



INDIAN INSTITUTE OF TECHNOLOGY MADRAS
ENGINEERING UNIT
CHENNAI – 600 036
TENDER NO. 32/ 2013-14 / ELDB

INDEX

S.N	Description	Page No
1	Notice Inviting Tender	2
2	Tender	4
3	Acceptance of Tender	6
4	Conditions of Contract	7
5	Schedules	14
6	Additional Specifications	17
7	Statutory requirements	18
8	Forms	19
9	Special Condition for Protection of Environment	23
10	Special condition for safety at the site	24
11	Insurance	28
12	Progress report	31
13	C.P.W.D Form 8	34
14	C.P.W.D safety code	74
15	C.P.W.D contractors labour regulations	84
16	List of approved makes and brands	90
17	Technical Specifications	91
18	Bill of quantities (Schedule –A)	120

INDIAN INSTITUTE OF TECHNOLOGY MADRAS
ENGINEERING UNIT
CHENNAI – 600 036

1. Notice Inviting Tenders

TENDER NO. 32 / 2013-14 / ELDB

EXECUTIVE ENGINEER, Indian Institute of Technology Madras, Chennai - 600 036 invites sealed tenders, in two envelope system (Application for eligibility and Financial bid) for the following work from the contractors who satisfy the Eligibility Criteria.

1. PARTICULARS OF WORK

- | | |
|--|--|
| 1.1 Name of Work | : Providing 1000kVA 11/0.433kV Distribution Transformer, HT/LT panels and allied cable works in Aero Space Substation at IIT Madras |
| 1.2. Estimated Cost | : Rs.48,95,000 /- |
| 1.3. Earnest Money Deposit (EMD) | : Rs. 97,900/- |
| 1.4. Cost of Tender Document | : Rs. 525/- |
| 1.5. Time Period for Completion | : Six Months |
| 1.6. Validity of the Tender | : 90 days from the date of Opening of the tender |
| 1.7. Date of Prebid Meeting | : 01/11/2013 at 11:00 AM |
| 1.8 Date and Time of submission of tender | : 08/11/2013 at 3:00 PM |
| 1.8. Date and Time of Opening of the Applications for Eligibility (Envelope No. 1) | : 08/11/2013 at 3:10 PM |
| 1.9. Date of Opening of the Financial bid (Envelope 2) | : Will be intimated later |
| 1.10. Place of submission of tenders | : Office of the Executive Engineer, Engineering unit
Administrative Building 3rd Floor
IIT Madras, Chennai – 600 036. |

1.11. Deadline for submission of tender

Tenders must be received by the Employer at the following address not later than 3.00 PM on the date of opening mentioned. In the event of the specified date for the submission of the Tender being declared a holiday by the Employer, the Tenders will be received up to the appointed time on the next working day

1.12. Address for Submission of Tender

The Executive Engineer
Engineering Unit, Administrative Building, 3rd floor,
Indian Institute of Technology Madras
Chennai – 600036.

1.13. The Employer may extend the deadline for submission of Tenders by issuing an amendment in writing in which case all rights and obligations of the Employer and the Tenderer previously subject to the original deadline will be subject to new deadline.

1.14. LATE TENDER

Tenders received late will not be accepted.

2. TENDER

- 2.1. I/We have read and examined the notice inviting tender, schedules A & B, Specifications applicable, drawings, Conditions of contract and other documents and rules referred to in the conditions of contract and all other contents in the tender documents for the work.
- 2.2. I/We hereby tender for the execution of the work specified for the Indian Institute of Technology Madras, within the time specified in Schedule – 'F' and in accordance in all respects with the specifications, designs, drawings and instructions in writing referred to in General Rules and Directions and in Clause 11 of Form 8 (General conditions of contract) and with such materials as are provided for, and in all respects in accordance with such conditions applicable.
- 2.3. I/We agree to keep the tender open for Ninety (90) days from the date of opening of tender and not to make any modifications in its terms and conditions
- 2.4. I/We agree that the EMD deposited by me/us be retained by IITM towards Security Deposit to ensure execution of all works referred to in the tender documents on the terms and conditions contained or referred to therein.
- 2.4. If I/We fail to furnish the prescribed performance guarantee as mentioned elsewhere within prescribed period, I/we agree that IITM shall, without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely.
- 2.5. I/we agree that in case of forfeiture of earnest money as aforesaid, I/we shall be debarred from participating in the re-tendering process of the work.
- 2.6. If I/we fail to commence work as specified in clause 3A of the contract, I/we agree that IITM shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said earnest money and the performance guarantee absolutely,
- 2.7. I/We agree to carry out such deviations as may be ordered, up to a maximum percentage mentioned in Schedule 'F' and those in excess of that limit at the rates to be determined in accordance with the provision contained in Clause 12.2 and 12.3 of the contract.

2.8. I/we hereby declare that I/we shall treat the tender documents, drawings and other records connected with the work as secret / confidential documents and shall not communicate the information derived therefrom to any person other than a person to whom I/we am / are authorised to communicate the same or use the information in any manner prejudicial to the safety of the State.

2.9. I/We hereby certify that the tender document downloaded is the exact copy of the document published by the IITM and no alterations and additions have been made by me / us in the tender document.

Contractor

Dated

Signature of the Tenderer

Postal Address

Witness

Signature

Name

Postal Address

Occupation

3. Acceptance

The above tender is accepted by me for an on behalf of the Board of Governors, IITM
for _____ a _____ sum _____ of
Rs. _____ (Rupees _____

_____)

The letters referred to below shall form part of this contract Agreement:

- a)
- b)
- c)

For & on behalf of the Board of Governors, IITM.

Signature _____

Designation _____

Date _____

4. Conditions of contract

4.1. Definitions

In the contract, the following expressions shall, unless the context otherwise requires, have the meanings, hereby respectively assigned to them:-

1. The expression 'works' or 'work' shall, unless there be something either in the subject or context repugnant to such construction, be construed and taken to mean the works by or by virtue of the contract contracted to be executed, whether temporary or permanent, and whether original, altered, substituted or additional.
2. The 'Site' shall mean the land/or other places on, into or through which work is to be executed under the contract or any adjacent land, path or street through which work is to be executed under the contract or any adjacent land, path or street which may be allotted or used for the purpose of carrying out the contract.
3. The 'contractor' shall mean the individual, firm or company, whether incorporated or not, undertaking the works and shall include the legal personal representative of such individual or the persons composing such firm or company, or the successors of such firm or company and the permitted assignees of such individual, firm or company.
4. The 'Engineer-in-charge' means the Engineer who shall supervise and be in-charge of the work and who shall sign the contract on behalf of IIT as mentioned in Schedule 'F' hereunder.
5. 'Accepting Authority' shall mean the authority mentioned in Schedule.
6. 'Excepted Risks' are riots (other than those on account of contractor's employees), war, acts of God such as earthquake, lightening and unprecedented floods, and other such causes over which the contractor has no control and accepted as such by the Accepting Authority.
7. 'Market Rate' shall be the rate as decided by the Engineer-in-charge on the basis of the cost of materials and labour at the site where the work is to be executed plus the percentage mentioned in Schedule 'F' to cover all overheads and profits.
8. 'Schedules(s)' referred to in these conditions shall mean the relevant schedule(s) annexed to the tender papers or the standard schedule of Rates of the CPWD mentioned in schedule 'F' hereunder, with the amendments thereto issued up to the date of receipt of the tender.
9. 'Department' means IITM which invites the tenders.
10. 'District specification' means the specifications followed by the state of Tamil Nadu in the area where the work is to be executed.
11. 'Tendered value' means the value of the entire work as stipulated in the letter of award.
12. 'Employer means IITM

13. Where the context so requires, words imparting the singular also include the plural and vice versa. Any reference to masculine gender shall whenever required shall refer to feminine gender and vice versa.
14. Wherever the expression "Divisional Officer" appears in the Clauses, it should be substituted by the expression "Superintending Engineer / Executive Engineer".
15. "Engineer in Charge" means Superintending Engineer/ Executive Engineer, IITM, and the Engineer means the officer representing the Engineer-in-Charge of the Project.

4.2. Authority to sign the tender document

The tender must be signed by the person / persons competent to sign as indicated below. Same stipulations will also apply in the case of Receipt of payments for the work done.

1. If the Applicant is an individual, he should sign above his full typewritten name and current address.
2. If the Applicant is a proprietary firm, the Proprietor should sign above his full typewritten name and the full name of his firm with its current address.
3. If the Applicant is a firm in partnership, the Documents should be signed by all the Partners of the firm above their full typewritten names and current addresses. Alternatively the Documents should be signed by a Partner holding Power of Attorney for the firm and in this case a certified copy of the Power of Attorney should accompany the tender documents. In both cases a certified copy of the Partnership Deed and current address of all the partners of the firms should be furnished.
4. If the Applicant is a limited Company, or a Corporation, the Documents shall be signed by a duly authorized person holding Power of Attorney for signing the Documents, accompanied by a copy of the Power of Attorney. The Applicant should also furnish a copy of the Memorandum of Articles of Association duly attested by a Public Notary

4.3 .Instructions for filling the Bill of Quantities (Schedule A)

1. Rate for each item shall be filled in words and figures and there shall be no discrepancy between the rate quoted in figures and words. However, if a discrepancy is found, the rate which corresponds with the amount worked out by the contractor shall unless otherwise proved, be taken as correct.
2. If the amount of an item is not worked out by the contractor or it does not correspond with the rates written either in figures or in words, then the rates quoted by the contractor in words shall be taken as correct.
3. Where the rates quoted by the contractor in figures and in words tally but the amount is not worked out correctly, the rates quoted by the contractor, will, unless otherwise proved, be taken as correct and not the amount.
4. If no rate has been quoted for any item(s), leaving space both in figure(s), words(s) and amount, it will be presumed that the contractor has included the cost of this / these item(s)

in other items and rate for such items(s) will be considered as zero and work will be required to be executed accordingly.

5. Amount must be quoted in full rupees only.
6. Special care should be taken to write the rates in figures as well as in words and the amount in figures in such a way that interpolation is not possible. The total amount should be written both in figures and in words. In case of figures, the word 'Rs' should be written before the figure of 'Rupees' and the word ' P ' after the decimal figures, eg.' Rs 2.15P' and in case of words the word, "Rupees" should precede and the word 'Paise' should be written at the end. Unless the rate is in whole rupees and followed by the word 'only', it should invariably be up to two decimal places. While quoting each rate in schedule of tender, the word 'only' should be written closely following the rate and it should not be written in the next line.
7. In the case of item Rate Tenders, only rates quoted shall be considered. Any tender containing percentage below/above the rates quoted is liable to be rejected
8. Tenders containing proposal for any alteration in the work or in the time allowed for carrying out the work, or which contain any other condition including conditional rebates, will be summarily rejected.
9. The officer inviting tenders shall have the right to reject all or any of the tenders and will not be bound to accept the lowest or any other tender.
10. The tender for the work shall not be witnessed by a Contractor or Contractors who himself / themselves has/have tendered for the same work. Failure to observe this condition would render tenders of the Contractor tendering, as well as witnessing the tender, liable to summary rejection.
11. In the case of any tender where unit rate of any item/items appear unrealistic, such tender will be considered as unbalanced and in case the tenderer is unable to provide satisfactory explanation, such tender is liable to be rejected.
12. The tenderers shall sign a declaration under the Official Secret Act, 1923, for maintaining secrecy of the tender documents, drawings or other records connected with the work given to them.

4.4. Refund / forfeiture of EMD

1. In the event of a tender being accepted, a receipt for the Earnest Money forwarded therewith shall thereupon be given to that Contractor.
2. In the event of a tender being rejected, the Earnest Money forwarded with such unaccepted tender shall thereupon be returned to the Contractor remitting the same, without any interest.
3. Tender for the work shall remain open for acceptance for a period of 90 days from the date of opening of the Tender.

4. If any tenderer withdraws his tender before the said period or issue of acceptance, whichever is earlier or makes any modification in the terms and conditions of the tender which are not acceptable to the Institute, then IITM, shall without prejudice to any other right or remedy, be at liberty to forfeit 50 % of the said earnest money.

4.5 Documents to be submitted upon acceptance of the tender.

1. On acceptance of the tender, the name of the accredited representative(s) of the Contractor who would be responsible for taking instructions from the Engineer in Charge shall be communicated in writing to the Engineer in Charge.
2. The Contractor shall give a list of IITM employees related to him.

4.6 Signing of Agreement.

1. The successful contractor on acceptance of his tender shall within 14 days from the stipulated date of start of the work, sign the contract.
2. **Documents constituting the contract**
 - a. Non judicial stamp paper for value not less than Rs.100 containing the brief description of the contract duly signed by both parties to the contract.
 - b. The notice inviting tender, the financial bid and all other the documents including drawings, if any, forming the tender as issued at the time invitation of tender and acceptance thereof together with any correspondence leading thereto.
 - c. Decisions taken in the Pre-bid meeting if conducted.
 - d. Letter of acceptance
 - e. Letter of award (After submission of Performance Guarantee)

4.7 Special conditions

1. Child Labour is strictly prohibited.
2. Construction labour shall not be permitted (except staff for watch and ward) to stay inside the campus and no labour camp shall be allowed to be set up inside the campus.
3. The construction activities and storage of materials shall be restricted within the area earmarked around the proposed building, which shall be barricaded with materials approved by IITM.
4. The contractor shall abide by the restrictions imposed by the security wing of the Institute on the working and on movement of labour, materials etc. and nothing extra shall be payable on this account. The contractor shall arrange for necessary photo identity passes for the labour for entry into the campus. Advance action for obtaining such passes shall be taken by the contractor and no claim on this account shall be entrained.
5. Movement of labour should be restricted to the areas where work is carried out. Workers should be made to confine themselves to the work areas and should not wander into the near by areas / buildings/ forest.

6. The work should be executed during day time only. If the work is required to be carried out in the night, necessary permission of the Engineer-in-charge shall be obtained. Contractor will make his own arrangement for lighting the area and no extra amount for carrying out the work during night is payable. To the extent possible engaging women labour in the night shift should be avoided
7. The work shall be carried out with least hindrance to the adjoining buildings and offices and the contractor will be responsible for any damage, caused to the existing fixtures, electric fittings, cables, roads, pipelines etc. in the course of execution and the contractor shall make good any such damages for which nothing extra is payable.
8. Water for construction shall be arranged by the contractor. The contractor will not be allowed to use any of the water resources available within the campus nor will be permitted to dig any bore well inside the campus.
9. No plot rent shall be charged for materials stocked in the institute land during the course of construction with the prior approval the Engineer. All such materials shall be removed at the time of completion of the work.
10. The contractor shall make his own arrangement for electricity required during the construction period.
11. Tenderers shall inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders as to the nature of the site and shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their tender. A tenderer shall be deemed to have full knowledge of the site whether he inspects it or not. Submission of a tender implies that the tenderer has read the complete contract documents and is aware of the conditions, specification of the work to be done and of the local conditions and other factors having a bearing on the execution of work. Any claim either for extra amount or for additional time for execution due to ignorance about the site and working condition is not payable.
12. All documents forming the contract shall be taken as mutually explanatory of one another, detailed drawings being followed in preference to small scale drawing and figured dimensions in preference to scaled.
13. In the case of discrepancy between the schedule of Quantities, the specifications and/or the Drawings, the following order of precedence shall be observed.
 - i. Description of item in the Schedule of Quantities.
 - ii. Particular Specifications and special conditions, if any
 - iii. Drawings.
 - iv. C.P.W.D Specifications
 - v. Specifications of B.I.S.
14. If there are varying or conflicting provisions made in any one document forming part of the contract, the Engineer-in-charge shall be the deciding authority with regard to the

interpretation of the documents and his decision shall be final and binding on the contractor.

