issued on the last day of that period.

10.2
Taking Over of Parts of the Works due to Default of the Contractor and Recovery of Additional Cost

Parts of the Works (other than Sections) shall not be taken over or used by the Employer, except as may be stated in the Contract or as may be agreed by both Parties.

If Contractor:

i) At any time makes default during currency of work or does not execute any part of the work with due diligence and continues to do so even after a notice in writing of 7

days in this respect from the Employer's Representative; or

ii) Commits default in complying with any of the terms and conditions of the contract and does not remedy it or takes effective steps to remedy it within 7 days even after a notice in writing is given in that behalf by the Employer's Representative; or

iii) Fails to complete the work(s) or items of work with individual dates of completion, on or before the date (s) so determined, and does not complete them within the period specified in the notice given in writing in that behalf by the Employer's Representative.

The Employer's Representative on behalf of the Employer, without prejudice to any other right or remedy against the Contractor which have either accrued or accrue thereafter to the Employer, by a notice in writing to take the part work / part incomplete work of any item (s) out of his hands and shall have powers to:

a) Take possession of the site and any materials, constructional plant, implements, stores etc., thereon; and / or
b) Carry out the part work / part incomplete work of any item (s) by any other Agency.

In such an event, the Contractor shall be liable for loss / damage suffered by the Employer because of action under this clause and to compensate for this loss or damage, the Employer shall be entitled to recover a sum equivalent to 20% of the value of the part work / part incomplete work so taken away subject to a maximum limit of 10% of the tendered value of the work.

The value of the work taken away shall be calculated for the items and Quantities taken away, at the Contract rates including price variation as applicable on the date when notice in writing for taking away part work, was issued to the Contractor. The Contractor from whom part work is being taken out, shall not be allowed to participate in the tendering process for carrying out such work.

The amount to be recovered from the Contractor as determined above, shall, without prejudice to any other right or remedy available to the Employer as per law or as per agreement, will be recovered from any money due to the Contractor on any account, and if such money is insufficient, the Contractor shall be called upon in writing and he as shall be liable pay the same within 30 days.

If the Contractor fails to pay the required sum within the aforesaid period of 30 days, the Employer's Representative on behalf of the Employer shall have the right to sell any or all of the Contractor's unused materials, constructional plant, implements, temporary building at site etc., and adjust the proceeds of sale thereof towards the dues recoverable from the Contractor under the Contract and if thereafter there remains any balance outstanding, it shall be recovered in accordance with the

provisions of the Contract.

In the event of above course being adopted by the Employer's Representative, the Contractor shall have no claim to compensation for any loss sustained by him by reasons of his having purchased or procured any materials or entered into any engagements or made any advance on any account or with a view to the execution of the work or the performance of the Contract.

10.3
Interference with Tests on Completion

If the Contractor is prevented, for more than 14 days, from carrying out the Tests on Completion by a cause for which the Employer is responsible, the Contractor shall carry out the Tests on Completion as soon as practicable.

If the Contractor suffers delay and/or incurs Cost as a result of this delay in carrying out the Tests on Completion, the Contractor shall give notice to the Employer and. shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

(a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.5 [Extension of Time for Completion], and

(b) payment of any such Cost plus reasonable profit, which shall be added to the Contract Price.

After receiving this notice, the Employer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

11
Defects Liability

11.1
Completion of Outstanding Work and Remedying Defects

In order that the Works and Contractor's Documents, and each Section, shall be in the condition required by the Contract (fair wear and tear excepted) by the expiry date of the relevant Defects Notification Period or as soon as practicable thereafter, the Contractor shall:

(a) complete any work which is outstanding on the date stated in a Taking-Over Certificate, within such reasonable time as is instructed by the Employer, and

(b) execute all work required to remedy defects or damage, as may be notified by the Employer on or before the expiry date of the Defects Notification Period for the Works or Section (as the case may be).

If a defect appears or damage occurs, the Employer shall notify the Contractor accordingly.

Defects Liability Period for the purpose of the Contract shall be 3 (three) year from the date of handing over.

11.2
Cost of Remedying Defects

All work referred to in sub-paragraph (b) of Sub-Clause 11.1 [Completion of Outstanding Work and Remedying Defects] shall be executed at the risk and cost of the Contractor, if and to the extent that the work is attributable to:

(a) the design of the Works,
(b) Plant, Materials, Goods, Products or workmanship not being in accordance with the Contract,
(c) improper operation or maintenance which was attributable to matters for which the Contractor is responsible (under Sub-Clauses 5.5 to 5.7 or otherwise), or
(d) failure by the Contractor to comply with any other obligation.

If and to the extent that such work is attributable to any other cause, the Employer shall give notice to the Contractor accordingly, and Sub-Clause 13.3 [Variation Procedure] shall apply.

11.3
Extension of Defects Notification Period

The Employer shall be entitled subject to Sub-Clause 2.5 [Employer's Claims] to an extension of the Defects Notification Period for the Works or a Section if and to the extent that the Works, Section or a major item of Plant (as the case may be, and after taking over) cannot be used for the purposes for which they are intended by reason of a defect or damage. However, a Defects Notification Period shall not be extended by more than three years.

If delivery and/or erection of Plant and/or Materials was suspended under Sub-Clause 8.8 [Suspension of Work] or Sub-Clause 16.1 [Contractor's Entitlement to Suspend Work], the Contractor's obligations under this Clause shall not apply to any defects or damage occurring more than two years after the Defects Notification Period for the Plant and/or Materials would otherwise have expired.

11.4
Failure to Remedy

Defects

If the Contractor fails to remedy any defect or damage within a reasonable time, a date may be fixed by (or on behalf of) the Employer, on or by which the defect or damage is to be remedied. The Contractor shall be given reasonable notice of this date.

If the Contractor fails to remedy the defect or damage by this notified date and this remedial work was to be executed at the cost of the Contractor under Sub-Clause 11.2 [Cost of Remedying Defects], the Employer may (at his option):

(a) carry out the work himself or by others, in a reasonable manner and at the Contractor's cost, but the Contractor shall have no responsibility for this work; and the Contractor shall subject to Sub-Clause 2.5 [Employer's Claims] pay to the Employer the costs reasonably incurred by the Employer in remedying the defect or damage;

(b) agree or determine a reasonable reduction in the Contract Price in accordance with Sub-Clause 3.5 [Determinations]; or

(c) if the defect or damage deprives the Employer of substantially the whole benefit of the Works or any major part of the Works, terminate the Contract as a whole, or in respect of such major part which cannot be put to the intended use. Without prejudice to any other rights, under the Contract or otherwise, the Employer shall then be entitled to recover all sums paid for the Works or for such part (as the case may be), plus financing costs and the cost of dismantling the same, clearing the Site and returning Plant and Materials to the Contractor.

11.5
Removal of Defective Work

If the defect or damage cannot be remedied expeditiously on the Site and the Employer gives consent, the Contractor may remove from the Site for the purposes of repair such items of Plant as are defective or damaged. This consent may require the Contractor to increase the amount of the Performance Security by the full replacement cost of these items, or to provide other appropriate security.

11.6
Further Tests

If the work of remedying of any defect or damage may affect the performance of the Works, the Employer may require the repetition of any of the tests described in the Contract, including Tests on Completion and/or Tests after Completion. The requirement shall be made by notice within 28 days after the defect or damage is remedied.

These tests shall be carried out in accordance with the terms applicable to the previous tests, except that they shall be carried out at the risk and cost of the Party liable, under Sub-Clause 11.2 [Cost of Remedying Defects], for the cost of the remedial work.

11.7

Right of Access

Until the Taking-over Certificate has been issued, the Contractor shall have the right of access to all parts of the Works and to records of the operation and performance of the Works, except as may be inconsistent with the Employer's reasonable security restrictions.

11.8

Contractor to Search

The Contractor shall, if required by the Employer, search for the cause of any defect, under the direction of the Employer. Unless the defect is to be remedied at the cost of the Contractor under Sub-Clause 11.2 [Cost of Remedying Defects], the Cost of the search plus reasonable profit shall be agreed or determined in accordance with Sub-Clause 3.5 [Determinations] and shall be added to the Contract Price.