15. Any error in description, quantity or rate in schedule of Quantities or any omission there from shall not vitiate the contract or release the contractor from the execution of the whole or any part of the works comprised therein according to drawings and specifications or from any of his obligations under the contract. All such variations, errors additions, substitutions etc shall be decided as per the terms of the contract
16. The building work shall be carried out complying in all respects with the requirements of relevant bye-laws of the local body under the jurisdiction of which the work is to be executed or as directed by the Engineer-in-Charge and nothing extra will be paid on this account.
17. The work of water supply, internal sanitary installations and drainage work etc. shall be carried out as per the local body bye-laws and the contractor shall produce necessary completion certificate from such authorities after completion of the work, if required.
18. Where CPWD specifications are not available for fittings and fixtures, the same should conform to bye-laws and specification of the local Body. The contractor should engage licensed plumbers for the work.
19. The contractor shall comply with all legal orders and directions of the local or public authority or municipality and abide by them.
20. The contractor shall give a performance test of the installation(s) as per specifications before the work is finally accepted and nothing extra whatsoever shall be payable to the contractor for the test.
21. Any cement slurry added over base surface (or) for continuation of concreting to obtain better bond between old and new concrete is deemed to have been included in the items and nothing extra shall be payable or extra cement considered in consumption on this account
22. The Rate for RCC works includes cost of concreting in sloped & curved roof, chajjas & beams and no extra rate shall be payable for concreting in such situations.
23. The rate for Centering & shuttering under concrete items will be the same for Centering & shuttering in curves & arches also unless specified otherwise in the BOQ.
24. The contractor should construct proper mortar bands of lean mix with adequate depth & size over the roof for flooding with water & proper curing. In case of Arches, wet gunny bags shall be used for a period of two weeks.
25. Holes and chase for water supply and drainage, etc, shall be provided as directed during progress of work without any claim for extra for finishing
26. The rate quoted for tiling on walls shall include providing the bevel edges for the corners or the PVC corner strips. No additional payment shall be payable on this account.

27. Sample of all materials, fixtures, flooring tiles, wall tiles, doors, windows, sanitary fittings, roofing sheets electrical fittings etc, shall be got approved in advance from the Engineer-in-Charge before taking up the respective work. The contractor shall produce all the materials in advance so that there is sufficient time for testing and approving the materials and clearance of the same before their use in work.
28. The contractor shall be furnished, free of cost one certified copy of the contract documents except Standard Specifications, Schedule of Rates and such other printed and published documents, together with all drawings as may be forming part of the tender papers. None of these documents shall be used for any purpose other than that **of this** contract
29. For any dispute arising out of this agreement, the legal jurisdiction will be at Chennai in Tamil Nadu only.
30. It is not binding on the competent authority to accept the lowest or any other tender and any or all the tenders received can be rejected without assigning any reason.
31. Canvassing whether directly or indirectly, in connection with tender is strictly prohibited and the tenders of the contractors who resort to canvassing will be liable to rejection.
32. The competent authority reserves the right to accept part of the tender and the tenderer shall be bound to perform the same at the rates quoted.
33. The contractor shall associate an Electrical contractor of the appropriate class to carry out the electrical works. But it is the principal contractor who is responsible for completion of the Electrical work also as per contract. No agreement is created between the Electrical contractor associated by the tenderer and IITM in this regard.
34. Other agencies related to this project will also simultaneously execute their part of works and the contractor shall cooperate and allow smooth working of all such agencies. The contractor shall leave such holes, openings etc, for laying / burying of pipes, cable, conduits, clamps, boxes and hooks for fans etc. as may be required for other agencies. Conduits for electrical wiring shall be laid in such a way that they leave enough space for concreting and do not adversely affect the structural members. The rates quoted for the items of work are deemed to include charges for coordinating with all such agencies and nothing extra is payable on this account.
35. The following events will take place in the Campus which may hinder the progress of work.

The duration of the events are

- | | | |
|--------------------------|---|-------------------------------|
| a. Shaastra and Saar ang | - | 10 days (normally in January) |
| b. Convocation | - | 2 days (normally in July) |

The completion time stipulated in the contract is deemed to have included the above, if they happen during the duration of the contract.

5. SCHEDULES

Schedule 'A' - The Bill of Quantities enclosed in this document.

Schedule 'B' - Schedule of materials proposed to be issued to the tenderer
NO MATERIAL SHALL BE ISSUED TO THE TENDERER BY IITM

Schedule 'C' - Schedule of tools and plants proposed to be hired to the tenderer
NO TOOLS AND PLANTS SHALL BE HIRED TO THE CONTRATOR BY IITM

Schedule 'D' - Extra schedules for specific requirements / documents for the work, if any.

Schedule 'E' - Price escalation will be as per CLAUSES – 10C of the agreement. Apart from these price escalations no other claim for escalation for execution of work during the period/extended period of the contract is payable.

Schedule 'F'

Name of work: **Providing 1000kVA 11/0.433kV Distribution Transformer, HT/LT panels and allied cable works in Aero Space Substation at IIT Madras**

Estimated cost of work : Rs. 48,95,000/-

Earnest money : Rs.97,900/-

Performance Guarantee : 5% of the tendered value

Security Deposit : 5% of the tendered value

General Rules and Directions:

Officer inviting tender Executive Engineer, IIT Madras

Maximum percentage for quantity of items work
to be executed beyond which rates are to be
determined in accordance with clause 12.2 and 12.3. } See below

Definition

Engineer-in-charge Executive Engineer

Accepting authority Director, IIT Madras

Percentage on cost of material and
labour to cover all overheads and profit 15%

Standard schedule of rates CPWD DSR 2012

Department IIT Madras

Standard CPWD contract form CPWD form 8 with upto date
Modification and correction

Terms of Payment

70% of the item rate for supply of materials

20% for after erection and testing

10% for commissioning and handing over of the work.

Clause 1

i.) Time allowed for submission of Performance Guarantee from the date of issue of letter of acceptance in days. 7 (seven)_Days

(ii) Maximum allowable extension beyond the period provided above 7(Seven) Days.

Clause 2

Authority for levying compensation under clause 2. Superintending Engineer

Clause 2a

Whether clause 2a shall be applicable : Yes applicable.

Clause 5

Number of days from the date of issue of letter of acceptance for reckoning the date of start : 14 Days

Time allowed for execution of work : Six months

Authority to give fair and reasonable

Extension of time for completion of work : EXECUTIVE ENGINEER, IITM

Clause 6, 6A : Clause 6A shall be applicable.

Clause 7

Gross work to be done with net payment after adjustment of advances for material collected, if any, since the last such payments : Rs.2 Lakhs
for being eligible to interim payment.

Whether Clause 10B (ii) shall be applicable Yes

Clause 10 C Applicable

Clause 11

Specification to be followed for execution of work

Particular specifications CPWD Specifications 1996 Vol. I to VI and revised CPWD Specifications 2003, general specifications for electrical works part – I 2004, , general specifications for electrical works part-IV Sub Station

IS codes, Manufacturer's specifications, General Engineering Practice.

(The specification mentioned earlier will prevail over the one mentioned later unless decided other wise by the Engineer in Charge)

Clause 12

Deviation limit beyond which clauses 30% for construction

12.2 & 12.3 shall apply for building work

(Excluding foundation) 50% for maintenance

Deviation limit beyond which
clauses 12.2 & 12.3 shall apply for
foundation work.



100%

Clause 16

Competent Authority for
deciding reduced rates for items which
are not as per specification

Executive Engineer
IIT Madras

Clause 36(i) Technical Personnel to be employed at site.

Designation	Minimum qualification and experience required	Discipline	Rate of recovery per month for non employment
Technical Representatives	Diploma in Engineering with minimum 5 years of experience – 1 No.	Electrical / Mechanical Engineering	Rs. 20000

6. ADDITIONAL SPECIFICATIONS

The additional specification given below is not substitute to CPWD specifications or IS specifications. These shall be read along with CPWD specifications or IS specifications.

6.1. GENERAL

1. The work shall be carried out using metric dimensions only and shall be measured and paid in metric dimensions. F.P.S. units, if any, mentioned in drawings etc are for guidance only.
2. Wherever any reference to any Indian Standard Specification occurs in the documents relating to this contract the same shall be inclusive of all amendments issued thereto or revision thereof if any, up to the date of receipt of tenders.
3. Unless otherwise specified in the schedule of quantities the rates for the various items are for execution at all heights, levels and locations.
4. Unless otherwise specified in the schedule of quantities the rate for the items of the work shall be considered as inclusive of pumping out or bailing out water during execution, if required, for which no extra payments will be made. This will include water encountered from any source, such as rains, floods, sub-soil water table being high or due to any other cause whatsoever.

6.2. Electrical Conduits Laying

For fixing electrical conduits in walls the required chase should be cut using only electrically operated circular saw. Using of hammer and chisel is completely prohibited

7. STATUTORY REQUIREMENTS / APPROVAL FROM STATUTORY AUTHORITIES

Work for electrical installation shall be carried out in accordance with this specification and complying with the relevant statutory requirements and national standards. It shall be the responsibility of the contractor to obtain approvals of competent Central or State Government authorities and satisfy them regarding the compliance with relevant regulations for this scope of work.

The work should be carried out only under the supervision of licensed supervisors. The licenses possessed by the Contractor's supervisor shall be made available to the Client for scrutiny before commencement.

Test certificate for installation shall be prepared in the form required by the Electrical Inspectorate Govt. of Tamilnadu and Tamilnadu Electricity Board. Any rework on account of remarks by Electrical Inspector shall have to be carried out by the Electrical contractor at no extra cost.

8. Forms

8.1 Guarantee bond

Form of performance security (guarantee) Bank guarantee bond

In consideration of the Indian Institute of Technology Madras (hereinafter called "The Institute") Having offered to accept the terms and conditions of the proposed agreement betweenand.....(hereinafter called "the said contractor (s))for the work..... (hereinafter called "the said agreement") having agreed to production of a irrevocable bank Guarantee for Rs.....(Rupees.....only) as security / guarantee from the contractor (s) for compliance of his obligations in accordance with the terms and condition in the said agreement.

- 1) We.....(hereinafter referred to as "the Bank") hereby (Indicate the name of the Bank) Undertake to pay to the Institute an amount not exceeding Rs.....(Rupees.....only) on demand by the Institute.
- 2) We.....do hereby undertake to pay the amounts due and payable under this Guarantee without any demure, merely on a demand from the Institute stating that the amount claimed is required to that recoveries due or likely to be due from the contractor (s). Any such demand on the Bank shall be conclusive as regard 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 undertake to pay to IITM any money so demanded notwithstanding any dispute or disputes raised by the contractor (s) in any suit or proceeding pending before any court or Tribunal relating thereto, our liability under this present guarantee being absolute and unequivocal.
The payment so made by us under this bond shall be a valid discharge of our liability payment therein under and the contractor (s) shall have no claim against us for making such payment.
- 4) We.....further agree that the guarantee herein (indicate the name of the bank) Contained shall remain in full force and effect during the period that would be taken for the said performance of the said agreement and that

it shall continue to be enforceable till all the dues of the Institute under or by virtue of the said agreement have been fully paid and claims satisfied or discharged or till Engineer-in-charge on behalf of the Institute certifies that the terms and conditions of the said agreement have been fully and properly carried out by the said contractor (s) and accordingly discharges this guarantee.

- 5) We.....further agree with the Institute that (Indicate the name of the Bank) the Institute shall have the fullest liberty without our consent without effecting 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 (s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Institute against the said contractor (s) and to forbear 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 (s) or for any forbearance, act of omission on the part of the Institute on any indulgence by the Institute to the said contractor (s) 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 (s).
- 7) We.....lastly undertake not to revoke this (Indicate the name of the Bank) Guarantee except with the previous consent of the Institute in writing.
- 8) This guarantee shall be valid up to.....unless extended on demand by Institute. Notwithstanding anything mentioned above, our liabilities under this guarantee is restricted to Rs (Rupees) and unless a claim of writing is lodged with us within six month of the date of expiry or extended date of expiry of this guarantee all our liabilities under this guarantee shall stand discharge.

Dated the.....day of.....for.....(Indicate the name of the Bank)

8.2. Form of guarantee bond for EMD

In consideration of the Indian Institute of Technology Madras (hereinafter called "The Institute") Having offered to accept the terms and conditions of the proposed tender for the work ofhaving agreed to production of an irrevocable bank Guarantee for Rs.....(Rupees.....only) as security from the contractor (s) for compliance of his obligations in accordance with the terms and condition in the tender.

- 1) We..... (hereinafter referred to as "the Bank") hereby (Indicate the name of the Bank) Undertake to pay to the Institute an amount not exceeding Rs.....(Rupees.....only) on demand by the Institute.
- 2) We.....do hereby undertake to pay the amounts due and payable under this Guarantee without any demure, merely on a demand from the Institute stating that the amount claimed is required to that recoveries due or likely to be due from the contractor (s). Any such demand on the Bank shall be conclusive as regard 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 undertake to pay to IITM any money so demanded notwithstanding any dispute or disputes raised by the contractor (s) in any suit or proceeding pending before any court or Tribunal relating thereto, our liability under this present guarantee being absolute and unequivocal. The payment so made by us under this bond shall be a valid discharge of our liability payment therein under and the contractor (s) shall have no claim against us for making such payment.
- 4) We.....further agree that the guarantee herein (indicate the name of the bank) Contained shall remain in full force during the **SIX months period.**

- 5) We.....further agree with the Institute that (Indicate the name of the Bank) the Institute shall have the fullest liberty without our consent without effecting 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 (s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Institute against the said contractor (s) and to forbear 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 (s) or for any forbearance, act of omission on the part of the Institute on any indulgence by the Institute to the said contractor (s) 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 (s).
- 7) We.....lastly undertake not to revoke this (Indicate the name of the Bank) Guarantee except with the previous consent of the Institute in writing.
- 8) This guarantee shall be valid up to **SIX months** unless extended on demand by Institute. Notwithstanding anything mentioned above, our liabilities under this guarantee is restricted to Rs..... (Rupees) and unless a claim of writing is lodged with us within six month of the date of expiry or extended date of expiry of this guarantee all our liabilities under this guarantee shall stand discharge.

Dated the.....day of.....for.....(Indicate the name of the Bank)

9. Special conditions

9.1. Protection of Environment

1. The debris / construction waste and other waste generated from the work spot should not be thrown inside the campus. All waste material should be taken out of the campus or should be dumped at a place earmarked by the Engineer in charge. All construction material should be stored only at places earmarked by the engineer in charge.
2. Material like cement, aggregate, steel etc should not be stored in buildings that are in use. If any material stored in unauthorized location the same shall got removed at the cost of contractor and necessary rent shall be levied for the area used for storage.
3. For Intercarting of various materials use of animal drawn vehicles are strictly prohibited.
4. Preparation of concrete, mortars in the roads, pavements, bare floors under the building is strictly prohibited.
5. While transporting the materials along the road, spillage of material should be avoided. If any spillage occurs, the same should be got cleaned immediately.
6. No vegetation inside the campus should be damaged.
7. Smoking is strictly prohibited at workplace.

10.0 Safety at the Site

1. The contractor must appoint a qualified person (full time) for taking care of implementation of Safety systems
2. The Contractor shall submit the **Project Safety Plan** stating the methodology of implementation of systems to ensure the safe and environment friendly work place. The Safety Plan must include the following.

- a. Organization Chart
- b. Reporting relationship of the safety enforcement personal in a flow chart
- c. Safety Committee Structure – Chairman, secretary and committee members

10.1 Roles & Responsibilities of the Safety committee

Enforcement of

1. applicable Statutory requirements, standards and codes related to safety and its adherence,
2. General safety rules and regulations concerning use of personal protective equipment and safety devices relevant to site activities, Awareness and Training Programs, Motivational schemes, programs for safe Access, Egress and workstation safety
3. Safe use of construction power supply and upkeep / maintenance of installations
4. Work permit systems
5. Use, maintenance and inspection of Plant & machinery
6. Scaffold & formwork norms
7. Use, maintenance and inspection of Lifting Tools
8. Fire Protection and prevention
9. Emergency preparedness

10.2.1 Status of Safety implementation at site will be discussed in the Weekly Review meeting. Contractor must submit the safety statistics every month in the enclosed format. Merit Certificate will be issued for the achievement of safety mile stones like 0.5 million safe man hours, one million safe man hours, 1.5 million safe man hours and so on.