11.9

Performance Certificate

Performance of the Contractor's obligations shall not be considered to have been completed until the Employer has issued the Performance Certificate to the Contractor, stating the date on which the Contractor completed his obligations under the Contract.

The Employer shall issue the Performance Certificate within 28 days after the expiry of the Defects Liability Periods. If the Employer fails to issue the Performance Certificate accordingly, the Performance Certificate shall be deemed to have been issued on the date 28 days after the date on which it should have been issued, as required by this Sub-Clause.

Only the Performance Certificate shall be deemed to constitute acceptance of the Works.

11.10

Unfulfilled Obligations

After the Performance Certificate has been issued, each Party shall remain liable for the fulfillment of any obligation which remains unperformed at that time. For the purposes of determining the nature and extent of unperformed obligations, the Contract shall be deemed to remain in force.

11.11

Clearance of Site

Upon receiving the Performance Certificate, the Contractor shall remove any remaining Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works from the Site.

If all these items have not been removed within 28 days after the Employer issues the Performance Certificate, the Employer may sell or otherwise dispose of any remaining items. The Employer shall be entitled to be paid the costs incurred in connection with, or attributable to, such sale or disposal and restoring the Site.

Any balance of the moneys from the sale shall be paid to the Contractor. If these moneys are less than the Employer's costs, the Contractor shall pay the outstanding balance to the Employer

12
Tests after Completion

12.1
Procedure for Tests after Completion

If Tests after Completion are specified in the Contract, this Clause shall apply Unless otherwise stated in the Particular Conditions:

(a) the Contractor shall provide any other plant, equipment and suitably qualified and experienced staff, as are necessary to carry, out the Tests after Completion efficiently; and

(b) the Contractor shall carry out the Tests after Completion in the presence of such Employer's and/or Contractor's Personnel as either Party may reasonably request.

the Tests after Completion shall be carried out as soon as is reasonably practicable after the Works or Section have been taken over by the Employer, The Employer shall give to the Contractor 21 days' notice of the date after which the Tests after Completion will be carried out. Unless otherwise agreed, these Tests shall be carried out within 14 days after this date, on the day or days determined by the Employer.

The results of the Tests after Completion shall be compiled and evaluated by the Contractor, who shall prepare a detailed report. Appropriate account shall be taken of the effect of the Employer's prior use of the Works.

12.2
Delayed Tests

If the Contractor incurs Cost as a result of any unreasonable delay by the Employer to the Tests after Completion, the Contractor shall (i) give notice to the Employer and (ii) be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to payment of any such Cost plus reasonable profit, which shall be added to the Contract Price.

After receiving this notice, the Employer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine this Cost and profit.

If, for reasons not attributable to the Contractor, a Test after Completion on the Works or any Section cannot be completed during the Defects Notification Period (or any other

period agreed upon by both Parties), then the Works or Section shall be deemed to have passed this Test after Completion.

12.3
Retesting

If the Works, or a Section, fail to pass the Tests after Completion:

(a) sub-paragraph (b) of Sub-Clause 11.1 [Completion of Outstanding Work and Remedying of Defects] shall apply, and

(b) either Party may then require the failed Tests, and the Tests after Completion on any related work, to be repeated under the same terms and conditions.

If and to the extent that this failure and retesting are attributable to any of the matters listed in sub-paragraphs (a) to (d) of Sub-Clause 11.2 [Cost of Remedying Defects] and cause the Employer to incur additional costs, the Contractor shall subject to Sub-Clause 2.5 [Employer's Claims] pay these costs to the Employer.

12.4
Failure to Pass Tests after Completion

If the Works, or a Section, fail to pass a Test after Completion and the Contractor proposes to make adjustments or modifications to the Works or such Section, the Contractor may be instructed by (or on behalf of) the Employer that right of access to the Works or Section cannot be given until a time that is convenient to the Employer. The Contractor shall then remain liable to carry out the adjustments or modifications and to satisfy this Test, within a reasonable period of receiving, notice by (or on behalf of) the Employer of the time that is convenient to the Employer. Even if the Contractor does not receive this notice during the relevant Defects Notification Period, the Contractor shall not be relieved of this obligation.

13
Variation and Adjustments

13.1
Right to Vary

Variations may be initiated by the Employer at any time prior to issuing the Taking-Over Certificate for the Works, either by an instruction or by a request for the Contractor to submit a proposal. A Variation shall not comprise the omission of any work which is to be carried out by others.

The Contractor shall execute and be bound by each Variation, unless the Contractor promptly gives notice to the Employer stating (with supporting particulars) that (i) the Contractor cannot readily obtain the Goods required for the Variation, {ii) it will reduce the safety or suitability of the Works, or (iii) it will have an adverse impact on the

achievement of the Performance Guarantees. Upon receiving this notice, the Employer shall cancel, confirm or vary the instruction.

13.2
Value Engineering

The Contractor may, at any time, submit to the Employer a written proposal which (in the Contractor's opinion) will, if adopted, (i) accelerate completion, (ii) reduce the cost to the Employer of executing, maintaining or operating the Works, (iii) improve the efficiency or value to the Employer of the completed Works, or (iv) otherwise be of benefit to the Employer.

The proposal shall be prepared at the cost of the Contractor and shall include the items listed in Sub-Clause 13.3 [Variation Procedure].

13.3
Variation Procedure

If the Employer requests a proposal, prior to instructing a Variation, the Contractor shall respond in writing as soon as practicable, either by giving reasons why he cannot comply (if this is the case) or by submitting:

(a) a description of the proposed design and/or work to be performed and a programme for its execution,

(b) the Contractor's proposal for any necessary modifications to the programme according to Sub-Clause 8.3 [Programme] and to the Time for Completion and

(c) the Contractor's proposal for adjustment to the Contract Price.

The Employer shall, as soon as practicable after receiving such proposal (under Sub-Clause 13.2 [Value Engineering] or otherwise), respond with approval, disapproval or comments. The Contractor shall not delay any work whilst awaiting a response.

Each instruction to execute a Variation, with any requirements for the recording of Costs, shall be issued by the Employer to the Contractor, who shad acknowledge receipt.

Upon instructing or approving a Variation, the Employer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine adjustments to the Contract Price and the Schedule of Payments. These adjustments shall include reasonable profit, and shall take account of the Contractor's submissions under Sub-Clause 13.2 [Value Engineering] if applicable.

13.4
Payment in Applicable Currencies

Payment under this Contract shall be made only in Indian Rupees.

13.5 **Deleted.**

13.6
Daywork

For work of a minor or incidental nature, the Employer may instruct that a Variation shall be executed on a daywork basis. The work shall then be valued in accordance with the daywork schedule included in the Contract, and the following procedure shall apply. If a daywork schedule is not included in the Contract, this Sub-Clause shall not apply.

Before ordering Products for the work, the Contractor shall submit quotations to the Employer. When applying for payment, the Contractor shall submit invoices, vouchers and accounts or receipts for any Products.

Except for any items for which the daywork schedule specifies that payment is not due, the Contractor shall deliver each day to the Employer accurate statements in duplicate which shall include the following details of the resources used in executing the previous day's work:

(a) the names, occupations and time of Contractor's Personnel,

(b) the identification type and time of Contractor's Equipment and Temporary Works, and

(c) the quantities and types of Plant and Materials used.

One copy of each statement will, if correct, or when agreed, be signed by the Employer and returned to the Contractor. The Contractor shall then submit priced statements of these resources to the Employer, prior to their inclusion in the next Statement under Sub-Clause 14.3 [Application for Interim Payments].

13.7 Foreclosure of Contract due to Abandonment or Reduction in Scope of Works

If at any time after acceptance of the tender the Employer shall decide to abandon or reduce the scope of the Works for any reason whatsoever and hence not require the whole or any part of the Works to be carried out, the Employer's Representative shall give notice in writing to that effect to the Contractor and the Contractor shall act accordingly in the matter. The Contractor shall have no claim to any payment of compensation or otherwise whatsoever, on account of any profit or advantage which he might have derived from the execution of the Works in full but which he did not derive in consequence of the foreclosure of the whole or part of the Works.

The Contractor shall be paid for Works executed at site to be decided by the Employer.

14
Contract Price and Payment

14.1
The Contract Price

Unless otherwise stated in the Particular Conditions:

(a) payment for the Works shall be made on the basis of the lump sum Contract Price; and

(b) the Contractor shall pay all taxes, duties and fees required to be paid by him under the Contract, and the Contract Price shall not be adjusted for any of these costs.

14.2
Mobilisation Advance

Mobilisation advance not exceeding 10% of the accepted bid value may be given, if requested by the Contractor in writing within 30 days of the handing over of the site. In such a case, the Contractor shall execute Bank Guarantee from a Scheduled Commercial Bank /Financial Institution as approved by RBI as per form given in Section 8 (Contract Forms), aggregating to the full amount of mobilisation advance before such advance is released. Such advance shall be paid in one single tranche.

The mobilisation advance above shall not bear any interest. Repayment of the advance shall commence from payment of the 3rd Running Account Bill and shall be entered as a deduction from First Interim Payment Certificate @ 10% of the value of Interim Certificate, until the total amount of advance loan has been repaid by the Contractor, always provided that the complete recovery of advance loan shall be made before 90% completion of Works or three-fourth of completion period as originally specified in the Contract, whichever occurs first.

Recovery of advance at any intermediate stage shall be effected, if necessary, by encashment of part Bank Guarantees if the appropriate pro-rata amount of advance is not available from the Works done by the Contractor.

If the circumstances are considered reasonable by the Employer's Representative, the period mentioned for request by the Contractor in writing for grant of mobilization advance may be extended in the discretion of the Employer's Representative.

The said Bank Guarantees for advances shall initially be made for the full amount and valid for the Contract period, and be kept renewed from time to time to cover the balance amount and likely period of complete recovery.

14.3
Application for Interim Payments

The Contractor shall submit a Statement in six copies to the Employer after the end of each month in respect of each site, in a form approved by the Employer, showing in detail the amounts to which the Contractor considers himself to be entitled, together with supporting documents which shall include the relevant report on progress in accordance with Sub-Clause 4.21 [Progress Reports].

The Statement shall include the following items, as applicable, which shall be expressed in INR, in the sequence listed:

(a) the estimated contract value in accordance with Payment Schedule (including Variations but excluding items described in sub-paragraphs (b) and (c) below);

(b) any other additions, or deductions which may have become due under the Contract or otherwise, including those under Clause 20 [Claims, Disputes and Arbitration]; and

(c) the deduction of amounts included in previous Statements.

14.4
Schedule of Payments

Schedule of Payments is specified in Section 5 (Employer's Requirements) in which the Contract Price will be paid. Such payment schedule for planning, design and construction of the Hospital Building subject to the condition that the Contractor shall not submit more than one Bill per month per site, provided that each such monthly bill shall relate to one or more completed activities of the Project as described in Section 5 (Employer's Requirements).

In case of Products to be supplied for each site, the Employer shall make the payment in the following manner :

(a) Upon supply : 80% of value of the furniture, medical equipment as quoted in the Price Bid (b) Upon installation and commissioning : 15% thereof
(c) Upon training : 5 % thereof.
Note :- Upon supply and payment of 80% of the value of furniture/medical equipments the right of such properties shall vest on WBMSCL and the contructor will be the custodian of all such meterials till installation,comissionig and handed over.

14.5 **Deleted.**

14.6

Interim Payments

No amount will be paid until the Employer has received and approved the Performance Security. Thereafter, the Employer shall within 7 days after receiving a Statement and supporting documents, give to the Contractor notice of any items in the Statement with which the Employer disagrees, with supporting particulars. Payments due shall not be withheld, except that:

(a) if any thing supplied or work done by the Contractor is not in accordance with the Contract, the cost of rectification or replacement may be withheld until rectification or replacement has been completed; and/or

(b) if the Contractor was or is failing to perform any work or obligation in accordance with the Contract, and .had been so notified by the Employer, the value of this work or obligation may be withheld until the work or obligation has been performed.

The Employer may, by any payment, make any correction or modification that should properly be made to any amount previously considered due. Payment shall not be deemed to indicate the Employer's acceptance, approval, consent or satisfaction.

14.7

Timing of Payments

Except as otherwise stated in Sub-Clause 2.5 [Employer's Claims], the Employer shall pay to the Contractor:

(a) the advance payment within 30 days after the date of delivery of possession of the Site subject to commencement of work at the site including setting up of site office etc. both for Contractor and WBMSCL-staff

(b) the amount which is due in respect of each Statement, other than the Final Statement, within 15 working days after receiving the Statement and supporting documents; and

(c) the final amount due, within 60 working days after receiving the Final Statement and written discharge in accordance with Sub-Clause 14.11 [Application for Final Payment] and Sub-Clause 14.12 [Discharge].

Payment of the amount due in INR shall be made into the bank account, nominated by the Contractor.

14.8 **Deleted**.

14.9 **Deleted.**

14.10
Statement at Completion

Within 60 days after receiving the Taking-Over Certificate for the Works, the Contractor shall submit to the Employer six copies of supporting documents, in accordance with Sub-Clause 14.3 [Application for Interim Payments], showing:

(a) the value of all work done in accordance with the Contract up to the date stated in the Taking-Over Certificate for the Works,

(b) any further sums which the Contractor considers to be due, and

(c) an estimate of any other amounts which the Contractor considers will become due to him under the Contract. Estimated amounts shall be shown separately in this Statement at completion.

The Employer shall then give notice to the Contractor in accordance with Sub-Clause 14.6 [Interim Payments] and make payment in accordance with Sub-Clause 14.7 [Timing of Payments].

14.11
Application for Final Payment

Within 30 days after receiving the Taking Over Certificate for the Works, the Contractor shall submit, to the Employer, six copies of a draft final statement with supporting, documents showing in detail in a form approved by the Employer:

(a) the value of all work done in accordance with the Contract, and

(b) any further sums which the Contractor considers to be due to him under the Contract or otherwise.

If the Employer disagrees with or cannot verify any part of the draft final statement, the Contractor shall submit such further information as the Employer may reasonably require and shall make such changes in the draft as may be agreed between them. The Contractor shall then prepare and submit to the Employer the final statement as agreed. This agreed statement is referred to in these Conditions as the "Final Statement",

14.12
Audit

The Employer shall have the right to cause an audit and technical examination of the works and the draft final statement of the Contractor including all supporting vouchers, abstract, etc. to be made after payment of the Draft final statement and if as a result of such audit and technical examination, any sum is found to have been overpaid in respect of any work done by the Contractor under the Contract or any work claimed to have been done by him under the Contract and found not to have

been executed, the Contractor shall be liable to refund the amount of over-payment and it shall be lawful for the Employer to recover the same from him in the manner prescribed in these General Conditions or in any other manner legally permissible.

However if, following discussions between the Parties and any changes to the draft final statement which are agreed, it becomes evident that a dispute exists, the Employer shall pay the agreed parts of the draft final statement in accordance with Sub-Clause 14.6 [Interim Payments] and Sub-Clause 14.7 [Timing of Payments]. Thereafter, if the dispute is finally resolved under Sub-Clause 20.3 [Arbitration], the Contractor shall then prepare and submit to the Employer a Final Statement.

14.13
Discharge

When submitting the Final Statement, the Contractor shall submit a written discharge which confirms that the total of the Final Statement represents full and final settlement of all moneys due to the Contractor under or in connection with the Contract. This discharge may state that it becomes effective when the Contractor has received the Performance Security and the out-standing balance of this total, in which event the discharge shall be effective oh such date.