10.2.2 The General Guidelines governing the safety implementation shall include the following Rules., while preparing the safety plan.

1. All the workmen shall undergo Safety Induction, screening before engaging them on the job. Physical fitness of the person to certain critical jobs like working at

height or other dangerous locations to be ensured before engaging the person on work.

2. Sub-contractors shall ensure adequate supervision at workplace. They shall ensure that all persons working under them shall not create any hazard to self or to co-workers.
3. Nobody is allowed to work without wearing safety helmet. Chinstrap of safety helmet shall be always on. Drivers, helpers and operators are no exception.
4. All labour should be dressed properly attending to work wearing dhotis, lungies should be avoided to the extend possible.
5. The workmen shall wear suitable protection devices like mask, gloves, shoes etc,
6. No one is allowed to work at or more than three meters height without wearing safety belt and anchoring the lanyard of safety belt to firm support preferably at shoulder level.
7. No one is allowed to enter into workplace and work at site without adequate foot protection.
8. Usage of eye protection equipment shall be ensured when workmen are engaged for grinding, chipping, welding and gas-cutting. For other jobs as and when site safety co-coordinator insists eye protection has to be provided.
9. All PPE like Safety shoes, Safety helmet, Safety belt, Safety goggles etc. shall be arranged before starting the job.
10. All excavated pits shall be barricaded & barricading to be maintained till the backfilling is done. Safe approach to be ensured into every excavation.
11. Adequate illumination at workplace shall be ensured before starting the job at night.
12. All the dangerous moving parts of the portable / fixed machinery being used shall be adequately guarded. Ladders being used at site shall be adequately secured at bottom and top. Ladders shall not be used as work platforms.
13. Erection zone and dismantling zone shall be barricaded and nobody will be allowed to stand under suspended loads.
14. Contractors should spray water using Water browser periodically in the site to reduce the dust rising due to wind.
15. Horseplay is completely prohibited at workplace. Running at the site is completely prohibited, except in the case of emergency.
16. Material shall not be thrown from the height. If required, the area shall be barricaded and one person shall be posted outside the barricading for preventing the tre-passers from entering the area.
17. Other than electricians with red helmet no one is allowed to carry out electrical connections, repairs on electrical equipment or other jobs related thereto.

18. All electrical connections shall be made using 3 or 4 core cables, having a earth wire.
19. Proper Earthling pits at site to be constructed. And the sensitivity must be maintained less than 1 ohm
20. Main panel boards should have MCB's and RCCB / ELCB's (30 mA sensitivity).
21. Inserting of bare wires for tapping the power from electrical sockets is completely prohibited.
22. All major, minor accidents and near misses to be recorded and reported to the IITM and the management must take necessary steps to avoid the recurrence.
23. Scaffoldings used should be of proper construction. No Casuarina pole / bamboo scaffolding is permitted. It should be inspected by competent person(s) before use
24. All tools and tackles shall be inspected before use. Defects to be rectified immediately. No lifting tackle to be used unless it is certified by the competent authority.
25. All tools and tackles shall be tested and have a Identification no., SWL and date of next test marked on them.
26. A tools and tackles inspection register must be maintained and updated regularly.
27. Good housekeeping to be maintained. Passages shall not be blocked with materials. Materials like bricks shall not be stacked to the dangerous height at workplace.
28. Must have a reverse horn on all the Earth moving vehicles and Equipments used at site.
29. Debris, scrap and other materials to be cleared from time to time from the workplace and at the time of closing of work everyday.
30. Adequate fire fighting equipment shall be made available at workplace and persons are to be trained in fire fighting techniques with the co-ordination of site safety co-ordinator.
31. All the unsafe conditions, unsafe acts identified by contractors, reported by site supervisors and / or safety personnel to be corrected on priority basis.
32. No children shall be allowed to enter the workplace.
33. Other than the Driver / operator, no one shall travel in a tractor / tough rider etc.
34. All the lifting tools and tackles shall be stored properly when not in use.
35. Clamps shall be used on Return cables to ensure proper earthling for welding works.
36. Return cables shall be used for earthling.
37. All the pressure gauges used in gas cutting apparatus shall be in good working condition.
38. Proper eye washing facilities shall be made in areas where chemicals are handled.

39. Connectors and hose clamps are used for making welding hose connections.
40. Proper warning boards and caution notices to be displayed at required areas inside the site.
41. All cranes must have a trained signal man for signaling.
42. All underground cables for supplying construction power shall be routed using conduit pipes.
43. Spill trays shall be used to contain the oil spills while transferring / storing them.
44. Tapping of power by cutting electric cables in between must be avoided. Proper junction boxes must be used.

10.3 Any violation of above will attract levy of penalty by the engineer in charge on the contractor.

11. INSURANCE

1. Insurance of Works

The Contractor shall effect Contractor's all risk insurance policy (CAR policy) in the joint names of the Employer and the Contractor, the name of the former being placed first in the policy, covering the following:

(a) The Works at the contract price together with the materials for incorporation in the works at their replacement value.

(b) All plants and equipment and other things brought to the site by the Contractor at their replacement value.

The insurance shall be against all losses or damages from whatever causes, other than excepted risks, as defined in Clause 2 of Conditions of Contract, for which the Contractor is responsible under the Contract. The insurance cover shall be for the period of contract and also for the period of maintenance, for loss or damage arising from a cause prior to commencement of the period of maintenance, and for any loss or damage, occasioned by the Contractor in the course of any operations carried out for the purpose complying with his course of any operations carried out for the purpose of complying with his obligations during maintenance period under Clause 17 of Clauses of Contract. Such insurance shall be effected with an insurer and with terms approved by the Employer. The Contractor shall, whenever required, produce the policy or policies and the receipts for payment of the current premiums.

2. Third Party Insurance

Before commencing the execution of the Works, the contractor shall insure against the liability for any material or physical damage, loss or injury which may occur to any property or life including that of the Employer or to any person, including any employee of the Employer, by or arising out of the execution of the works or in the carrying out of the Contract. The sum insured will be for Rs.5 lakhs. Such insurance shall be effected with an insurer and in terms approved by the Employer. The Contractor shall, whenever required, produce before the Engineer-in-charge the policy or policies of insurance and the receipts of payment of the current premiums.

3. Workmen's Insurance

The Employer's shall not be liable for any payment in respect of any damages or compensation payable according to law in respect or in consequence of any accident or injury or loss of life to any workman or other person in the employment of the Contractor or any sub-contractor, except an accident or injury resulting from any act or default of the Employer, his agents or servants. The Contractor shall insure against such liability with an insurer approved by the Employer for sum of the established norms during the entire period till completion of Period of Maintenance.

4. Recovery from the Contractor

Without prejudice for the other rights of the Employer against the Contractor in respect of default, the Employer shall be entitled to deduct from any sums payable to the Contractor the amount of any damages, compensation costs, charges and other expenses paid by the Employer and which are payable by the Contractor under this clause.

5. Extension of time

The Contractor, in case of rebuilding or reinstatement, shall be entitled to such extension of time for completion as the Engineer-in-charge may deem fit, but shall, however not be entitled to reimbursement by the Employer of any shortfall or deficiency in the amount finally paid by the insurer in settlement of any claim arising as set out herein.

6. Insurance by Sub-Contractors

Without prejudice to his liability under this clause the Contractor shall also cause all Sub-Contractors to effect, for their respective portions of the works, similar policies of insurance in accordance with the provisions of this clause and shall produce or cause to produce to the Employer such policies. The Contractor shall not permit a Sub-Contractor to commence work at the site unless the said insurance policies are submitted. In the event of failure of the Sub-Contractor to take out such a policy of insurance before commencing the works at the site, the Contractor shall be responsible for any claim or damage attributable to the said Sub-Contractor.

7. Period of Policies

All the insurance covers mentioned above shall be kept alive during the complete period of the contract. If the Contractor shall fail to effect and keep in force the insurance referred to above, or any other insurance which he may be required to effect under the terms of the Contract, then and in any such case the Employer on advice of the Engineer-in-Charge may effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose and from time to time deduct the amount so paid by the Employer as aforesaid from any moneys due or which may become due to the Contractor, or recover the same as debt due from the Contractor.

8. Damage to Persons and Property – Employer to be Indemnified

The Contractor shall indemnify the Employer against all losses and claims in respect of injuries or damages to any person or material or physical damage to any property whatsoever which may arise out of or in consequence of the execution and maintenance of the works and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect of or in relation thereto, except any compensation or damages for or with respect to:

- (a) The permanent use or occupation of land by the works or any part thereof.
- (b) The right of the Employer to execute the works or any part thereof on, over, under, in
or through any land.

(c) Injuries or damage to persons or property resulting from any act or neglect of the Employer, his agents, servants or other contractors, not being employed by the Contractor or for or in respect of any claims, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto or where the injury or damage was contributed to by the contractor, his servants or agents, such part of the compensations as may be just and equitable having regard to the extent of the responsibility of the Employer, his servant or agent or other Contractors, for the damage or injury.

Signature of Contractor

-Sd-
Executive Engineer (E)

12. Progress Reports

The contractor shall submit monthly progress report of the work in a computerized form. The progress report shall contain the following.

1. Construction schedule of the various components of the work through bar chart for the next 3 quarters, showing the milestones, targeted tasks and up to date progress.
2. Progress chart of the various components of the work that are planned and achieved for the month as well as cumulative up to the month with reasons for deviations, if any, in a tabular 12.format.
3. Plant and machinery statement, indicating those deployed in the work, and their working status.
4. Man power statement, indicating the labour and staff employed in the work and the details of work carried out.
5. Financial statement, indicating the broad details of all the running account payments received up to date, such as gross value of work done. Advances taken, recoveries effected, amounts withheld, net payments, details of payments received, etc.
6. A statement showing the extra and substituted items submitted by the contractor and the payments received against them, items pending for sanctions / decisions by the Institute , broad details of the bank guarantees, indicating their validity period, board details of the insurance policies taken by the contractor, if any, advances received and adjusted from the department etc.
7. Progress photographs in colour of the various items / components of the work done up to date to indicate visually the actual progress of the work.
8. Quality assurance and quality control tts conducted during the month with results thereof.
9. Safety report.
10. Other details asked for by the engineer-in-charge.

Proforma for Reports

Physical Progress

Name of Item	Quantity as per Agreement	Quantity executed during the month	Total up to date quantity executed	Anticipated balance quantity
--------------	---------------------------	------------------------------------	------------------------------------	------------------------------

Financial Progress

Amount of work done during the month	Total amount of work done up to date	Anticipated amount of balance work
--------------------------------------	--------------------------------------	------------------------------------

TOTAL MANHOURS WORKED DURING THE MONTH

S . N	Description	Number	Man-hours worked	OT Performed	Total
1	Company Staff				
2	Subcontractor's Workmen (including security personnel)				
	GRAND TOTAL OF MANHOURS WORKED DURING THE MONTH				

Total Man-hours worked since inception :
 Safe man hours from last reported :
 Lost time due to injury :

Details of Reportable Lost Time Injury

S N	Name of Injured	Date of Accident	Resumed duty on	Man days lost			Claim Status
				Up to last month (1)	This month (2)	Total (1+2)	

Man days Lost during the month (Cumulative of 2)

--

Number of Dangerous Occurrences : _____

No of Near Miss Cases : _____

Routed through
Site In charge
/Time Keeper

Site Safety Co-ordinator

Signature: _____

Signature:

Date: _____

Date: _____

The contractor has to submit the progress report to the Engineer-in-Charge in triplicate by 10th day of every month as per the above proforma along with photographs of the work done during that month. The contractor shall be charged @ Rs.5000 (Rupees five thousand only) in the event of non-receipt of monthly progress report on due date (i.e. on 10th of every month) in the manner prescribed above. In case 10th day happens to be a closed holiday then the progress report will be submitted on the next working day.

A videography of the work should be undertaken at various stages of construction right from the day of start of work to date of completion / occupation covering all major events inspections etc. The videography shall be reviewed time to time by the Engineer in charge.

13.0 CPWD - FORM - 8

CLAUSES OF CONTRACT

CLAUSE 1

- i. The contractor shall submit an irrevocable performance guarantee of 5 % (Five percent) of the tendered amount in addition to other deposits mentioned elsewhere in the contract for his proper performance of the contract agreement, (not withstanding and / or without prejudice to any other provisions in the contract) within the period specified in schedule 'F' from the date of issue of letter of acceptance. This period can be further extended by the Engineer-in-charge upto a maximum as specified in schedule 'F' on written request of contractor stating the reason for delays in procuring the performance guarantee, to the satisfaction of the Engineer-in-charge. This guarantee shall be in the form of cash (in case guarantee amount is less than Rs.10,000/-) or Banker's Cheque of any scheduled bank / Demand Draft of any scheduled Bank
- ii. The performance guarantee shall be initially valid upto the stipulated date of completion plus 60 days beyond that. In case the time for completion of work gets enlarged, the contractor shall get the validity of performance guarantee extended to cover such enlarged time for completion of work. After recording of the completion certificate for the work by the competent authority, the performance guarantee shall be returned to the contractor, without any interest.
- iii. The Engineer-in-charge shall not make a claim under the performance guarantee except for amounts to which the Institute is entitled under the contract (not withstanding and / or without prejudice to any other provisions in the contract agreement). In the event of:
 - (a) Failure by the contractor to extend the validity of the Performance guarantee as described herein above, in which event the Engineer-in-charge may claim the full amount of the performance guarantee.
 - (b) Failure by the contractor to pay the Institute any amount due, either as agreed by the Contractor or determined under any of the clauses / conditions of the agreement, within 30 days of the service of the notice to this effect by Engineer-in-charge.
- iv. In the event of contract being determined or rescinded under provision of any of the Clause / Condition of the agreement, the performance guarantee shall stand forfeited in full and shall be absolutely at the disposal of the Institute.

CLAUSE 1 A

The person/persons whose tender(s) may be accepted (herein after called the contractor) shall permit Institute at the time of making any payment to him for work done under the contract to deduct a sum at the rate of 5 % of the gross amount of each running bill till the

sum along with the sum already deposited as earnest money, will amount to security deposit of 5 % of the tendered value of the work. Such deductions will be made and held by Institute by way of Security Deposit unless he/ they has / have deposited the amount of Security at the rate mentioned above in cash.

All compensations or the other sums of money payable by the contractor under the terms of this contract may be deducted from or from any sums which may be due to or may become due to the contractor by the Institute on any account whatsoever and in the event of his Security Deposit being reduced by reason of any such deductions.

The contractor shall within 10 days make good in cash any sum or sums which may have been deducted from his security deposit or any part thereof. The security deposit shall be collected from the running bill of the contractor at the rates mentioned above and the earnest money deposited at the time of tenders will be treated as a part of security deposit.

The Security deposit as deducted above can be released against bank guarantee issued by a scheduled bank, on its accumulations to a minimum of Rs 5 Lakhs subject to the condition that amount of such bank guarantee, except last one shall not be less than Rs 5 Lakhs.

CLAUSE 2

If the contractor fails to maintain the required progress in terms of clause 5 or fails to complete the work and clear the site on or before the contract or extended date of completion, he shall, without prejudice to any other right or remedy available under the law to the Institute on account of such breach, pay as agreed compensation the amount calculated at the rates stipulated below by the authority specified in schedule 'F' (whose decision in writing shall be final and binding) may decided on the amount of tendered value of the work for every completed day / month (as applicable) that the progress remains below the specified in clause 5 or that the work remains incomplete.

This will also apply to items or group of items for which a separate period of completions has been specified.

i. Compensation for delay of work : @ 1.5 % 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 amount of compensation may be adjusted or set-off against any sum payable to the Contractor under this or any other contract with the Institute. In case, the contractor does not achieve a particular milestones mentioned in schedule 'F', or the re-scheduled milestone(s) in terms of clause 5.4, the amount shown against that milestone shall be withheld, to be adjusted against the compensation levied at the final grant of Extension of Time. With-holding 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 milestones, amount mentioned against each milestone missed subsequently also shall be withheld. However, no interest, whatsoever, shall be payable on such withheld amount.