14.14
Final Payment

In accordance with sub-paragraph (c) of Sub-Clause 14.7 [Timing of Payments], the Employer shall pay to the Contractor the amount which is finally due, less all amounts previously paid by the Employer and any deductions in accordance with Sub-Clause 2.5 [Employer's Claims].

14.15
Cessation of Employer's Liability

The Employer shall not be liable to the Contractor for any matter or thing under or in connection with the Contract or execution of the Works, except to the extent that the Contractor shall have included an amount expressly for it:

(a) in the Final Statement and also

(b) (except for matters or things arising after the issue of the Taking-Over Certificate for the Works) in the Statement at completion described in Sub-Clause 14.10 [Statement at Completion].

However, this Sub-Clause shall not limit the Employer's liability under his indemnification obligations, or the Employer's liability in any case of fraud, deliberate default or reckless misconduct by the Employer

14.16
Currencies of Payment

The Contract Price shall be paid in Indian Rupees only.

15
Termination by Employer

15.1
Notice to Correct If the Contractor fails to carry out any obligation under the Contract, the Employer may by notice require the Contractor to make good the failure and to remedy it within a specified reasonable time.

15.2
Termination by Employer The Employer shall be entitled to terminate the Contract if the Contractor:

(a) fails to comply with a notice under Sub-Clause 15.1/Notice to Correct],

(b) abandons the Works or otherwise plainly demonstrates the intention not to continue performance of his obligations under the Contract,

(c) without reasonable excuse fails to proceed with the Works in accordance with Clause 8 [Commencement, Delays and Suspension],

(d) fails to comply with the milestone as approved by the Employer or such modified milestone as subsequently approved by the Employer,

(e) If the Contractor being a company shall pass a resolution or the Court shall make an order that the Contractor shall be wound up or if a receiver or a manager on behalf of a creditor shall be appointed or if circumstances shall arise which entitle the Court or the creditor to appoint a Receiver or a manager or which entitles the court to make a winding up order,.

(f) If the Contractor shall suffer an execution being levied on its goods and allows it to be continued for a period of 30 days.

(g) becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or event occurs which (under applicable Laws) has a similar effect to any of these acts or events, or

(h) gives or offers to give (directly or indirectly) to any person any bribe, gift commission or other thing of value, as an inducement or reward:

(i) for doing or forbearing to do any action in relation to the Contract, or

(ii) for showing or forbearing to show favour or disfavour to any person in relation to the Contract,

(i) if any of the Contractor's Personnel or agents gives or offers to give (directly or indirectly) to any person any such inducement or reward as is described in this sub-paragraph (h). However, lawful inducements and rewards to Contractor's Personnel shall not entitle termination.

In any of these events or circumstances, the Employer may, upon giving 14 days' notice to the Contractor, terminate the Contract and expel the Contractor from the Site. However, in the case of sub-paragraph (h) or (i), the Employer may by notice terminate the Contract immediately.

The Employer's election to terminate the Contract shall not prejudice any other rights of the Employer, under the Contract or otherwise.

The Contractor shall then leave the Site and deliver any required Goods, all Contractor's Documents, and other design documents made by or for him, to the Employer. However, the Contractor shall use his best efforts to comply immediately with any reasonable instructions included in the notice for the protection of life or property or for the safety of the Works.

After termination, the Employer may complete the Works and/or arrange for any other entities to do so. The Employer and these entities may then use any Goods, Contractor's Documents and other design documents made by or on behalf of the Contractor.

The Employer shall then give notice that the Contractor's Equipment and Temporary Works will be released to the Contractor at or near the Site. The Contractor shall promptly arrange their removal, at the risk and cost of the Contractor. However, if by this time the Contractor has failed to make a payment due to the Employer, these items may be sold by the Employer in order to recover this payment. Any balance of the proceeds shall then be paid to the Contractor.

In any case in which any of the powers conferred upon the Employer's Representative in terms hereof, shall have become exercisable and the same are not exercised, the non- exercise thereof shall not constitute a waiver of any of the conditions hereof and such powers shall notwithstanding be exercisable in the event of any future case of default by the Contractor and the liability of the Contractor for compensation shall remain unaffected. In the event of the Employer's Representative putting in force all or any of the powers vested in him under the preceding clause he may, if he so desires after giving a notice in writing to the Contractor, take possession of (or at the sole discretion of the Employer's

Representative which shall be final and binding on the Contractor) use as on hire (the amount of the hire money being also in the final determination of the Employer's Representative) all or any tools, plant, materials and stores, in or upon the works, or the site thereof belonging to the Contractor, or procured by the Contractor and intended to be used for the execution of the work/ or any part thereof, paying or allowing for the same in account at the Contract rates, or, in the case of these not being applicable, at current market rates to be certified by the Employer's Representative, whose certificate thereof shall be final and binding on the Contractor. The Employer's Representative may also direct where required, the clerk of the works, foreman or other authorized agent of the Contractor to remove such tools, plant, materials or stores from the premises (within a time to be specified in such notice). In the event of the Contractor failing to comply with any such requisition, the Employer's Representative may remove them at the Contractor's expense or sell them by auction or private sale on account of the Contractor and his risk in all respects and the certificate of the Employer's Representative as to the expenses of any such removal and the amount of the proceeds and expenses of any such sale shall be final and conclusive against the Contractor.

15.3 Valuation at Date of Termination

As soon as practicable after a notice of term 15.2 [Termination by Employer] has taken effect, the Employer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine the value of the Works, Goods and Contractor's Documents, and any other sums due to the Contractor for work executed in accordance with the Contract.

15.4 Payment after Termination

After a notice of termination under Sub-Clause 15.2 [Termination by Employer] has taken effect, the Employer may:

(a) proceed in accordance with Sub-Clause 2.5 [Employer's Claims],

(b) withhold further payments to the Contractor until the costs of design, execution, completion and remedying of any defects, damages for delay in completion (if any), and all other costs incurred by the Employer, have been established, and/or

(c) recover from the Contractor any losses and damages incurred by the Employer and any extra costs of completing the Works, after allowing for any sum due to the Contractor under Sub-Clause 1.5.3 [Valuation at Date of Termination], After recovering any such losses, damages and extra costs, the Employer shall pay any balance to the Contractor.

15.5
Employer's Entitlement to Termination

The Employer shall be entitled to terminate the Contract, at any time for the Employer's convenience, by giving notice of such termination to the Contractor, The termination shall take effect 28 days after the later of the dates on which the Contractor receives this notice

After this termination, the Contractor shall proceed in accordance with Clause 16 [Cessation of Work and Removal of Contractor's Equipment] and shall be paid in accordance with Sub-Clause 19.6 [Optional Termination, Payment and Release].

16

Cessation of Work and Removal of Contractor's Equipment

After a notice of termination under Sub-Clause 15.5 [Employer's Entitlement to Termination], or Sub-Clause 19.6 [Optional Termination, Payment and Release] has taken effect, the Contractor shall promptly:

(a) cease all further work, except for such work as may have been instructed by the Employer for the protection of life or property or for the safety of the Works,

(b) hand over Contractor's Documents, Plant, Materials and other work, for which the Contractor has received payment, and

(c) remove all other Goods from the Site, except as necessary for safety, and leave the Site.

17
Risk and Responsibility

17.1
Indemnities

The Contractor shall indemnify and hold harmless the Employer, the Employer's Personnel, and their respective agents, against and from all claims, damages, losses and expenses (including legal fees and expenses) in respect of:

(a) bodily injury, sickness, disease or death, of any person whatsoever arising out of or in the course of or by reason of the design, execution and completion of the Works and the remedying of any defects, unless attributable to any negligence, willful act or breach of the Contract by the Employer, the Employer's Personnel, or any of their respective agents, and

(b) damage to or loss of any property, real or personal (other than the Works), to the extent that such damage or loss:

(i) arises but of or in the course of or by reason of the design, execution and completion of the Works and the remedying of any defects, and

(ii) is not attributable to any negligence, willful act or breach of the Contract by the Employer, the Employer's Personnel, their respective agents, or anyone directly or indirectly employed by any of them,

The Employer shall indemnify and hold harmless the Contractor, the Contractor's Personnel, and their respective agents, against and from all claims, damages, losses and expenses (including legal fees and expenses) in respect of (1) bodily injury, sickness, disease or death, which is attributable to any negligence, willful act or breach of the Contract by the Employer, the Employer's Personnel, or any of their respective agents, and (2) the matters for which liability may be excluded from insurance cover, as described in sub-paragraphs (d)(i), (ii) and (iii) of Sub-Clause 18.3 [Insurance Against Injury to Persons and Damage to Property].

17.2 Contractor's Care of the Works

The Contractor shall take full responsibility for the care of the Works and Goods from the Commencement Date until the Taking-Over Certificate is issued (or is deemed to be issued under Sub-Clause 10.1 [Taking Over of the Works and Sections]) for the Works, when responsibility for the care of the Works shall pass to the Employer. If a Taking-Over Certificate is issued (or is so deemed to be issued) for any Section of the Works, responsibility for the care of the Section shall then pass to the Employer.

After responsibility has accordingly passed to the Employer, the Contractor shall take responsibility for the care of any work which is outstanding on the date stated in a Taking-Over Certificate, until this outstanding work has been completed.

If any loss or damage happens to the Works, Goods or Contractor's Documents during the period when the Contractor is responsible for their care, from any cause not listed in Sub-Clause 17.3 [Employer's Risks], the Contractor shall rectify the loss -or damage at the Contractor's risk and cost, so that the Works, Goods and Contractor's Documents conform with the Contract.

The Contractor shall be liable for any loss or damage caused by any actions performed by the Contractor after a Taking-Over Certificate has been issued. The Contractor shall also be liable for any loss or damage which occurs after a Taking-Over Certificate has been issued and which arose from a previous event for which the Contractor was liable.

17.3
Employer's Risks

The risks referred to in Sub-Clause 17.4 below are:

(a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,

(b) rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war, within the Country,

(c) riot, commotion or disorder within the Country by persons other than the Contractor's Personnel and other employees of the Contractor,

(d) munitions of war, explosive materials, ionising radiation or contamination by radio-activity, within the Country, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity, and

(e) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds.

17.4
Consequences of Employer's Risks

If and to the extent that any of the risks listed in Sub-Clause 17.3 above results in loss or damage to the Works, Goods or Contractor's Documents, the Contractor shall promptly give notice to the Employer and shall rectify this loss or damage to the extent required by the Employer.

If the Contractor suffers delay and/or incurs Cost from rectifying this loss or damage, the Contractor shall give a further notice to the Employer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

(a) an extension of time for any such delay, if completion is or will ,be delayed, under Sub-Clause 8.5 [Extension of Time for Completion], and

(b) payment of any such Cost, which shall be added to the Contract Price.

After receiving this further notice, the Employer shall proceed in accordance with Sub Clause 3.5 [Determinations] to agree or determine these matters.

17.5
Intellectual and Industrial Property Rights

In this Sub-Clause, "infringement" means an infringement (or alleged infringement) of any patent, registered design, copyright, trade mark, trade name, trade secret or other intellectual or industrial property right relating to the Works; and "claim" means a claim (or proceedings pursuing a claim) alleging an infringement.

Whenever a Party does not give notice to the other Party of any claim within 28 days of receiving the claim, the first Party shall be deemed to have waived any right to indemnity under this Sub-Clause.

The Employer shall indemnify and hold the Contractor harmless against and from any claim alleging an infringement which is or was:

(a) an unavoidable result of the Contractor's compliance with the Employer's Requirements, or

(b) a result of any Works being used by the Employer;

(i) for a purpose other than that indicated by, or reasonably to be inferred from, the Contract, or

(ii) in conjunction with any thing not supplied by the Contractor, unless such use was disclosed to the Contractor is stated in the Contract.

The Contractor shall indemnify and hold the Employer harmless against and from any other claim which arises out of or in relation to (i) the Contractor's design, manufacture, construction or execution of the Works, (ii) the use of Contractor's Equipment, or (iii) the proper use of the Works.

If a Party is entitled to be indemnified under this Sub-Clause, the indemnifying Party may (at its cost) conduct negotiations for the settlement of the claim, and any litigation or arbitration which may arise from it, The other Party shall, at the request and cost of the indemnifying Party, assist in contesting the claim. This other Party (and its Personnel) shall not make any admission which might be prejudicial to the indemnifying Party, unless the indemnifying Party failed to take over the conduct of any negotiations, litigation or arbitration upon being requested to do so by such other Party.

17.6

Limitation of Liability

Neither Party shall be liable to the other Party for loss of use of any Works, loss of profit, loss of any contract or for any indirect or consequential loss or damage which may be suffered by the other Party in connection with the Contract, other than under Sub-Clause 16.4 [Payment on Termination] and Sub-Clause 17.1 [Indemnities].

The total liability of the Contractor to the Employer, under or in connection with the Contract other than under Sub-Clause 4.25 [Electricity, Water and Gas], Sub-Clause 4.26 [Employer's Equipment], Sub-Clause 17.1 [Indemnities] and Sub-Clause 17.5 [Intellectual and Industrial Property Rights], shall not exceed the sum stated in the

Particular Conditions or (if a sum is not so stated) the Contract Price stated in the Contract Agreement.

This Sub-Clause shall not limit liability in any case of fraud, deliberate default or reckless misconduct by the defaulting Party.

18
Insurance

18.1
General Requirements for Insurances

In this Clause, "insuring Party" means, for each type of insurance, the Party responsible for effecting and maintaining the insurance specified in the relevant Sub-Clause.

Wherever the Contractor is the insuring Party, each insurance shall be effected with insurers. These terms shall be consistent with any terms agreed by both Parties before they signed the Contract Agreement. This agreement of terms shall take precedence over the provisions of this Clause.

If a policy is required to indemnify joint insured, the cover shall apply separately to each insured as though a separate policy had been issued for each of the joint insured. If a policy indemnifies additional joint insured, namely in addition to the insured specified in this Clause, (i) the Contractor shall act under the policy on behalf of these additional joint insured except that the Employer shall act for Employer's Personnel, (ii) additional joint insured shall not be entitled to receive payments directly from the insurer or to have any other direct dealings with the insurer, and (iii) the insuring Party shall require all additional joint insured to comply with the conditions stipulated in the policy.

Each policy insuring against loss or damage shall provide for payments to be made in the currencies required to rectify the loss or damage. Payments received from insurers shall be used for the rectification of the loss or damage,

The relevant insuring Party shall, within the respective periods stated in the Particular Conditions (calculated from the Commencement Date), submit to the other Party:

(a) evidence that the insurances described in this Clause have been effected, and

(b) copies of the policies for the insurances described in Sub-Clause 18.2 [Insurance of Works and Contractor's Equipment] and Sub-Clause 18.3 [Insurance against Injury to Persons and Damage to Property].

When each premium is paid, the insuring Party shall submit evidence of payment to the other Party.

Each Party shall comply with the conditions stipulated in each of the insurance policies. The insuring Party shall keep the insurers informed of any relevant changes to the execution of the Works and ensure that insurance is maintained in accordance with this Clause.

Neither Party shall make any material alteration to the terms of any insurance without the prior approval of the other Party. If an insurer makes (or attempts to make) any alteration, the Party first notified by the insurer shall promptly give notice to the other Party.

If the insuring Party fails to effect and keep in force any of the insurances it is required to effect and maintain under the Contract, or fails to provide satisfactory evidence and copies of policies in accordance with this Sub-Clause, the other Party may (at its option and without prejudice to any other right or remedy) effect insurance for the relevant coverage and pay the premiums due. The insuring Party shall pay the amount of these premiums to the other Party, and the Contract Price shall be adjusted accordingly.