CLAUSE 2A

In case, the contractor completes the work ahead of scheduled completion time, a bonus @ 1 % (one percent) of the tendered value per month, computed on per day basis shall be payable to the contractor, subject to a maximum limit of 5 % (five percent) of the tendered value. The amount of bonus, if payable, shall be paid along with final bill after completion of work. Provided always that provision of the clause 2 A shall be applicable only when so provided in schedule 'F'.

CLAUSE 3

Subject to other provisions contained in this clause, the Engineer-in-charge may, without prejudice to his any other rights remedy against the contractor in respect of any delay, inferior workmanship, any claims for damages and / or any other provisions of contract or otherwise, and whether the date of completion has or has not elapsed, by notice in writing absolutely determine to contract in any of the following cases:

If the contractor having been given by the Engineer-in-charge a notice in writing to rectify, reconstruct or replace any defective work or that work is being performed in an inefficient or otherwise improper or un workman like manner shall omit to comply with the requirement of such notice for a period of 7 days thereafter.

If the contractor has, without reasonable cause, suspended the progress of the work or has failed to proceed with the work with due diligence so that in the opinion of the Engineer-in-charge (which shall be final and binding) he will be unable to secure completion of the work by the date for completion and continues to do so after a notice in writing of seven days from the Engineer-in-charge.

If the contractor fails to complete the work within the stipulated date or items of work with individual date of completion, if any stipulated, on or before such date(s) of completions and does not complete them within the period specified in a notice given in writing in that behalf by the Engineer-in-charge.

If the contractor persistently neglects to carry out his obligations under the contract and / or commits default complying with any of the terms and conditions of the contract and does not a remedy it or takes effective steps to remedy it within 7 days after a notice in writing is given to him in that behalf by the Engineer-in-charge.

If the contractor shall offer to give or agree to give to any person in Government service or to any other person on his behalf any gift or consideration of any kind as an inducement or

reward for doing or for bearing to do or for having done or forborne to do any act in relation to the obtaining or execution of this or any other contract for Government.

If the contractor shall enter into a contract with the Institute in connection with which commission has been paid or agreed to be paid by him or to his knowledge, unless the particulars of any such commission and the terms of payment thereof have been previously disclosed in writing to the Engineer – in – Charge.

If the contractor shall obtain a contract with the Institute as a result of wrong tendering or other non-bonafide methods or competitive tendering.

If the contractor being an individual or if a firm any partner thereof shall at any time be adjudged insolvent or have a receiving order or order for administration of his estate made against him or shall take any proceedings for liquidation or composition (other than a voluntary liquidation for the purpose of amalgamation or reconstruction) under any insolvency Act of the time being in force or make any conveyance or assignment of his effects or composition or arrangement for the benefit of his creditor or purport so to do, or if any application be made under insolvency act for the time being in force for the sequestration of his estate or if a trust deed be executed by him for benefit of his creditors.

If the contractor being a company shall pass a resolution or the court shall make an order that the company shall be wound up or if a receiver or a manager on behalf of a creditor shall be appointed or if the circumstances shall arise which entitle the court or the creditor to appoint a receiver or a manager or which entitle the court to make a winding up order.

If the contractor shall suffer an execution being levied on his good and allow it to be continued for a period of 21 days.

If the contractor assigns transfers, sublets (engagement of labour on piece – work basis or of labour with materials not to be incorporated in the work, shall not be deemed to be subletting) or otherwise parts with or attempts to assign, transfer, sublet or otherwise parts with the entire works or any portion thereof with out the prior written approval of the Engineer – in – charge.

When the contractor has made himself liable for action under any of the cases aforesaid, the Engineer-in-charge on behalf of the Institute shall have powers.

To determine the contract as aforesaid (of which termination notice in writing to the contractor under the hand of the Engineer-in-charge shall be conclusive evidence). Upon such determination, the Earnest Money Deposit, Security Deposit already recovered and performance guarantee under the contract shall be liable to be forfeited and shall be absolutely at the disposal of the Institute.

After giving notice to the contractor to measure up the work of the contractor and to take such whole, or the balance or part there of, as shall be un-executed out of his hands and to give it to another contractor to complete the work. The contractor, whose contract is determined or

rescinded as above, shall not be allowed to participate in the tendering process for the balance work.

In the event of above courses being adopted by the Engineer-in-charge, the contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased or procured any material or entered into any engagements or made any advance on account or with a view to the execution of the work or the performance of the contract. And in case action is taken under any of the provision aforesaid, the contractor shall not be entitled to recover or be paid any sum for any work thereof actually performed under this contract unless and until the Engineer-in-charge has certified in writing the performance of such work and value payable in respect thereof and he shall only be entitled to be paid the value so certified.

CLAUSE 3 A

In case, the work cannot be started due to reason not within the control of the contractor within 1/8th of the stipulated time for the completion of the work, either party may close the contract. In such an eventuality, the earnest money deposit and performance guarantee of the contractor shall be refunded, but no payment on account of interest, loss of profit or damages etc. shall be payable at all.

CLAUSE 4

In any case in which any of the powers conferred upon Engineer-in-charge by clause 3 thereof, 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 compensations shall remain unaffected. In the event of Engineer-in-charge 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 Engineer-in-charge 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 Engineer-in-charge) all or any tools, plants, 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 this not being applicable, at current market rates to be certified by the Engineer-in-charge, whose certificate thereof shall be final, and binding on the contractor, clerk of the works, foreman or other authorized agent 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 Engineer-in-charge may remove them at the contractor's expense or sell them by auction or private sale on account of the contractor on his risk in all respects and certificate of the Engineer-in-charge 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.

CLAUSE 5

The time allowed for execution of the works as specified in schedule 'F' or the extended time in accordance with these conditions shall be the essence of the contract. The execution of the work shall commence from such time period as mentioned in schedule 'F' or from the date of handing over of the site whichever is later. If the contractor commits default in commencing the execution of the work as aforesaid, Institute shall without prejudice to any other right to remedy available in law, be at the liberty to forfeit the earnest money & performance guarantee absolutely.

5.1 As soon as possible after the contract is concluded the contractor shall submit a time and progress chart for each mile stone and get it approved by the Engineer-in-charge. The chart shall be prepared in direct relation to the time slated in the contract documents for completion of items of the works. It shall indicate 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 Engineer-in-charge 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 mile stones given in Schedule 'F'.

5.2 If the work(s) be delayed by :

Force majeure, such as abnormally bad weather, flood, cyclone or any other act of God or serious loss or damage by fire, or civil commotion, local commotion of workmen, strike or lockout, affecting any of the trades employed on the work or any other cause which, in the absolute discretion of the Engineer in charge is beyond the Contractor's control then upon the happening of any such event causing delay, the contractor shall immediately give notice

thereof in writing to the Engineer-in-charge but shall nevertheless use constantly his best endeavors to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the Engineer-in-charge to proceed with the works.

5.3 Request for rescheduling of milestones and extension of time, to be eligible for consideration, shall be made by the contractor in writing within fourteen days of the happening of the event causing delay on the prescribed form. The contractor may also, if practicable, indicate in such a request the period for which extension is desired.

5.4 If any such case the Engineer in Charge may give a fair and reasonable extension of time and reschedule the mile stone for completion of work. Such extension shall be communicated to the contractor by the Engineer-in-charge in writing, within 3 months of the date of receipt of such request. Non-application by the contractor for extension of time

shall not be a bar for giving a fair and reasonable extension by the Engineer-in-charge and this shall be binding on the contractor.

CLAUSE 6

-Deleted –

CLAUSE 6A

Engineer – in – charge shall, except as otherwise provided ascertain and determine measurement for the value of work done in accordance with the contract.

All measurements of all items having financial value shall be entered by the contractor complied in the shape of the Computerized Measurement Book having pages of A-4 size as per the format of the Institute so that a complete record is obtained of all the items of work performed under the contract.

All such measurements and levels recorded by the contractor or his authorized representative from time to time, during the progress of the work, shall be got checked by the contractor from the Engineer - in - charge or his authorized representative as per interval or program fixed in consultation with the Engineer – in – Charge or his authorized representative. After the necessary corrections made by the Engineer – in – charge the measurement sheets shall be returned to the contractor for incorporating the corrections and for resubmission to the Engineer – in – charge for the dated signatures by the Engineer – in – charge and the contractor or their representatives in token of their acceptance.

Whenever bill is due for payment, the contractor would initially submit draft computerized measurement sheets and these measurements would be got checked / test checked from the Engineer – in – charge and / or his authorized representative . The contractor will thereafter incorporate such changes as may be done during these checks / test checks in his draft computerized measurements and submit to the Institute a computerized measurement book duly bound, and with its pages machine numbered and a soft copy of the same. The Engineer – in – Charge and / or his authorized representative would thereafter check this MB and record the necessary certificates for their checks / test checks.

The final, fair, computerized measurement book given by the contractor duly bound with its page machine numbered and soft copy of the same should be 100% correct, and no cutting or over writing in the measurements would thereafter be allowed. If at all any error is noticed, the contractor shall have to submit a fresh computerized MB with its pages duly machine numbered and bound, after getting the earlier MB cancelled by the Institute. There after the MB shall be taken in the Division Office records and allotted a number as per the Register of Computerized MBs . This should be done before the corresponding bill is submitted to the Engineering Unit for payment. The contractor shall submit two separate copies of such computerized MB's for the purpose of reference and record by the various officers of the Engineering Unit.

The contractor shall also submit to the Engineering Unit separately his computerized Abstract of cost and the bill based on these measurements, duly bound and its pages machine numbered along with two spare copies of the 'bill'. Thereafter this bill will be processed by the Engineering Unit and allot a number as per computerized record in the same way as done for the measurement book meant for measurements.

The contractor shall, without extra charge, provide assistance with every appliance, labour and other things necessary for checking of measurements / levels by the Engineer – in – Charge or his representative.

Except where any general or detailed description of the work expressly shows to the contrary, measurements shall be taken in accordance with procedure set forth in the specifications notwithstanding any provision in the relevant standard methods of measurements or any general or local custom. In the case of items which are not covered by specifications, measurement shall be taken in accordance with the relevant standard method of measurement issued by Bureau of Indian Standards and if for any item no such standard is available then a mutually agreed method shall be followed.

The contractor shall give not less than 7 days notice to the Engineer-in-charge or his authorized representative in charge of the work before covering up or otherwise placing beyond the reach of checking and / or test checking the measurement of any work in order that the same may be checked and / or test checked and correct dimensions thereof be taken before the same is covered up or placed beyond the reach of checking measurement and / or test checking measurement and shall not cover up and place beyond reach of measurement of any work without consent in writing of the Engineer-in-charge or his authorized representative in-charge of the work who shall within the aforesaid period of 7 days inspect of the work, and if any work shall be covered up or placed beyond the reach of checking and / or test checking measurements without such notice having been given or the Engineer-in-charge's consent being obtained in writing the same shall be uncovered at the contractor expenses or in default thereof no payment or allowance shall be made for such work or the material with which the same was executed

Engineer – in - charge or his authorized representative in may cause either themselves or through another officer of the department to check the measurements recorded by the contractor and all provisions stipulated herein above shall be applicable to such checking of measurement or levels.

It is also a term of this contract that checking and / or test checking the measurements of any item of work in the measurement book and / or it payment in the interim, on account of final bill shall not be considered as conclusive evidence as to the sufficiency of any work or material to which it relates nor shall it relieve the contractor from liabilities from any over measurement or defects noticed till completion of the defects liability period

CLAUSE 7

No payment shall be made for work, estimated to cost Rs.25 Lakhs/- or less till after the whole of the work shall have been completed and certificate of completion given. For works estimated to cost over Rs.25 Lakhs/- the interim of running account bill shall be submitted by the contractor for the work executed on the basis of such recorded measurements on the format of the Institute in triplicate on or before the date of every month fixed for the same by the Engineer-in-charge. The contractor shall not be entitled to be paid any such interim payment if the gross work done together with net payment / adjustment of advances for material collected, if any, since the last such payment is less than the amount specified in schedule 'F' in which case the interim bill shall be prepared on the appointed date of the month after the requisite progress is achieved. Engineer-in-charge shall arrange to have the bill verified by the taking or causing to be taken, where necessary, the requisite measurement of the work. In the event of the failure of the contractor to submit the bills Engineer-in-charge shall prepare or cause to be prepared such bills in which the events no claims whatsoever due to delays on payment including that of interest shall be payable to the contractor. Payment on account of amount admissible shall be made by the Engineer-in-charge certifying the sum to which the contractor is considered entitled by way of interim payment of such rates as decided by the Engineer-in-charge. The amount admissible shall be paid within 21 working days after day of presentation of the bill by the contractor to the Engineer-in-charge

All such interim payments shall be recorded as payment of advance against final payment only and shall not preclude the requirement of bad, unsound and imperfect or unskilled work to be rejected, removed, taken away and reconstructed or re-erected. Any certificate given by the Engineer-in-charge relating to the work done or materials delivered forming part of such payments, may be modified or corrected by any subsequent such certificate(s) or by the final certificate and shall not by itself be conclusive evidence that any work or materials to which it relates is / are in accordance with the contract and specifications. Any such interim payment, or any part thereof shall not be in any respect conclude, determine, or affect in any way powers of Engineer-in-charge under the contract or any of such payments be treated as final settlement and adjustments of accounts or in any way vary or affect the contract.

Pending consideration of extension of date of completion, interim payments shall continue to be made as herein provided without prejudice to the right of the Institute to take action under the terms of this contract for delay in completion of the work, if the extension of date of completion is not granted by the competent authority.

The Engineer-in-charge in his sole discretion on the basis of a certificate from his Site Engineer to the effect that work has been completed up to the level in question make interim advance payments without detailed measurement for work done (other than foundation, item, to be covered under finishing items) upto lintel level (including sunshade etc) and slab level for

each floor working out at 75 % of the assessed value. The advance payment so allowed shall be adjusted in the subsequent interim bill by taking detailed measurement thereof.

CLAUSE 8

Within 10 days of the completion of the work the contractor shall give notice of such completion to the Engineer-in-charge and within 30 days of the receipt of such notice the Engineer-in-charge shall inspect the work and if there is no defect in the work shall furnish the contractor a final certificate of completion, otherwise a provisional certificate of physical completion indicating defects (a) to be rectified by the Contractor and / or (b) for which payment will be made at reduced rates, shall be issued. But no final certificate of the completion shall be issued, nor shall the work be considered to be completed until the contractor shall have removed from the permission on which the work shall be executed all scaffolding, surplus materials, rubbish, all huts and sanitary arrangements required his / their work people on the site in connection with the execution of the works as shall have been erected or constructed by the contractor(s) and clean of the dirt from all wood work, doors, windows, walls, floor, other part of the buildings, in, upon, or above which the work is to be executed or which he may have had positions for the purpose of the execution thereof, and not until the work shall have been measured by the Engineer-in-charge. If the contractor shall fail to comply with the requirement of this clause as to removal of scaffoldings, surplus materials and rubbish and all huts and sanitary arrangements as aforesaid and cleaning of dirt on or before the date fixed for the completion of the work, the Engineer-in-charge may at the expense of the contractor remove such scaffoldings, surplus materials and rubbish etc. and dispose of the same as he thinks fit and clean of such dirt as aforesaid and the contractor shall have no claim in respect of scaffolding surplus materials as aforesaid except for any some actually realized by the sale thereof.

CLAUSE 8A

When the annual repairs and maintenance of works are carried out, the splashes and droppings from white washing, colour washing, painting etc., on walls, floor, windows, shall be removed and the surface cleaned simultaneously with the completion of these item of work in the individual rooms, quarters or premises etc. where the work is done: without waiting for the actual completion of all the other items of work in the contract. In case the contractor fails to comply with the requirements of this clause, the Engineer-in-Charge shall have the right to get this work done at the cost of the contractor either by the Institute or through any other agency. Before taking such action, the Engineer-in-Charge shall give ten days notice in writing to the contractor.

CLAUSE 8 B

The contractor shall submit completion plan as required vide general specification for electrical works (Part I – Internal) 2005 and (Part II – External) 1994 as applicable within 30 days of the completion of the work.

In case the contractor fails to submit the completion plan as aforesaid, he shall be liable to pay a sum equivalent to 2.5 % of the value of the work subject to a ceiling of Rs.50,000/- (Rupees fifty thousand only) as may be fixed by the Executive Engineer concerned and in this respect the decision of the Executive Engineer shall be final and binding on the contractor.

CLAUSE 9

The final bill shall be submitted by the contractor in the same manner as specified in interim bills within three months of physical completion of the work or within one month of the date of the final certificate of completion furnished by the Engineer-in-charge whichever is earlier. No further claim shall be made by the contractor after submission of the final bill and these shall be deemed to have been waived and extinguished. Payments of those items of this bill in respect of which there is no dispute and of items in dispute, for quantities and rates as approved by Engineer-in-charge, will, as far as possible be made within the period specified herein under, the period being reckoned from the date of receipt of the bill by the Engineer-in-charge or his authorized Assistant Executive Engineer, complete with account of materials issued by the Department and dismantled materials.

- i. if the tendered value of work is upto Rs.15 Lakhs : 3 months.
- ii. if the tendered value of work exceeds Rs.15 Lakhs : 6 months.

CLAUSE 9 A

Payments due to the contractor be made to his bank registered financial co-operative or thrift societies or recognized financial institutions instead of direct to him. The contractor has to furnish the Engineer-in-charge (1) an authorization in the form of a legally valid document such as a power of attorney conferring authority on the bank. Registered, Financial, Co-operative or Thrift Societies or recognized financial institutions to receive payments and (2) his own acceptance of the correctness of the amount made out as being due to him by Institute or his signature on the bill or other claim performed against Institute before settlement by the Engineer-in-charge of the account of claim by payment to the Bank, registered, financial, co-operative or thrift society, recognized financial institutions. While the receipt given by such banks, registered, financial, co-operative or thrift societies or recognized financial institutions shall constitute a full and sufficient discharge for the payment the contractor shall whenever possible present his bills duly receipted and discharged through his bank, registered financial, co-operative or thrift society, recognized financial institutions.

Nothing herein contained shall operate to create in favour of the bank; registered financial co-operative or thrift society, recognized financial institutions any rights or equities vis-à-vis the Institute.

CLAUSE 10

-Deleted-

CLAUSE 10 A

The contractor shall at his own expense, provide materials, required for the works.

The contractor shall, at his own expense and without delay, supply to the Engineer-in-charge samples of materials to be used on the work and shall get his approval in advance. All such materials to be provided by the contractor shall be in conformity with specifications laid down or referred to in the contract. The contractor shall, if requested by the Engineer-in-charge furnish proof, to the satisfaction of the Engineer-in-charge that the materials so comply. The Engineer-in-charge shall within 30 days of supply of samples or within such further period as he may require intimate to the contractor in writing whether samples are approved by him or not. If samples or not approved the contractor shall forthwith arrange to supply to the Engineer-in-charge for his approval fresh samples complying with the specifications laid down in the contract. When materials are required to be tested in accordance with the specifications, approval of the Engineer-in-charge shall be issued after the test results are received.

The contractor shall at his risk and cost submit the sample of materials to be tested or analysed and shall not make use of or incorporate in the work any materials represented by the samples until the required tests are analysis have been made and materials finally accepted by the Engineer-in-charge. The contractor shall not be eligible for any claim or compensation either arising out of any delay in the work or due to any corrective measures required to be taken on account of and as a result of testing of materials.

The contractor shall, at his risk and cost make all arrangements and shall provide all facilities as the Engineer-in-charge may required for collecting and preparing the required number of samples for each tests at such time and to such place or places as may be directed by the Engineer-in-charge and bear all charges and cost of testing unless specifically provided for otherwise elsewhere in the contract or specifications. The Engineer-in-charge or his authorized representatives shall at all times have access to the work and to all workshop and places where work is being prepared or from their materials, manufactured articles or machinery are being obtained for the work and the contractor shall afford every facility and every assistance in obtaining the rights to the such access.

The Engineer-in-charge shall have full powers to require the removal from premises of all materials which in this opinion or not in accordance with the specifications and in case of default, the Engineer-in-charge shall be at liberty to employ at the expense of the contractor, other persons to remove the same without being answerable or accountable for a loss or damage that may happen or arise to such materials the Engineer-in-charge shall also have full powers require other proper materials to be substituted thereof and in case of default, the Engineer-in-charge may cause the same to be supplied and all cost which may attend such removal and substitutions shall be borne by the contractor.

The contractor shall at his own expense provide a material testing lab at the site for conducting routine field tests. The lab shall be equipped at least with testing equipments as specified in schedule – 'F'.

CLAUSE 10 B

The contractor, on signing an indenture in the form to be specified by the Engineer-in-charge, shall be entitled to be paid during the progress of the execution of the work upto 90 % of the work assessed value of any materials which are in the opinion of the Engineer-in-charge non-perishable, non-fragile and noncombustible and are in accordance with the contract and which have been brought on the site in connection therewith and are adequately stored and / or protected against damage by weather or other causes but which have not at the time of advance, been incorporated in the works. When materials on account of which an advance has been made under this sub-clause are incorporated in the work, the amount of such advance shall be recovered / deducted from the next payment made under any of the clause or clauses of this contract.

Such secured advance shall also be payable on other items of perishable nature, fragile and combustible with the approval of the Engineer-in-charge provided the contractor provides a comprehensive insurance cover for the full cost of such materials. The decision of the Engineer-in-charge shall be final and binding on the contractor in this matter. No secured advance, shall however, be paid on high-risk materials such as ordinary glass, sand, petrol diesel etc.

Mobilization advance not exceeding 10 % of the tendered value may be given, if requested by the contractor in writing within one month of the order to commence the work. In such a case, the contractor shall furnish a Bank Guarantee Bond from a Scheduled Nationalized Bank as Specified by the Engineer-in-charge for the full amount of mobilization advance before such advance is released. Such advance shall be in two or more installments to be determined by the Engineer-in-charge at his sole discretion. The first installment of such advance shall be released by the Engineer-in-charge to the contractor on a request made by the contractor to the Engineer-in-charge in this behalf. The second and subsequent installments shall be released by the Engineer-in-charge only after the contractor furnishes a proof of the satisfactory utilization of the earlier installment to the entire satisfaction of the Engineer-in-charge.

Provided always that the provision of clause 10B (ii) shall be applicable only when so provided in 'Schedule F'.

An advance for plant, machinery & shuttering material required for the work and brought to site by the contractor may be given, if requested by the contractor in writing, within one month of bringing such plant and machinery to site. Such advance shall be given on such plant and machinery, which in the opinion of the Engineer-in-charge will add to the expeditious

execution of work and improve the quality of work. The amount of advance shall be restricted to 5 % (five percent) of the tender value. In the case of new plant and equipment to be purchased for the work, the advance shall be restricted to 90 % of the price of such new plant and equipment paid by the contractor for which the contractor shall produce evidence satisfactory to the Engineer-in-charge. In the case of second hand and used plants and equipment, the amount of such advance shall be limited to 50 % of the depreciated value of plant and equipment as may be decided by the Engineer-in-charge. The contractor shall, if so required by the Engineer-in-charge submit the statement of value of such old plant and equipment duly approved by a Registered Value recognized by the Central Board of Direct Taxes under the Income-Tax Act, 1961. No such advance shall be paid on any plant and equipment of perishable nature and on any plant and equipment of a value less than Rs.50,000/- seventy five per cent of such amount of advance shall be paid after the plant & equipment is brought to site and balance twenty five percent on successfully commissioning the same.

Leasing of equipment shall be considered at par with purchase of equipment and shall be covered by tripartite agreement with the following:

Leasing company, which gives certificate of agreeing to lease equipment to the contractor.
Engineer-in-charge and the contractor.

This advance shall further be subject to the condition that such plant and equipment (a) are considered by the Engineer-in-charge to be necessary for the works; (b) and are in and are maintained in working order; (c) hypothecated to the Institute as specified by the Engineer-in-charge before the payment of advance is released. The contractor shall not be permitted to remove from the site such hypothecated plant and equipment without the prior written permission of the Engineer-in-charge. The contractor shall be responsible for maintaining such plant and equipment in good working order during the entire period of hypothecation failing which such advance shall be entirely recovered in lump sum. For this purpose, steel scaffolding and form work shall be treated as plant and equipment.

The contractor shall insure the plant and machinery for which mobilization advance is sought and given, for a sum sufficient to provide for their replacement at site. Any amounts not recovered from the insurer will be borne by the contractor.

The mobilization advance and plant and machinery advance in (ii) & (iii) above bear simple interest at the rate of 10 percent per annum and shall be calculated from the date of payment to the date of recovery, both days inclusive, on the outstanding amount of advance. Recovery of such sums advanced and interest shall be made by the deductions from the contractors bills commencing after first 10% of the Gross value of the work is executed and paid, on prorata percentage basis to the Gross value of the work build beyond 10% in such a way that the entire advance is recovered by the time 80% of the Gross value of the contract is

executed and paid, together with interest due on the entire outstanding amount up to the date of recovery of the installment.

If the circumstances are considered reasonable by the Engineer-in-charge, the period mentioned in (ii) and (iii) for request by the contractor in writing for grant of mobilization advance and plant and equipment advance may be extended at the discretion of the Engineer-in-charge.

The said bank guarantee 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 together with interest.

CLAUSE 10 C

If after submission of the tender, the price of any material incorporated in the works(excluding the materials covered under Clause 10CA and not being a material supplied the Engineer-in-Charge's stores in accordance with Clause 10 thereof) and/or wages of labour increases as a direct result of the coming into force of any fresh law, or statutory rule or order (but not due to any changes of rate in sales tax/VAT, Central/State Excise/Custom Duty) beyond the prices/wages prevailing at the time of the last stipulated date of receipt of tenders including extensions, if any, for the work during contract period including the justified period extended under the provisions of clause 5 of the contract without any action under clause 2, then the amount of the contract shall accordingly be varied and provided further that any such increase shall be limited to the price/wages prevailing at the time of stipulated date of completion or as prevailing for the period under consideration, whichever is less. If after submission of the tender, the price of any material incorporated in the works (excluding the materials covered under Clause 10CA and not being a material supplied from the Engineer-in-Charge's stores in accordance with Clause 10 thereof) and/or wages of labour as prevailing at the time of last stipulated date of receipt of tender including extensions, if any, is decreased as a direct result of the coming into force of any fresh law or statutory rules or order (but not due to any changes of rate in sales tax/VAT, Central/State Excise/Custom Duty), Institute shall in respect of materials incorporated in the works (excluding the materials covered under Clause 10CA and not being material supplied from the Engineer-in-Charge's stores in accordance with Clause 10 hereof) and/or labour engaged on the execution of the work after the date of coming into force of such law statutory rule or order be entitled to deduct from the dues of the contractor, such amount as shall be equivalent to the difference between the prices of the materials and/or wages as prevailed at the time of the last stipulated date for receipt of tenders including extensions if any for the work and the prices of materials and/or wages of labour on the coming into force of such law, statutory rule or order. This will be applicable for the contract period including the justified period extended under the provisions of clause 5 of the contract without any action under clause 2.

Engineer-in-Charge may call books of account and other relevant documents from the contractor to satisfy himself about reasonability of increase in prices of materials and wages. The contractor shall, within a reasonable time of his becoming aware of any alteration in the price of any such materials and/or wages of labour, give notice thereof to the Engineer-in-Charge stating that the same is given pursuant to this condition together with all information relating thereto which he may be in position to supply.

For this purpose, the labour component of the work executed during period under consideration shall be the percentage as specified in Schedule F, of the value of work done during that period and the increase/decrease in labour shall be considered on the minimum daily wages in rupees of any unskilled adult male mazdoor, fixed under any law, statutory rule or order.

Clause 10 CA

If after submission of the tender, the price of materials specified in schedule 'F' increases / decreases beyond the price(s) prevailing at the time of the last stipulated date for receipt of tenders (including extension, if any) for the work, then the amount of the contract shall accordingly be varied and provided further that any such variations shall be effected for stipulated period of contract including the justified period extended under the provisions of clause 5 of the contract without any action under clause 2

However for work done / during the justified period extended as above it will be limited to indices prevailing at the time of stipulated date for completion or as prevailing for the period under consideration, whichever is less.

The increase / decrease in prices shall be determined by the All India wholesale price indices of Materials as published by Economic Advisor to Government of India, Ministry of Commerce and Industry and base price for material as issued under the authority of Director General (Works), CPWD as valid on the last stipulated date of receipt of tender, including extension if any and for the period under consideration. In case price index of a particular material is not issued by the Ministry of Commerce and Industry the price of nearest similar material as indicated in schedule F shall be followed.

The amount of the contract shall accordingly be varied for all such materials and will be worked out as per the following formula given below :

a) Adjustment for component of '**Cement**'

$$V = P \times Q \times \frac{CI - CI_0}{CI_0}$$

Where,

V = Variation in material cost i.e. increase or decrease in the amount in Rupees to be paid or recovered.

P = Base Price of materials as issued under authority of DG (W), CPWD valid at the time of the last stipulated date of receipt of tender including extensions, if any.

Q = Quantity of materials used in the works since previous bill.

CI₀ = All India wholesale Price Index for the material as published by the Economic Advisor to Government of India, Ministry of Industry and Commerce as valid on the last stipulated date of receipt of tenders including extensions, if any.

CI = All India wholesale Price Index for the material for period under consideration as published by the Economic Advisor to Government of India, Ministry of Industry and Commerce.

(In respect of the justified period extended under the provisions of clause 5 of the contract with out any action under clause 2, the index prevailing at the time of stipulated date of completion or the prevailing index of the period under consideration whichever is less shall be considered)

b) Adjustment for component of **'Steel'**

$$V_s = P_s \times Q_s \times \frac{SI - SI_0}{SI_0}$$

Where,

V_s = Variation in cost of steel reinforcement bars i.e. increase or decrease in the amount in rupees to be paid or recovered.

P_s = Base Price of steel reinforcement bars, as issued under authority of DG (W), CPWD at the time of the last stipulated date of receipt of tender including extensions, if any.

Q_s = Quantity of steel paid either by way of secured advance or used in the works since previous bill. (Whichever is earlier)

SI₀ = All India wholesale Price Index for Steel (bars & rods) for the period under consideration as published by the Economic Advisor to Government of India, Ministry of Industry and Commerce as valid on the last stipulated date of receipt of tenders including extensions, if any.

SI = All India wholesale Price Index for Steel (bars & rods) for the period under consideration as published by the Economic Advisor to Government of India, Ministry of Industry and Commerce.

Note: (i) In respect of the justified period extended under the provisions of clause 5 of the contract with out any action under clause 2, the index prevailing at the time of stipulated date of completion or the prevailing index of the period under consideration whichever is less shall be considered)

(ii) If during progress of work or at the time of completion of work, it is noticed that any material brought at site is in excess of requirement, then amount of escalation if paid earlier on such excess quantity of material shall be recovered on the basis of cost indices as applied at the time of payment of escalation or as prevailing at the time of effecting recovery, whichever is higher.

Provided always that provisions of the preceding Clause 10 C shall not be applicable in respect of materials covered in this clause.

CLAUSE 10 CC

~~-Deleted-~~

CLAUSE 10 D

The contractor shall treat all materials obtained during dismantling of a structure, excavation of the site for a work, etc. as Institute's property and such materials shall be disposed off to the best advantage of Institute according to the instructions in writing issued by the Engineer-in-charge.

CLAUSE 11

The contractor shall execute the whole and every part of the work in the most substantial and work manlike manner both as regards materials and otherwise in every respect in strict accordance with the specifications. The contractor shall also confirm exactly, fully and faithfully to the design, drawings and instructions in writing in respect of the work signed by the Engineer-in-charge and the contractor shall be furnished free of charge one copy of the contract documents together with specifications, designs, drawings and instructions as are not included in the standard specification of Central Public Works Department specified in Schedule 'F' or in any Bureau of Indian Standard or any other, published standard or code or, schedule of rates or any other printed publication referred to elsewhere in the contract.