Nothing in this Clause limits the obligations, liabilities or responsibilities of the Contractor or the Employer, under the other terms of the Contract or otherwise. Any amounts not insured or pot recovered from the insurers shall be borne by the Contractor and/or the Employer in accordance with these obligations, liabilities or responsibilities. However, if the insuring Party .fails to effect and keep in force an insurance which is available and which it is required to effect and maintain under the Contract, and the other Party neither approves the omission nor effects insurance for the coverage relevant to this default, any moneys which should have been recoverable under this insurance shall be paid by the insuring Party.

Payments by one Party to the other Party shall be subject to Sub-Clause 2.5 [Employer's Claims] or Sub-Clause 20.1 [Contractor's Claims], as applicable.

18.2 Insurance for Works and contractor's Equipment

The insuring Party shall insure the works, Plant, Materials and Contractor's Documents for not less than the full reinstatement cost including the costs of demolition, removal of debris and professional fees and profit. This insurance shall be effective from the date by which the evidence is to be submitted under sub-paragraph (a) of Sub-Clause 18.1 [General Requirements for Insurances], until the date of issue of the Taking-Over Certificate for the Works.

The insuring Party shall maintain this insurance to provide cover until the date of issue of the Performance Certificate, for loss or damage for which the Contractor is liable arising from a cause occurring prior to the issue of the Taking-Over Certificate, arid for

loss or damage caused by the Contractor in the course of any other operations (including those under Clause 11 [Defects Liability] and Clause 12 [Tests after Completion]).

The insuring Party shall insure the Contractor's Equipment for not less than the full replacement value, including delivery to Site. For each item of Contractor's Equipment, the insurance shall be effective while it is being transported to the Site and until it is no longer required as Contractor's Equipment,

Unless otherwise stated in the Particular Conditions, insurances under this Sub-Clause:

(a) shall be effected and maintained by the Contractor as insuring Party,

(b) shall be in the joint names of the Parties, who shall be jointly entitled to receive payments from the insurers, payments being held or allocated between the Parties for the sole purpose of rectifying the loss or damage,

(c) shall cover all loss and damage from any cause not listed in Sub-Clause 17.3 [Employer's Risks],

(d) shall also cover loss or damage from the risks listed in sub-paragraph (c) of Sub-Clause 17.3 [Employer's Risks], with deductibles per occurrence of not more than the amount stated in the Particular Conditions (if an amount is not so stated, this sub-paragraph (d) shall not apply), and

(e) may however exclude loss of, damage to, and reinstatement of:

(i) a part of the Works which is in a defective condition due to a defect in its design, materials or workmanship (but cover shall include any other parts which are lost or damaged as a direct result of this defective condition and not as described in sub-paragraph (ii) below),

(ii) a part of the Works which is lost or damaged in order to reinstate any other part of the Works if this other part is in a defective condition due to a defect in its design, materials or workmanship,

(iii) a part of the Works which has been taken over by the Employer, except to the extent that the Contractor is liable for the loss or damage, and

(iv) Goods while they are not in the Country, subject to Sub-Clause 14.5 [Plant and Materials intended for the Works].

18.3

Insurance against Injury to Persons and Damage to Property

The insuring Party shall insure against each Party's liability for any loss, damage, death or bodily injury which may occur to any physical property (except things insured under Sub-Clause 18.2 {Insurance for Works and Contractor's Equipment]) or to any person (except persons insured under Sub-Clause 18.4 [Insurance for Contractor's Personnel]), which may arise out of the Contractor's performance of the Contract and -occurring before the issue of the Performance Certificate.

This insurance shall be for a limit per occurrence of not less than the amount stated in the Particular Conditions, with no limit on the number of occurrences. If an amount is not stated in the Contract, this Sub-Clause shall not apply.

Unless otherwise stated in the Particular Conditions, the insurances specified in this Sub-Clause:

a) shall be effected and maintained by the Contractor as insuring Party,

b) shall be in the joint names of the Parties,

c) shall be extended to cover liability for all loss and damage to the Employer's property (except things insured under Sub-Clause 18.2) arising out of the Contractor's performance of the Contract, and

d) may however exclude liability to the extent that it arises from:

i) the Employer's right to have the Permanent Works executed on, over, under, in or through any land, and to occupy this land for the Permanent Works,

ii) damage which is an unavoidable result of the Contractor's obligation to execute the Works and remedy any defects, and

iii) a cause listed in Sub'-Clause 17.3 [Employer's Risks], except to the extent that cover is available at commercially reasonable terms.

18.4 Insurance for Contractor's Personnel

The Contractor shall effect and maintain insurance against liability for claims, Personnel damages, losses and expenses (including legal fees and expenses) arising from injury sickness, disease or death of any person employed by the Contractor or any other of the Contractor's Personnel.

The Employer shall also be indemnified under the policy of insurance, except that this insurance may exclude losses and claims to the extent that they arise from any act or neglect of the Employer or of the Employer's Personnel.

The insurance shall be maintained in full force and effect during the whole time that these personnel are assisting in the execution of the Works,

19
Force Majeure

19.1
Definition of Force Majeure

In this clause, Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below:

(i) war, hostilities (whether war be declared or not), invasion, act of foreign enemies.

(ij) rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war;

(iii) riot, commotion, disorder, strike or lockout by persons other than the Contractor's Personnel and other employees of the Contractor ,

(iv) munitions of war, explosive materials, ionising radiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity, and

(v) natural catastrophes such as earthquake, hurricane, typhoon or volcanic activity or flood.

19.2
Notice of Force Majeure

If a Party is or will be prevented from performing any of its obligations under the Contract by Force Majeure, then it shall give notice to the other Party of the event or circumstances constituting the Force Majeure and shall specify the obligations, the performance of which is or will be prevented. The notice shall be given within 14 days after the Party became aware, or should have become aware, of the relevant event or circumstance constituting Force Majeure.

The Party shall, haying given notice, be excused performance of such obligations for so long as .such Force Majeure prevents it from performing them.

Notwithstanding any other provision of this Clause, Force Majeure shall not apply to obligations of either Party to make payments to the other Party under the Contract.

19.3

Duty to Minimise Delay

Each Party shall at all times use all reasonable endeavours to minimise any delay in the performance of the Contract as a result of Force Majeure.

A Party shall give notice to the other Party when it ceases to be affected by the Force Majeure.

19.4

Consequences of Force Majeure

If the Contractor is prevented from performing any of his obligations under the Contract by Force Majeure of which notice has been given under Sub-Clause 19.2 [Notice of Force Majeure], and suffers delay and/or incurs Cost by reason of such Force Majeure, the Contractor shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

(a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.5 [Extension of Time for Completion], and

(b) if the event or circumstance is of the kind described in sub-paragraphs (i) to (iv) of Sub-Clause 19;1 [Definition of Force Majeure] and, in the case of sub-paragraphs (ii) to (iv), occurs in the Country, payment of any such Cost.

After receiving this notice, the Employer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

19.5 **Deleted.**

19.6

Optional Termination, Payment and Release

If the execution of substantially all the Works in progress is prevented for a continuous period of 84 days by reason of Force Majeure of which notice has been given under Sub-Clause 19.2 [Notice of Force Majeure], or for multiple periods which total more than 140 days due to the same notified Force Majeure, then either Party may give to the other Party a notice of termination of the Contract. In this event, the termination shall take effect 7 days after the notice is given, and the Contractor shall proceed in accordance with Sub-Clause 16.3 [Cessation of Work and Removal of Contractor's Equipment].

Upon such termination, the Employer shall pay to the Contractor the amounts payable for any work carried out till that date to be determined in terms of Sub-Clause 3.5.

19.7

Release from Performance

Under the Law Notwithstanding any other provision of this Clause, if any event or circumstance outside the control of the Parties (including, but not limited to, Force Majeure) arises which makes it impossible or unlawful for either or both Parties to fulfill its or their contractual obligations or which, under the law governing the Contract, entitles the Parties to be released from further performance of the Contract, then upon notice by either Party to the other Party of such event or circumstance:

(a) the Parties shall be discharged from further performance, without prejudice to the rights of either Party in respect of any previous breach of the Contract, and

(b) the sum payable by the Employer to the Contractor shall be the same as Would have been payable under Sub-Clause 19.6 [Optional Termination, Payment and Release] if the Contract had been terminated under Sub-Clause 19.6.