The contractor shall comply with the provisions of the contract and with the care and diligence execute and maintain the works and provide all labour and materials, tools and plants including for measurements and supervisions of all works, structural plans and other things of temporary or permanent nature required for such execution and maintenance in so far as the necessity for providing these, is specified or is reasonably inferred from the contract. The contractor shall take full responsibility for adequacy, suitability and safety of all the works and methods of construction.

CLAUSE 12

The Engineer-in-charge shall have power (i) to make alteration in, omissions from, additions to, or substitutions for the original specifications, drawings, designs and instructions that may

appear to him to be necessary or advisable during the progress of the work, and (ii) to omit a part of the works in case of non-availability of a portion of the site or for any other reasons and the contractor shall be bound to carry out the works in accordance with any instructions given to him in writing signed by the Engineer-in-charge and such alterations, omissions, additions or substitutions shall form part of the contract as if originally provided therein any in any altered, additional or substituted work which the contractor may be directed to do in the manner specified above as part of the works, shall be carried out by the contractor on the same conditions in all respects including price on which he agreed to do the main work except as hereafter provided.

12.1 The time for completion of the works shall, in the event of any deviations resulting in additional cost over the tendered value sum being ordered, be extended, if requested by the contractor, as follows :

- i) In the proportion which the additional cost of the altered, additional or substituted work, bears to the original tendered value plus.
- ii) 25 % of the time calculated in (i) above or such further additional time as may be considered reasonable by the Engineer-in-charge.

12.2 In the case of extra item(s) the contractor may within fifteen days of receipt of order or occurrence of the item(s) claim rates, supported by proper analysis, for the work and the Engineer-in-charge shall within one month of the receipt of the claims supported by analysis, after giving consideration to the analysis of the rates submitted by the contractor, determine the rates on the basis of the market rates and the contractor shall be paid in accordance with the rates so determined.

In the case of substituted items, the rate for the agreement item (to be substituted) and substituted item shall also be determined in the manner as mentioned in the aforesaid para.

In the case of substituted items (items that are taken up with partial substitution or in lieu of items of work in the contract), the rate for the agreement item (to be substituted) and substituted item shall also be determined in the manner as mentioned in the following para

If the market rate for the substituted item so determined is more than the market rate of the agreement item (to be substituted), the rate payable to the contractor for the substituted item shall be the rate for the agreement item (to be substituted) so increased to the extent of the difference between the market rates of substituted item and the agreement item (to be substituted).

If the market rate for the substituted item so determined is less than the market rate of the agreement item (to be substituted), the rate payable to the contractor for the substituted item shall be the rate for the agreement item (to be

substituted) so decreased to the extent of the difference between the market rates of substituted item and the agreement item (to be substituted).

In the case of contract items, substituted items, contract cum substituted items, which exceed the limits laid down in schedule 'F', the contractor may within fifteen days of receipt of order or occurrence of the excess, claim revision of the rates, supported by proper analysis, for the work in excess of the above mentioned limits, provided that if the rates so claimed are in excess of the rates specified in the schedule of quantities the Engineer-in-charge shall within one month of receipt of the claim supported by analysis, after giving consideration to the analysis of the rates submitted by the contractor, determine the rates on the basis of the market rates and the contractor shall be paid in accordance with the rates to be determined.

12.3 The provisions of the preceding paragraph shall also apply to the decrease in the rates of items for the work in excess of the limits laid down in Schedule 'F', and the Engineer-in-charge shall after giving notice to the contractor within one month of occurrence of the excess and after taking into consideration any reply received from him within fifteen days of the receipt of the notice, revise the rates for the work in question within one month of the expiry of the said period of fifteen days having regard to the market rates.

12.4 The contractor shall send to the Engineer-in-charge once every three months an upto date account giving complete details of all claims for additional payments to which the contractor may consider himself entitled and of all additional work ordered by the Engineer-in-charge which he has executed during the preceding quarter failing which the contractor shall be deemed to have waived his right. However, the Superintending Engineer may authorize consideration of such claims on merits.

12.5 For the purpose of operation of Schedule 'F', the following works shall be treated as works relating to foundation unless & otherwise defined in the contract.

- (i) For Buildings : All works up to 1.2 metres above ground level or up to floor 1 level whichever is lower.
- (ii) For abutments, piers and well staining : All works up to 1.2 m above the bed level.
- (iii) For retaining walls, wing walls, compound walls, chimneys, over head reservoirs/tanks and other elevated structures : All works up to 1.2 metres above the ground level.
- (iv) For reservoirs/tanks (other than overhead reservoirs/tanks) : All works up to 1.2 metres above the ground level.
- (v) For basement: All works up to 1.2 m above ground level or up to floor 1 level whichever is lower.
- (vi) For Roads, all items of excavation and filling including treatment of sub base.

12.6 Any operation incidental to or necessarily has to be in contemplation of tenderer while filing tender, or necessary for proper execution of the item included in the Schedule of

quantities or in the schedule of rates mentioned above, whether or not, specifically indicated in the description of the item and the relevant specifications, shall be deemed to be included in the rates quoted by the tenderer or the rate given in the said schedule of rates, as the case may be. Nothing extra shall be admissible for such operations.

CLAUSE 13

If at any time after acceptance of the tender, the Institute 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 Engineer-in-charge 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 at contract rates full amount for works executed at site and, in addition, a reasonable amount as certified by the Engineer-in-charge for the items hereunder mentioned which could not be utilized on the work to the full extent in view of the foreclosure:

Any expenditure incurred on preliminary site work, e.g. temporary access roads, temporary labour huts, staff quarters and site office; storage accommodation and water storage tanks.

Institute shall have the option to take over contractor's materials or any part thereof either brought to site or of which the contractor is legally bound to accept delivery from suppliers (for incorporation in or incidental to the work) provided, however, Institute shall be bound to take over the materials or such portions thereof as the contractor does not desire to retain. For materials taken over or to be taken over by Institute, cost of such materials as detailed by Engineer-in-charge shall be paid. The cost shall, however, take into account purchase price, cost of transportation and deterioration or damage which may have been caused to materials whilst in the custody of the contractor.

If any materials supplied by Institute are rendered surplus, the same except normal wastage shall be returned by the contractor to Institute at rates not exceeding those at which these were originally issued less allowance for any deterioration or damage which may have been caused whilst the materials were in the custody of the contractor. In addition, cost of transporting such materials from site to Institute stores, if so required by Institute, shall be paid.

Reasonable compensation for transfer of T & P from site to contractor's permanent stores or to his other works, whichever is less. If T & P are not transported to either of the said places, no cost of transportation shall be payable. Reasonable compensation for repatriation of contractor's site staff and imported labour to the extent necessary.

The contractor shall, if required by the Engineer-in-charge furnish to him books of account, wage books, time sheets and other relevant documents and evidence as may be necessary to enable him to certify the reasonable amount payable under this condition.

The reasonable amount of items on (i), (iv) and (v) above shall not be in excess of 2 % of the cost of the work remaining incomplete on the date of closure, i.e. total stipulated cost of the work as per accepted tender less the cost of work actually executed under the contract and less the cost of contractor's materials at site taken over by the Institute as per item (ii) above. Provided always that against any payments due to the contractor this account or otherwise the Engineer-in-charge shall be entitled to recover or be credited with any outstanding balances due from the contractor for advance paid in respect of any tool, plants and materials and any other sums which at the date of termination were recoverable by the Institute from the contractor under the terms of the contract.

CLAUSE 14

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 Engineer-in-Charge; 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 Engineer-in-Charge; or

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 Engineer-in-Charge.

The Engineer- in-Charge without invoking action under clause 3 may, without prejudice to any other right or remedy against the contractor which have either accrued or accrue thereafter to Institute, 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 means at the risk and cost of the contractor

The Engineer-in-Charge shall determine the amount, if any, is recoverable from the contractor for completion of the part work/ part incomplete work of any item(s) taken out of his hands and execute at the risk and cost of the contractor, the liability of contractor on account of loss or damage suffered by Institute because of action under this clause shall not exceed 10% of the tendered value of the work.

In determining the amount, credit shall be given to the contractor with the value of work done in all respect in the same manner and at the same rate as if it had been carried out by the original contractor under the terms of his contract, the value of contractor's materials taken over and incorporated in the work and use of plant and machinery belonging to the contractor. The

certificate of the Engineer-in-Charge as to the value of work done shall be final and conclusive against the contractor provided always that action under this clause shall only be taken after giving notice in writing to the contractor. Provided also that if the expenses incurred by the Institute are less than the amount payable to the contractor at his agreement rates, the difference shall not be payable to the contractor.

Any excess expenditure incurred or to be incurred by Institute in completing the part work/ part incomplete work of any item(s) or the excess loss of damages suffered or may be suffered by Institute as aforesaid after allowing such credit shall without prejudice to any other right or remedy available to Institute in law or per as agreement 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 shall be liable to pay the same within 30 days. If the contractor fails to pay the required sum within the aforesaid period of 30 days, the Engineer-in-Charge shall have the right to sell any or all of the contractors' 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 Engineer-in-Charge, the contractor shall have no claim to compensation for any loss sustained by him by reason 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.

CLAUSE 15

The contractor shall, on receipt of the order in writing of the Engineer-in-charge, (whose decision shall be final and binding on the contractor) suspend the progress of the works or any part thereof for such time and in such manner as the Engineer-in-charge may consider necessary so as not to cause any damage or injury to the work already done or endanger the safety thereof for any of the following reasons :

on account of any default on the part of the contractor or; for proper execution of the works or part thereof for reasons other than the default of the contractor; or for safety of the works or part thereof.

The contractor shall, during such suspension, properly protect and secure the works to the extent necessary and carry out the instructions given in that behalf by the Engineer-in-charge.

If the suspension is ordered for reasons (b) and (c) in sub-para (i) above; the contractor shall be entitled to an extension of time equal to the period of every such suspension PLUS 25 % for completion of the item or group of items of work for which a separate period of completion is specified in the contract and of which the suspended work forms a part, and ; If the total period of all such suspensions in respect of an item or group of items or work for which a separate period of completion is specified in the contract exceeds thirty days, the contractor shall, in addition, be entitled to such compensation as the Engineer-in-charge may consider

reasonable in respect of salaries and / or wages paid by the contractor to his employees and labour at site, remaining idle during the period of suspension, adding thereto 2 % to cover indirect expenses of the contractor. Provided the contractor submits his claim supported by details to the Engineer-in-charge within fifteen days of the expiry of the period of 30 days.

If the works or part thereof is suspended on the orders of the Engineer-in-charge for more than three months at a time, except when suspension is ordered for reason (a) in sub-para (i) above, the contractor may after receipt of such order serve a written notice on the Engineer-in-charge requiring permission within fifteen days from receipt by the Engineer-in-charge of the said notice, to proceed with the work or part thereof in regard to which progress has been suspended and if such permission is not granted within that time, the contractor, if he intends to treat the suspension, where it affects only a part of the works as an omission of such part by Institute or where it affects whole of the works, as an abandonment of the works by Institute shall with in 10days of expiry of such period of 15 days give notice in writing of his intention to the Engineer-in-charge. In the event of the contractor treating the suspension as an abandonment of the contract by Institute, he shall have no claim to payment of any compensation on account of any profit or advantage which he might have derived from the execution of the work in full but which he could not derive in consequence of the abandonment. He shall, however, be entitled to such compensation, as the Engineer-in-charge may consider reasonable, in respect of salaries and / or wages paid by him to his employees and labour at site, remaining idle in consequence adding to the total thereof 2 % to cover indirect expenses of the contractor provided the contractor submits his claim supported by details to the Engineer-in-charge within 30 days of the expiry of the period of 3 months.

Provided, further, that the contractor shall not be entitled to claim any compensation from Institute for the loss suffered by him on account of delay by Institute in the supply of materials in schedule 'B' where such delay is covered by difficulties relating to the supply of wagons, force majeure including non-allotment of such materials by controlling authorities, acts of God, acts of enemies of the state / country or any reasonable cause beyond the control of the Institute.

CLAUSE 16

All works under or in course of execution or executed in pursuance of the contract shall at all times be open and accessible to the inspection and supervision of the Engineer-in-charge, his authorized subordinates in charge of the work and all the superior officers, officer of the Quality Assurance unit of the Institute or any organization engaged by the Institute for Quality Assurance and of the Chief Technical Examiner's Office , and the contractor shall, at all times, during the usual working hours and all at other time at which reasonable notice of the visit of such officers has been given to the contractor, either himself be present to receive orders and instructions or have a responsible agent duly accredited in writing, present for that purpose.

Orders given to the Contractor's agent shall be considered to have the same force as if they had been given to the contractor himself.

If it shall appear to the Engineer-in-charge or his authorized subordinates in-charge of the work or officers of the organization engaged by the Institute for quality assurance to the Chief Technical Examiner or his subordinate officers, that any work has been executed with unsound, imperfect, or unskillful workmanship, or with materials or articles provided by him for the execution of the work which are unsound or of a quality inferior to that contracted or otherwise not in accordance with the contract, the contractor shall, on demand in writing which shall be made within twelve months (six months in case of work costing Rs. 10 Lac and below except road work) of the completion of the work from the Engineer-in-charge specifying the work, materials or articles complained of notwithstanding that the same may have been passed, certified and paid for forthwith rectify, or remove and reconstruct the work so specified in whole or in part, as the case may require or as the case may be, remove the materials or articles so specified and provide other proper and suitable materials or articles at his own charge and cost. In the event of the failing to do so within a period specified by the Engineer-in-charge in his demand aforesaid, then the contractor shall be liable to pay compensation at the same rate as under clause 2 of the contract (for non-completion of the work in time) for this default.

In such case the Engineer-in-charge may not accept the item of work at the rates applicable under the contract but may accept such items at reduced rates as the competent authority may consider reasonable during the preparation of on account bills or final bill if the item is so acceptable without detriment to the safety and utility of the item and the structure or he may reject the work outright without any payment and / or get it and other connected and incidental items rectified, or removed and re-executed at the risk and cost of the contractor. Decision of the Engineer-in-charge to be conveyed in writing in respect of the same will be final and binding on the contractor.

CLAUSE 17

If the contractor or his working people or servants shall break, deface, injure or destroy any part of building in which they may be working, or any building, road, road kerb, fence, enclosure, water pipe, cables, drains, electric or telephone post or wires, trees, grass or grass land, or cultivated ground contiguous to the premises on which the work or any part is being executed, or if any damage shall happen to the work while in progress, from any cause whatever or if any defect, shrinkage or other faults appear in the work within twelve months (six months in the case of work costing Rupees Ten lacks and below except road work) after a certificate final or otherwise of its completion shall have been given by the Engineer-in-charge as aforesaid arising out of defect or improper materials or workmanship the contractor shall upon receipt of a notice in writing on that behalf make the same good at his own expense or in default the Engineer-in-charge as cause the same to be made good by other workmen and deduct the expense from any sums that may be due or at any time thereafter may become due to the

contractor, or from his security deposit or the proceeds of sale thereof or of a sufficient portion thereof. The security deposit of the contractor shall not be refunded before the expiry of twelve months (six months in the case of work costing Rupees Ten lakhs and below except road work) after the issue of the certificate final or otherwise of completion of work or till the final bill has been prepared and passed whichever is later. Provided that in case of road work, in the opinion of the Engineer in charge, half of the security deposit is sufficient, to meet all liabilities of the contractor under this contract, half of the security will be refundable after six months and the remaining half after twelve months of the issue of the said certificate of completion or till the final bill has been prepared and passed whichever is later.

In case of Maintenance and Operation works of E & M services, the security deposit deducted from contractors shall be refunded within one month from the date of final payment or within one month from the date of completion of the maintenance contract whichever is earlier.