20

Claim, Disputes and Arbitration

20.1

Contractor's Claims If the Contractor considers himself to be entitled to any extension of the Time for Completion and/or any additional payment, under any Clause of these Conditions or otherwise in connection with the Contract the Contractor shall give notice to the Employer, describing the event or circumstance giving rise to the claim. The notice shall be given as soon as practicable, and not later than 28 days after the Contractor became aware, or should have become aware, of the event or circumstance.

If the Contractor fails to give notice of a claim within such period of 28 days, the Time for Completion shall not be extended, the Contractor shall not be entitled to additional payment, and the Employer shall be discharged from all liability in connection with the claim. Otherwise, the following provisions of this Sub-Clause shall apply.

The Contractor shall also submit any other notices which are required by the Contract, and supporting particulars for the claim, all as relevant to such event or circumstance.

The Contractor shall keep such contemporary records as may be necessary to substantiate any claim, either on the Site or at another location acceptable to the Employer. Without admitting liability, the Employer may, after receiving any notice under this Sub-Clause, monitor the record-keeping and/or instruct the Contractor to keep further contemporary records. The Contractor shall permit the Employer to inspect all these records, and shall (if instructed) submit copies to the Employer.

Within 42 days after the Contractor became aware (or should have become aware) of the event or circumstance giving rise to the claim, or within such other period as may be proposed by the Contractor and approved by the Employer, the Contractor shall send to

the Employer a fully detailed claim which includes full supporting particulars 'of the basis of the claim and of the extension of time and/or additional payment claimed. If the event or circumstance giving rise to the claim has a continuing effect:

(a) this fully detailed claim shall be considered as interim;

(b) the Contractor shall send further interim claims at monthly intervals, giving the accumulated delay and/or amount claimed, and such further particulars as the Employer may reasonably require; and

(c) the Contractor shall send a final claim within 30 days after the issuance of Taking Over Certificate of the Works, or within such other period as may be proposed by the Contractor and approved by the Employer.

Within 60 days after receiving a claim or any further particulars supporting a previous claim, or within such other period as may be proposed by the Employer and approved by the Contractor, the Employer shall respond with approval, or with disapproval and detailed comments. He may also request any necessary further particulars, but shall nevertheless give his response on the principles of the claim within such time,

Each interim payment shall include such amounts for any claim as have been reasonably substantiated as due under the relevant provision of the Contract. Unless and until the particulars supplied are sufficient to substantiate the whole of the claim, the Contractor shall only be entitled to payment for such part of the claim as he has been able to substantiate.

The Employer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) the extension (if any) of the Time for Completion (before or after its expiry) in accordance with Sub-Clause 8.5 [Extension of Time for Completion], and/or (ii) the additional payment (if any) to which the Contractor is entitled under the Contract.

The requirements of this Sub-Clause are in addition to those of any other Sub-Clause which may apply to a claim. If the Contractor fails to comply with this or another Sub-Clause in relation to any claim, any extension of time and/or additional payment shall take account of the extent (if any) to which the failure has prevented or prejudiced proper investigation of the claim, unless the claim is excluded under the second paragraph of this Sub-Clause.

20.2

Amicable Settlement

Both Parties shall attempt to settle any dispute or difference between them amicably.

20.3

Arbitration

Unless settled amicably, all disputes and differences shall be settled by the parties by arbitration. Unless otherwise agreed by both Parties:

(a) the dispute shall be settled under the rules of arbitration of the Arbitration & Conciliation Act, 1996,

(b) the dispute shall be settled by a sole arbitrator to be appointed by the Principal Secretary, Department of Health & Family Welfare of the Government of West Bengal, India in accordance with the Act,

(c) the arbitration shall be held at Kolkata, and Courts at Kolkata shall alone have jurisdiction (to the exclusion of all other Courts) to entertain all disputes arising out of the Contract, and

(d) the arbitration shall be conducted in the language for communications defined in Sub-Clause 1.4 [Law and Language].

WEST BENGAL MEDICAL SERVICES CORPORATION LTD.

BIDDING DOCUMENTS FOR

Planning, Design and Construction of 01(One) Tertiary Healthcare Hospital along with Supply of Medical Equipments and Hospital Furniture in the State of West Bengal on Turnkey basis

(Bid Reference No. : WBMSCL/NIT-41/2015)

Section 7

Particular Conditions of Contract

WEST BENGAL MEDICAL SERVICES CORPORATION LTD.

BIDDING DOCUMENT FOR

Planning, Design and Construction of 01(One) Tertiary Healthcare Hospital along with Supply of Medical Equipments and Hospital Furniture in the State of West Bengal on Turnkey Basis

(Bid Reference No. : WBMSCL/NIT- 41/2015)

Section 8

Contract Forms

Table of Contents

1. FORM OF AGREEMENT …….. 3

2. PROFORMA FOR BANK GUARANTEE FOR MOBILISATION ADVANCE …… 6

3. FORM OF PERFORMANCE SECURITY BANK GUARANTEE…….. 9

FORM OF AGREEMENT

(ON NON JUDICIAL STAMP PAPER OF APPROPRIATE VALUE)

Agreement No. _____ dated _____

THIS AGREEMENT is made on _____ day of _____ Two Thousand _____ between WEST BENGAL MEDICAL SERVICES CORPORATION LIMITED (WBMSCL) hereinafter called the "Employer" (which expression shall, wherever the context so demands or requires, include their successors in office and assigns) of the One Part and M/s. _____ hereinafter called the Contractor (which expression shall wherever the context so demands or requires, include his/their successors and assigns) of the Other Part.

WHEREAS the Employer is desirous that Project should be executed and has by Notification of Award dated _____ accepted a tender submitted by the Contractor for the project at a total Contract Price of Rs. _____/- (Rupees _____ only).

Now THIS AGREEMENT WITNESSETH as follows :-

1. In this agreement words and expressions shall have the same meaning as are respectively assigned to them in the General Conditions of Contract hereinafter referred to.

2. **Documents**

The following documents in conjunction with Addenda/Corrigenda to Tender Documents shall be deemed to form and be read and construed as part of this agreement viz.

i. Notice Inviting e-Tender
ii. Instructions to Bidders
iii. Evaluation and Qualifying Criteria
iv. Bidding Forms
v. Employer's Requirements

vi. General Conditions of Contract.

vii. Particular Conditions of Contract

viii. Contract Forms.

ix. Amendment to Tender Documents

3. **Previous Communications**

This document constitutes the entire Contract between the parties and supersedes all previous communications, whether oral or written, in relation to the Services to be undertaken in accordance with the Contract.

4. **Execution of Project**

In consideration of the payment to be made by the Employer to the Contractor as hereinafter mentioned, the Contactor hereby covenants with the Employer to execute, complete, remedy defects therein and maintain the Project in conformity in all respects with the provisions of the Contract.

5. **Payment**

The Employer hereby covenants to pay to the Contractor in consideration of the execution, completion, remedying of any defects therein and maintenance of the works, the contract price or such other sum as may become payable under the provisions of the contract at the time and in the manner prescribed by the Contract.

6. Commencement of the Project

This Contract will remain in effect from_____ and expire on _____ unless terminated earlier in accordance with the provisions of the Contract.

7. **Acknowledgement**

The Contractor shall confirm acceptance of the terms of this Contract by signing and returning to WBMSCL the duplicate copy enclosed herewith within a period of 7 days from date of receipt of Notification of Award.

8.

In cosideration of the payment to be made by the employer to the contractor the contractor hereby covenants that upon supply and on payment of 80% of the value of furniture/medical equipments, the right of such properties shall vest on WBMSCL and the contractor will be the custodian of all such material s till installation, comissioning and handing over.

IN WITNESS whereof the parties hereto have caused their respective hands to be hereinto affixed the day and year first above written.