CLAUSE 18

The contractor shall provide at his own cost all materials (except such special materials if any as may in accordance with the contract be supplied from the Engineer – in – Charge stores), machinery, tools & Plants as specified in schedule 'F'. In addition to this appliances, implements, ladders, cordage, tackle, scaffolding and temporary works required for the proper execution of the work, whether original, altered or substituted and whether included in the specifications or other documents forming part of the contract or referred to in these conditions or not, or which may be necessary for the purpose of satisfying or complying with the requirements of the Engineer-in-charge as to any matter as to which under these conditions he is entitled to be satisfied, or which he is entitled to require together with carriage therefore to and from the work. The contractor shall also supply without charge the requisite number of persons with the means and materials, necessary for the purpose of setting out works, and counting, weighing and assisting the measurement for examination at any time and from time to time of the work or materials. Failing his so doing the same may be provided by the Engineer-in-charge at the expense of the contractor and the expenses may be deducted, from any money due to the contractor, under this contract or otherwise and/or from his security deposit or the proceeds of sale thereof, or of a sufficient portions thereof.

CLAUSE 18 A

In every case in which by virtue of the provision sub-section (1) of Section 12, of the Workmen's Compensation Act, 1923, Institute is obliged to pay compensation to a workman employed by the contractor, in execution of the works, Institute will recover from the contractor, the amount of the compensation so paid; and without prejudice to the rights of the Institute under sub-section (2) of section 12, of the said Act, Institute shall be at liberty to recover such amount or any part there by deducting it from the security deposit or from any sum due by Institute to the contractor whether under this contract or otherwise. Institute shall not be bound to contest any claim made against it under sub-section (1) Section 12, of the said Act, except on the written request of the contractor

and upon his giving to Institute full security for all costs for which Institute might become liable in consequence of contesting such claim.

CLAUSE 18 B

In every case in which by virtue of the provisions Contract Labour (Regulation and Abolition) Act 1970, and of the Contract Labour (Regulation and Abolition) Central Rules, 1971, Institute is obliged to pay nay amount of wages to a workman employed by the contractor in execution of the works, or to incur any expenditure in providing welfare and health amenities required to be provided under the above said Act and the rules under clause 19H or under the C.P.W.D. contractors, labour regulations, or under the rules framed by Government of India from time to time for the protection of health and sanitary arrangements for workers employed by contractors, Institute will recover from the contractor, the amount of wages so paid or the amount of expenditure so uncured; and without prejudice to the rights of the Institute under sub-section(2) of Section 20, and sub-section (4) of Section 21, of the Contract labour (Regulation and Abolition) Act, 1970, Institute shall be at liberty to recover such amount or any part thereof by deducting it form the security deposit or from any sum due by Institute to the contractor whether under this contract or otherwise Institute shall not be bound to contest any claim made against it under sub-section (1) of Section 20, sub-section (4) of section 21, of the said Act, except on the written request of the contactor and upon his giving to the Institute full security for all costs for which Institute might become liable in contesting such claim.

CLAUSE 19

The contractor shall obtain a valid license under the Contract Labour (R&A) Act 1970, and the Contract Labour (Regulation and Abolition) Central Rules, 1971, before the commencement of the work, and continue to have a valid license until the completion of the work. The contractor shall also abide by the provisions of the Child Labour (Prohibition and Regulation) Act, 1986.

The contractor shall also comply with the provision of the building and other construction workers (Regulation of Employment & Conditions of Service) Act, 1996 and the building and other Construction Workers Welfare Cess Act, 1996.

Any failure to fulfill these requirements shall attract the penal provisions of this contract arising out of the resultant non-execution of the work.

CLAUSE 19A

No labour below the age of eighteen years shall be employed on the work.

CLAUSE 19B

Payment of Wages:

The contractor shall pay to labour employed by him either directly or through sub-contractors, wages not less than fair wages as defined in the C.P.W.D. Contractor's Labour Regulations or as

per the provisions of the Contract Labour (Regulation and Abolition) Act, 1970 and the contract Labour (Regulation and Abolition) Central Rules, 1971, wherever applicable.

The contractor shall, notwithstanding the provisions of any contract to the contrary, cause to be paid fair wage to labour indirectly engaged on the work, including any labour engaged by his sub-contractors in connection with the said work, as if the labour had been immediately employed by him.

In respect of all labour directly or indirectly employed in the works for performance of the contractor's part of this contract, the contractor shall comply with or cause to be complied with the Central Public Works Department contractor's Labour Regulations made by Government of India from time to time in regard to payment of wages, wage period, deductions from wages recovery of wages not paid and deductions unauthorizedly made, maintenance of wage books or wage slips, publication of scale of wages and other terms of employment, inspection and submission of periodical returns and all other matters of the like nature or as per the provisions of the Contract Labour (Regulation and Abolition) Act, 1970, and the Contract labour (Regulation and Abolition) Central Rules 1971, wherever applicable.

- a) The Engineer-in-Charge concerned shall have the right to deduct from the moneys due to the contractor any sum required or estimated to be required for making good the loss suffered by a worker or workers by reason of non-fulfillment of the conditions of the contract for the benefit of the workers, non-payment of wages or of deductions made from his or their wages which are not justified by their terms of the contract or non-observance of the regulations.
- b) Under the provision of Minimum wages (Central) Rules, 1950, the contractor is bound to allow to the labours directly or indirectly employed in the works one day rest for 6 days continuous work and pay wages at the same rate as for duty. In the event of default, the Engineer-in-charge shall have the right to deduct the sum or sums not paid on account of wages for weekly holidays to any labors and pay the same to the persons entitled thereto from any money due to the contractor by the Engineer-in-charge concerned.

The contractor shall comply with the provisions of the Payment of Wages Act, 1936, Minimum Wages Act, 1948, Employees Liability Act, 1938, Workmen's Compensation Act, 1923, Industrial Disputes Act, 1947 Maternity Benefits Act, 1961, and the Contractor's Labour (Regulation and Abolition) Act 1970, or the modifications thereof or any other laws relating thereto and the rules made thereunder from time to time.

The Contractor shall indemnify and keep indemnified institute against payments to be made under and for the observance of the laws aforesaid and the C.P.W.D. Contractor's labour Regulations without prejudice to this right to claim indemnity from his sub-contractors.

The laws aforesaid shall be deemed to be a part of this contract and any breach thereof shall be deemed to be a breach of this contract.

Whatever is the minimum wage for the time being, or if the wage payable is higher than such

wage, such wage shall be paid by the contractor to the workman directly without the intervention of Jamadar and that Jamadar shall not be entitled to deduct or recover any amount from the minimum wage payable to the workmen as and by way of commission or otherwise.

The contractor shall ensure that no amount by way of commission or otherwise is deducted or recovered by the Jamadar from the wage of workmen.

CLAUSE 19 C

In respect of all labour directly or indirectly employed in the work for the performance of the contractor's part of this contract, the contractor shall at this own expense arrange for the safety provisions as per C.P.W.D. Safety Code framed from time to time and shall at his own expense provide for all facilities in connection therewith. In case the contractor fails to make arrangement and provide necessary facilities as aforesaid, he shall be liable to pay a penalty of Rs.200/- for each default and in addition the Engineer-in-Charge shall be at liberty to make arrangement and provide facilities as aforesaid and recover the costs incurred in that behalf from the contractor.

CLAUSE 19 D

The Contractor shall submit by the 4th and 19th of every month, to the Engineer-in-charge a true statement showing in respect of the second half of the preceding month and the first half of the current month respectively.

The number of labourers employed by him on the work,

Their working hours,

The wages paid to them,

The accidents that occurred during the said fortnight showing the circumstances under which they happened and the extent of damage and injury caused by them, and

The number of female workers who have been allowed maternity benefit according to Clause 19F and the amount paid to them.

Failing which the contractor shall be liable to pay to Institute, a sum not exceeding Rs.200/- for each default or materially incorrect statement. The decision of the Engineer-in-charge shall be final in deducting from any bill due to the contractor; the amount levied as fine and be binding on the contractor.

CLAUSE 19 E

In respect of all labour directly or indirectly employed in the work for the performance of the contractor's part of this contract, the contractor shall comply with or cause to be complied with all the rules framed by Government of India/Institute from time to time for the protection of health and sanitary arrangements for workers employed by the Institute and its contractors.

CLAUSE 19 F

Leave and pay during leave shall be regulated as follows :-

Leave :

- (i) In the case of delivery – maternity leave not exceeding 8 weeks, 4 weeks upto and

- including the day of delivery and 4 weeks following that day,
- (ii) In the case of miscarriage – upto 3 weeks form the date of miscarriage.

Pay :

In the case of delivery – leave pay during maternity leave will be at the rate of the women's average daily earnings, calculated on total wages earned on the days when full time work was done during a period of three months immediately preceding the date on which she gives notice that she expects to be confined or at the rate of Rupee one only a day whichever is greater.

In the case of miscarriage – leave pay at the rate of average daily earning calculated on the total wages earned on the days when full time work was done during a period of three months immediately preceding the date of such miscarriage.

Conditions for the grant of maternity Leave.

No maternity leave benefit shall be admissible to a woman unless she has been employed for a total period of not less than six months immediately preceding the date on which she proceeds on leave.

The contractor shall maintain a register of Maternity (Benefit) in the prescribed Form as shown in annexure – I and II, and the same shall be kept at the place of work.

CLAUSE 19 G

In the event of the contractor(s) committing a default or breach of any of the provisions of the Central Public Works Department, Contractor's Labour Regulations and Model Rules for the protection of health and sanitary arrangements for the workers as amended from time to time or furnishing any information or submitting or filing any statement under the provisions of the above regulations and Rules which is materially incorrect, he / they shall, without prejudice to any other liability, pay to the Institute a sum not exceeding Rs.200/- for every default, breach or furnishing, making, submitting, filing such materially incorrect statements and in the event of the contractors defaulting continuously in this respect, the penalty may be enhanced to Rs.200/- per day for each day of default subject to a maximum of 5 per cent of the estimated cost of the work put to tender. The decision of the Engineer-in-charge shall be final and binding on the parties.

Should it appear to the Engineer-in-charge that the contractor(s) is / are not properly observing and complying with the provisions of the C.P.W.D. Contractor's Labour Regulations and Model Rules and the provisions of the Contract Labour (Regulation and Abolition) Act 1970, and the Contract Labour (R&A) Central Rules 1971, for the protection of health and sanitary arrangements for work-people employed by the contractor(s) (hereinafter referred as 'the said Rules') the Engineer-in-charge shall have power to give notice in writing to the contractor(s) requiring that the said Rules be complied with and the amenities prescribed therein be provided to the work-people within a reasonable time to be specified in the notice. If the contractor(s) shall fail within the period specified in the notice to comply with and / observe the said Rules and to provide the amenities to the work-people as aforesaid, the Engineer-in-charge shall have the power to provide the amenities herein before mentioned at the cost of the contractor(s). The contractor(s) shall erect,

make and maintain at his/their own expense and to approved standards all necessary huts and sanitary arrangements required for his / their work-people on the site in connection with the execution of the works, and if the same shall not have been erected or constructed, according to approved standards, the Engineer-in-charge shall have power to give notice in writing to the contractor(s) requiring that the said huts and sanitary arrangements be remodeled and/or reconstruct such huts and sanitary arrangements according to approved standards, and if the contractor(s) shall fail to remodel or reconstruct such huts and sanitary arrangements according to approved standards within the period specified in the notice, the Engineer-in-charge shall have the power to remodel or reconstruct such huts and sanitary arrangements according to approved standards at the cost of the contractor(s).

CLAUSE 19 H

Deleted

CLAUSE 19 I

The Engineer-in-charge may require the contractor to dismiss or remove from the site of the work any person or persons in the contractors employ upon the work who may be incompetent or misconduct himself and the contractor shall forthwith comply with such requirements.

CLAUSE 19 J

It shall be the responsibility of the contractor to see that the building under construction is not occupied by any body unauthorized during construction, and is handed over to the Engineer-in-charge with vacant possession of complete building, If such building through completed is occupied illegally, then the Engineer-in-charge 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 Engineer-in-charge whose decision shall be final both with regard to the justification and quantum and be binding on the contractor.

However, the Engineer-in-charge, through a notice, may require the contractor to remove the illegal occupation any time on or before construction and delivery.

CLAUSE 19K

The contractor shall, at all stages of work, deploy skilled / semi skilled tradesmen who are qualified and possess certificate in particular trade from CPWD training institute / Industrial Training Institute / national Institute of Construction Management and Research (NICMAR) / National Academy of Construction / CIDC or any similar reputed and recognized institute managed ./ certified by State / Central Government. The number of such qualified tradesmen shall not be less than 20 % of total skilled / semi skilled workers required in each trade at any stage of work. The contractor shall submit number of man days required in respect of each trade , its scheduling and the list of qualified tradesmen along with requisite certificate from recognized institute to Engineer – in –

charge for approval. Notwithstanding such approval, if the tradesmen are found to have inadequate skill to execute the work of respective trade the contractor shall substitute such tradesmen with in two days of written notice from Engineer in charge . Failure on the part of the contractor to obtain approval of Engineer – in – charge or failure to deploy qualified tradesmen will attract a compensation to be paid by contractor at the rate of RS 100 per such tradesman per day. Decision of the Engineer – in – charge as to whether particular tradesman possesses requisite skill and amount of compensation in case of default shall be final and binding. Provided always, the provisions of this clause, shall not be applicable for works with estimated cost put to tender being less than Rs 5 crores

CLAUSE 20

The contractor shall comply with all the provisions of the Minimum Wages Act, 1948, and Contract Labour (Regulation and Abolition) Act, 1970, amended from time to time and rules framed thereunder and other labour laws affecting contract labour that may be brought into force from time to time.

CLAUSE 21

The contract shall not be assigned or sublet without the written approval of the Engineer-in-Charge. And if the contractor shall assign or sublet his contract, or attempt to do so, or become insolvent or commence any insolvency proceedings or make any composition with his creditors or attempt to do so, or if any bribe, gratuity, gift, loan, perquisite, reward or advantage pecuniary or otherwise, shall either directly or indirectly, be given, promised or offered by the contractor, or any of his servants or agent to any public officer or person in the employ of Government in any way relating to his office or employment, or if any such officer or person shall become in any way directly or indirectly interested in the contract, the Engineer-in-Charge on behalf of the Institute shall have power to adopt the course specified in Clause 3 hereof in the interest of Institute and in the event of such course being adopted, the consequences specified in the said Clause 3 shall ensue.

CLAUSE 22

All sums payable by way of compensation under any of these conditions shall be considered as reasonable compensation to be applied to the use of Institute without reference to the actuals, loss or damage sustained and whether or not any damage shall have been sustained.

CLAUSE 23

Where the contractor is a partnership firm, the previous approval in writing of the Engineer-in-Charge shall be obtained any change is made in the constitution of the firm. Where the contractor is an individual or a Hindu undivided family business concern such approval as aforesaid shall likewise be obtained before the contractor enters into any partnership agreement where under the partnership firm would have the right to carry out the works hereby undertaken by the contractor. If previous approval as aforesaid is not obtained, the contract shall be deemed to have been assigned in contravention of Clause 21 hereof and the same action may be taken, and the same

consequences shall ensue as provided in the said Clause 21.

CLAUSE 24

All works to be executed under the contract shall be executed under the direction and subject to the approval in all respects of the Engineer-in-Charge who shall be entitled to direct at what point or points and in what manner they are to be commenced, and from time to time carried on.

CLAUSE 25

Settlement of Disputes & Arbitration

Except where otherwise provided in the contract all question and disputes relating to the meaning of the specifications, designs, drawings and instructions here-in before mentioned and as to the quality of workmanship or materials used or as to any other question, claim, right, matter or thing whatsoever in any way arising out of or relating to the contract, designs, drawings, specifications, estimates, instructions, orders of these conditions or otherwise concerning the works or the execution or failure to executes the same whether arising during the progress of work or after the cancellation, termination, completion or abandonment thereof shall be dealt with as mentioned herein after.