_____	_____
In the capacity of _____	For and on behalf of WBMSCL
On behalf of M/s. _____	(The Employer)
(The Contractor)	In the presence of
In the presence of	Witnesses (Signature, Name &
Witnesses (Signature, Name &	Designation)
Designation)	1.
1.	2.
2.	

PROFORMA FOR BANK GUARANTEE FOR MOBILIZATION ADVANCE

(On Non-Judicial Stamp Paper of Appropriate Value)

To,

_____

West Bengal Medical Services Corporation Ltd.

_____

1. In consideration of, West Bengal Medical Services Corporation Ltd. (WBMSCL) (hereinafter called "The Employer") (which expression shall unless repugnant to the subject or context include its successors and assigns) having agreed under the terms and conditions of the Contract Agreement No. _____ dated _____ with M/s. _____ a company under the Companies Act, 1956 and having its registered office at _____ in the State of _____ (hereinafter called "the said bidder" which expression shall unless the context requires otherwise include its administrators, successors and assigns) in connection with the work of_____ (hereinafter called "the said Contract") to make at the request of the bidder a lump sum advance of Rs. _____/-(Rupees_____only) for utilizing it for the purpose of the Contract on his furnishing a Guarantee acceptable to the Employer , we,_____Bank incorporated under_____and having one of our branches at_____(hereinafter referred to as "the said Bank") do hereby guarantee the due recovery by the Employer of this said advance with interest thereon as provided according to the terms and conditions of the Contract. If the said bidder fails to utilize the said advance for the purpose of the Contract and/or the said advance together with Interest thereon as aforesaid is not fully recovered by the Employer, we,_____Bank hereby unconditionally and irrevocably undertake to pay to WBMSCL on demand and without demur to the extent of the said sum of Rs. _____/-(Rupees _____only),any claim made by the Employer on us for the loss or damage caused to or suffered by the Employer by reason of the Employer not being able to recover in full the said sum of Rs.___/-(Rupees _____ only)with interest as aforesaid.

2. We,_____Bank further agree that the Employer shall be the sole judge of and as to whether the said bidder has not utilized the said advance or any part thereof for the purpose of the Contract and the extent of loss or damage caused to or suffered by the Employer on account of the said advance together with interest not being recovered in full and the decision of the Employer that the said bidder has not utilized the said advance or any part thereof for the purpose of the Contract and as to the amount or amounts of loss or damage caused to or suffered by the Employer shall be final and binding on us.

3. We, the said Bank, further agree that the Guarantee herein contained shall remain in force and effect during the period that would be taken for the performance of the said Contract and till the said advance with interest has been fully recovered and its claims satisfied or discharged and till the Employer certifies that the said advance with interest has been fully recovered from the said bidder, and accordingly shall have no claim under this Guarantee after 30 (thirty) days from the date of satisfactory completion of the said Contract (as per the mutually agreed Work Schedule) i.e. upto and inclusive of_____ (date) unless a notice of the claim under this Guarantee has been served on the Bank before the expiry of the said period i.e._____(date) in which case the same shall be enforceable against the Bank notwithstanding the fact, that the same is enforced after the expiry of the said period.

4. The Employer shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee or Indemnity, from time to time, to vary any of the terms and conditions of the said Contractor the advance or to extend time of performance by the said bidder or to postpone for any time and from time to time any of the powers exerciseable by it against the said bidder and either to enforce or forbear from enforcing any of the terms and conditions governing the said Contract or the advance available to the Employer and the said Bank shall not be released from its liability under these presents by any exercise by the Employer of the liberty with reference to the matters aforesaid or by reasons of time being given to the said bidder or any other forbearance, actor omission on the part of the Employer or any indulgence by the Employer to the said bidder on any other matter or thing whatsoever which under the law relating to sureties would, but for this provision, have the effect of so releasing the Bank from its such liability.

5. It shall not be necessary for the Employer to proceed against the bidder before proceeding against the Bank and the Guarantee herein contained shall be enforceable against the Bank notwithstanding any security, which the Employer may have obtained or obtain from the bidder shall at the time when proceedings are taken against the Bank hereunder, be outstanding or unrealized.

6. We, the said Bank, lastly undertaken not to revoke this Guarantee during its currency except with the previous consent of the Employer in writing and agree that any change in the constitution of the said bidder or the said Bank shall not discharge our liability hereunder.

7. If any further extension of this Guarantee is required the same shall be extended to such required periods on receiving instructions from the bidder M/s. _____ on whose behalf this Guarantee is issued.

8. Notwithstanding anything contained hereinbefore our liability under this Guarantee is restricted to Rs._____/- (Rupees _____only) together with interest @_____. Our undertaking shall commence from the date of execution and shall remain in force upto_____.

Dated this_____day of

_____In presence of For and on behalf of (the Bank)

WITNESS Signature_____

1. _____ Name_____

2. _____ Designation_____

Authorization No.

Seal of the Bank_____

The above Guarantee is accepted by the Employer

For WBMSCL

FORM OF PERFORMANCE SECURITY BANK GUARANTEE

In consideration of the Employer having agreed under the terms and conditions of contract made vide his Notification of Award No.---------dated ------ between West Bengal Medical Services Corporation Ltd. (WBMSCL) (the Employer) represented by its Managing Director and _____(hereinafter called "the said Contractor) for Planning, Design and Construction of 6 (six) Tertiary Healthcare Hospitals along with Supply of Medical Equipments and Hospital Furniture in the State of West Bengal on Turnkey basis (herein after called the said Agreement") the Contractor having agreed to production of a irrevocable Bank Guarantee for Rs. ----------(Rupees ----------Only) as a Security/Guarantee for compliance of his obligations in accordance with the terms and conditions in the said Agreement:

1. We ---------- (indicate the name of the Bank) (hereinafter referred to as "the Bank" hereby undertake to pay to the WEST BENGAL MEDICAL SERVICES CORPORATION LTD., an amount not exceeding Rs. ---------- ---------- (Rupees ----------only) on demand by WBMSCL.

2. We ----------(indicate the name of the Bank) do hereby undertake to pay the amounts due and payable under this Guarantee without any demur, merely on a demand from WBMSCL for and on behalf of the Employer as an Agent/Power of Attorney Holder stating that the amount claimed is required to meet the recoveries due or likely to be due from the said Contractor. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this Guarantee. However, our liability under this Guarantee shall be restricted to an amount not exceeding Rs.---------- (Rupees ----------only).

3. We, the said Bank further under take to pay to the Employer represented by WBMSCL for and on behalf of the Employer as an Agent/Power of Attorney Holder any money so demanded notwithstanding any dispute or

disputes raised by the Contractor in any suit or proceeding pending before any court or Tribunal relating thereto, our liabilities under this present being absolute and unequivocal. The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment thereunder and the Contractor shall have no claim against us for making such payment.

4. We --------- (Indicate the name of the Bank) further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all dues of the Employer under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till the Employer's Representative on behalf of the Employer certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor and accordingly discharges this Guarantee.

5. We ---------- (indicate the name of the Bank) further agree with the Employer, that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extend time of performance by the said Contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said Contractor(s) and to forbear from or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor or for any forbearance, act of omission on the part of the Employer or any indulgence by the Employer to the said Contractor or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. This Guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor .

7. This Guarantee will neither be cancelled nor revoked by the Bank without the written authorization of WBMSCL. For this purpose the beneficiary WBMSCL would inform the Bank of their authorized signatories together with the specimen signatures.

8. This Guarantee shall be valid up to ----------unless extended on demand by the Employer. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs. ---------- (Rupees ---------- Only) and unless a claim in writing is lodged with us within six months of the date of expiry or the extended date of expiry of this Guarantee, all our liabilities under this Guarantee shall stand discharged.

Dated the ---------- day of ---------- for ---------- (indicate the name of the Bank)".

Note : To be put in sealed cover by Bank and addressed to the concerned officer of WBMSCL.

Signature Not Verified
Digitally signed by SAMIR KUMAR GHOSH
Date: 2015.11.27 20:24:55 IST
Location: West Bengal