If the contractor considers any work demanded of him to be outside the requirements of the contract, or disputes any drawings, record or decision given in writing by the Engineer-in-charge or any matter in connection with or arising out of the Contract or carrying out of the work, to be unacceptable, he shall promptly within 15 days request the Superintending Engineer in writing for written instruction or decision. Thereupon, the Superintending Engineer shall give his written instructions or decisions within a period of one month from the receipt of the contractor's letter.

If the Superintending Engineer fails to give his instructions or decisions in writing within the aforesaid period or if the contractor is dissatisfied with the instructions or decision of the Superintending Engineer, the contractor may, within 15 days of the receipt of Superintending Engineer's decision appeal to the Chairman (Engineering Unit), IITM who shall afford an opportunity to the contractor to be heard, if the matter so desires and to offer evidence in support of his appeal. The Chairman (Engineering Unit), IITM shall give his decision within 30 days of receipt of contractor's appeal.

If the contractor is dissatisfied with the decision of the Chairman (Engineering Unit), he may within a period of 15 days of the receipt of the Chairman's decision appeal to the Director , IITM who shall afford an opportunity to the contractor to be heard, if the matter so desires and to offer evidence in support of his appeal. The Director, IITM shall give his decision within 30 days of receipt of contractor's appeal.

If the contractor is dissatisfied with the decision of the Director IITM, he shall within 30 days of the receipt of the decision shall give notice to the Director, IITM for appointment of an arbitrator to adjudicate his claims, failing which the said decision of the Director, IITM shall be final and binding on the contractor.

Except where the decision has become final, binding and conclusive in terms of Sub para (iii)

above, disputes or difference shall be referred for adjudication through a sole arbitrator appointed by the Director, IITM. If the arbitrator so appointed is unable or unwilling to act or resigns his appointment or vacates his office due to any reason whatsoever, another sole arbitrator shall be appointed in the manner aforesaid. Such person shall proceed with the reference from the stage at which it was left by his predecessor.

It is a term of this contract that the party invoking arbitration shall give list of disputes with amounts claimed in respect of each such dispute along with the notice for appointment of arbitrator and giving reference to the rejection by the Director, IITM of the appeal.

It is also a term of this contract that no person other than a person appointed by such Director, IITM, as aforesaid should act as arbitrator.

It is also a term of this Contract that if the contractor does not make any demand for appointment of arbitrator in respect of any claims in writing as aforesaid within 120 days of receiving the intimation from the Engineer-in-charge that the final bill is ready for payment, the claim of the contractor shall be deemed to have been waived and absolutely barred and IITM shall be discharged and released of all liabilities under the Contract in respect of these claims.

The arbitration shall be conducted in accordance with the provisions of the Arbitration and Conciliation Act 1996 (26 of 1996) or any statutory modifications or re-enactment thereof and the rules made there under and for the time being in force shall apply to the arbitration proceeding under this clause.

It is also term of this Contract that the arbitrator shall adjudicate on only such disputed as are referred to him by the Director, IITM and give separate award against each dispute and claim referred to him and in all cases where the total amount of the claims by any party exceeds **Rs.1,00,000/-** the arbitrator shall give reasons for the award.

It is also a term of the Contract that if any fees are payable to the arbitrator, these shall be paid equally by both the parties.

It is also a term of the Contract that the arbitrator shall be deemed to have entered on the reference on the date of issues notice to both the parties calling them to submit their statement of claims and counter statement of claims. The venue of the arbitration shall be such place as may be fixed by the arbitrator in his sole discretion. The fees, if any, of the arbitrator shall, if required to be paid before the award is made and published, be paid half and half by each of the parties. The cost of the reference and of the award (including the fees, if any, of the arbitrator) shall be in the discretion of the arbitrator who may direct to any by whom and in what manner, such costs or any part thereof shall be paid and fix or settle the amount of costs to be so paid.

CLAUSE 26

The contractor shall fully indemnify and keep indemnified the Institute against any action, claim or proceeding relating to infringement or use of any patent or design or any alleged patent or design rights and shall pay any royalties which may be payable in respect of any article or part thereof

included in the contract. In the event of any claims made under or action brought against Institute in respect of any such matters as aforesaid, the contractor shall be immediately notified thereof and the contractor shall be at liberty, at his own expense, to settle any dispute or to conduct any litigation that may arise therefrom, provided that the contractor shall not be liable to indemnify the Institute if the infringement of the patent or design or any alleged patent or design right is the direct result of an order passed by the Engineer-in-Charge this behalf.

CLAUSE 27

-Deleted-

CLAUSE 28

In the case of any class of work for which there is no such specifications as referred to in Clause 11, such work shall be carried out in accordance with the Bureau of Indian Standards Specifications. In case there are no such specifications in Bureau of Indian Standards, the work shall be carried out as per manufacturer's specifications, if not available then as per District 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 Engineer-in-Charge.

CLAUSE 29

i) Whenever any claim or claims for payment of a sum of money arises out of or under the contract or against the contractor, the Engineer-in-Charge or the Institute shall be entitled to withhold and also have a lien to retain such sum or sums in whole or in part from the security, if any deposited by the contractor and for the purpose aforesaid, the Engineer-in-Charge or the Institute shall be entitled to withhold the security deposit, if any, furnished as the case may be and also have a lien over the same pending finalization or adjudication of any such claim. In the event of the security being insufficient to cover the claimed amount or amounts or if no security has been; taken from the contractor, the Engineer-in-Charge or the Institute 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 Engineer-in-Charge of the Institute or any contracting person through the Engineer-in-Charge 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 to above by the Engineer-in-Charge or Institute will be kept withheld or retained as such by the Engineer-in-Charge or Institute till the claim arising out of or under the contract is determined by the arbitrator (if the contractor is govern by the arbitration clause) 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 partnership firm or a limited company, the Engineer-in-Charge or the Institute 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 partner/ limited company as the case may be, whether in his individual capacity or otherwise.

ii) Institute shall have the right to cause an audit and technical examination of the works and the final bills of the contractor including all supporting vouchers, abstract, etc., to be made after payment of the final bill 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 Institute to recover the same from him in the manner prescribed in sub-clause (i) of this clause or in any other manner legally permissible; and if it is found that the contractor was paid less than what was due to him under the contract in respect of any work executed by him under it, the amount of such under payment shall be duly paid by Institute to the contractor, without any interest thereon whatsoever.

Provided that the Institute shall not be entitled to recover any sum overpaid, nor the contractor shall be entitled to payment of any sum paid short where such payment has been agreed upon between the Superintending Engineer on the one hand and the contractor on the other under any term of the contract permitting payment for work after assessment by the Superintending Engineer.

CLAUSE 29A

Any sum of money due and payable to the contractor (including the security deposit returnable to him) under the contract may be withheld or retained by way of lien by the Engineer-in-Charge or the Institute or any other contracting person or persons through Engineer-in-Charge against any claim of the Engineer-in-Charge or Institute or such other person or persons in respect of payment of a sum of money arising out of or under any other contract made by the contractor with the Engineer- in-Charge or the Institute or with such other person or persons.

It is an agreed term of the contract that the sum of money so withheld or retained under this clause by the Engineer-in-Charge or the Institute will be kept withheld or retained as such by the Engineer-in-Charge or the Institute or till his claim arising out of the same contract or any other contract is either mutually settled or determined by the arbitration clause or by the competent court, as the case may be and that the contractor shall have no claim for interest or damages whatsoever on this account or on any other ground in respect of any sum of money withheld or retained under this clause and duly notified as such to the contractor.

CLAUSE 30

-Deleted-

CLAUSE 31

The contractor(s) shall make his / their own arrangements for water required for the work and

nothing extra will be paid for the same. This will be subject to the following conditions.

- i) That the water used by the contractor(s) shall be fit for construction purposes to the satisfaction of the Engineer-in-charge.
- ii) The Engineer-in-Charge shall make alternative arrangements for supply of water at the risk and cost of contractor(s) if the arrangements made by the contractor(s) for procurement of water are in the opinion of the Engineer-in-Charge, unsatisfactory.
- iii) No bore wells / open wells shall be constructed inside the IITM Campus for drawl of water.

CLAUSE 31 A

-Deleted-

CLAUSE 32

Deleted

CLAUSE 33

Deleted

CLAUSE 34

Deleted

CLAUSE 35

The contractor undertakes to make arrangement for the supervision of the work by the firm supplying the bitumen used. The contractor shall collect the total quantity of bitumen required for the work as per standard formula, before the work is started and shall hypothecate it to the Engineer-in-Charge. If any bitumen remains unused on completion of the work on account of lesser use of materials in actual execution for reasons other than authorized changes of specifications and abandonment of portion of work, a corresponding deduction equivalent to the cost of unused materials as determined by the Engineer-in-Charge shall be made and the material returned to the contractors. Although the materials are hypothecated to Institute, the contractor undertakes the responsibility for their proper watch, safe custody and protection against all risks. The materials shall not be removed from site of work without the consent of the Engineer-in-Charge in writing.

The contractor shall be responsible for rectifying defects noticed within a year from the date of completion of the work and the portion of the security deposit relating to asphaltic work shall be refunded after the expiry of this period.

CLAUSE 36

Contractors Superintendence, Supervision, Technical Staff & Employees

The contractor shall provide all necessary superintendence during execution of the work and as along thereafter as may be necessary for proper fulfilling of the obligations under the contract.

The contractor shall immediately after receiving letter of acceptance of the tender and before commencement of the work, intimate in writing to the Engineer-in-Charge, the name(s), qualifications, experience, age, address(s) and other particulars along with certificates, of the principal technical representative to be in charge of the work and other technical representative(s)

who will be supervising the work, minimum requirement of such technical representative(s) and their qualifications and experience shall not be lower than specified in Schedule 'F'. The Engineer-in-Charge shall within 3 days of receipt of such communication intimate in writing his approval or otherwise of such a representative(s) to the contractor. Any such approval may at any time be withdrawn and in case of such withdrawal, the contractor shall appoint another such representative(s) according to the provisions of this clause. Decision of the tender accepting authority shall be final and binding on the contractor in this respect. Such a principal technical representative shall be appointed by the contractor soon after receipt of the approval from Engineer-in-Charge and shall be available at site before start of work.

If the contractor (or any partner in case of firm/company) who himself has such qualifications, it will not be necessary for the said contractor to appoint such a principal technical representative but the contractor shall designate and appoint a responsible agent to represent him and to be present at the work whenever the contractor is not in a position to be so present. All the provisions applicable to the principal technical representative under the clause will also be applicable in such a case to contractor or his responsible agent. The principal technical representative and/or the contractor shall on receiving reasonable notice from the Engineer-in-Charge or his designated representative(s) in charge of the work in writing or in person or otherwise, present himself to the Engineer-in-Charge and/or at the site of work, as required, to take instructions. Instructions given to the principal technical representative of the responsible agent shall be deemed to have the same force as if these have been given to the contractor. The principal technical representative and/or the contractor or his responsible authorized agent shall be actually available at site especially during important stages of execution of work, during recording of measurement of works and whenever so required by the Engineer-in-Charge by a notice as aforesaid and shall also note down instructions conveyed by the Engineer-in-Charge or his designated representative in the site order book and shall affix his signature in token of noting down the instructions and in token of acceptance of measurements.

If the Engineer-in-Charge, whose decision in this respect is final and binding on the contractor, is convinced that no such technical representative(s) is / are effectively appointed or is / are effectively attending or fulfilling the provision of this clause, a recovery (nonrefundable) shall be effected from the contractor as specified in Schedule 'F' and the decision of the Engineer-in-Charge as recorded in the site order book and measurement recorded checked / test checked in Measurement Books shall be final and binding on the contractor. Further if the contractor fails to appoint a suitable technical representative and / or other technical representative(s) and if such appointed persons are not effectively present are absent by more than two days without duly approved substitute or do not discharge their responsibilities satisfactorily, the Engineer-in-Charge shall have full powers to suspend the execution of the work until such date as suitable other technical representative(s) is / are appointed and the contractor shall be held responsible for the delay so caused to the work. The contractor shall submit a certificate of employment of the

technical representative(s) along with every on account bill/final bill and shall produce evidence if at any time so required by the Engineer-in-Charge.

The contractor shall provide and employ on the site only such technical assistants as are skilled and experienced in their respective fields and such foremen and supervisory staff as are competent to give proper supervision to the work.

The contractor shall provide and employ skilled, semiskilled and unskilled labour as is necessary for proper and timely execution of the work.

The Engineer-in-Charge shall be at liberty to object to and require the contractor to remove from the works any person who in his opinion misconducts himself, or is incompetent or negligent in the performance of his duties or whose employment is otherwise considered by the Engineer-in-Charge to be undesirable. Such person shall not be employed again at works site without the written permission of the Engineer-in-Charge and the persons so removed shall be replaced as soon as possible by competent substitutes.

CLAUSE 37

Clause 37 "Levy / Taxes Payable by Contractor"

- i) Sales tax including VAT (except Service tax) Building and other Construction Workers Welfare Cess or any other tax or Cess in respect of this contract shall be payable by the Contractor and IITM shall not entertain any claim whatsoever in this respect. However in respect of service tax , same shall be paid by the contractor to the concerned department on demand and it will be reimbursed to him by the Engineer-in-charge after satisfying that it has been actually and genuinely paid by the contractor.
- ii) The contractor shall deposit royalty and obtain necessary permit for supply of the red bajri, stone, kankar, etc. from local authorities.

If pursuant to or under any law, notification or order any royalty, cess or the like becomes payable by the Institute and does not any time become payable by the contractor to the State Government / Local authorities in respect of any material used by the contractor in the works then in such a case, it shall be lawful to the Institute and it will have the right and be entitled to recover the amount paid in the circumstances as aforesaid from dues of the contractor.

CLAUSE 38

- i) All tendered rates shall be inclusive of all taxes and levies (Except Service tax) payable under respective statutes. However. If any further tax or cess is imposed by Statute ,after the last stipulated date for the receipt of tender including extentions if any and the contractor thereupon necessarily and properly pays such taxes/levies/cess, the contractor shall be reimbursed the amount so paid. provided such payments, if any, is not, in the opinion of the Engineer-in-charge (whose decision shall be final and binding on the contractor) attributable to delay in execution of work within the control of the contractor.
- ii) The contractor shall keep necessary books of accounts and other documents for the purpose of this condition as may be necessary and shall allow inspection of the same by a duly authorised

representative of the Institute and/or the Engineer-in-Charge and further shall furnish such other information/document as the Engineer-in-Charge may require from time to time.

- iii) The contractor shall, within a period of 30 days of the imposition of any such further tax or levy or excess, , give a written notice thereof to the Engineer-in-Charge that the same is given pursuant to this condition, together with all necessary information relating thereto.

CLAUSE 39

Without prejudice to any of the rights or remedies under this contract if the contractor dies, the Engineer-in-charge on behalf of the Institute shall have the option of terminating the contract without compensation to the contractor.

CLAUSE 40

The contractor shall not be permitted to tender for works in the Institute (responsible for award and execution of contracts) in which his near relative is posted as Assistant Registrar(Engineering unit, IITM) or as an officer in any capacity between the grades of the Superintending Engineer and Junior Engineer (both inclusive). He shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives to any Official in the Institute. Any breach of this condition by the contractor would render him liable to be removed from the approved list of contractors of the Institute. If however the contractor is registered in any other department, he shall be debarred from tendering in Institute for any breach of this condition

NOTE: By the term "near relatives" is meant wife, husband, parents and grand parents, children and grand children, brothers and sisters, uncles, aunts and cousins and their corresponding in-laws.

CLAUSE 41

No engineer of gazetted rank or other gazetted officer employed in engineering or administrative duties in an engineering department of the Government of India shall work as a contractor or employee of a contractor for a period of one year after his retirement from government service without the previous permission of Government of India in writing. This contract is liable to be cancelled if either the contractor or any of his employees is found at any time to be such a person who had not obtained the permission of Government of India as aforesaid, before submission of the tender or engagement in the contractor's service, as the case may be.

CLAUSE 42

Deleted

CLAUSE 43

The work (whether fully constructed or not) and all materials, machines, tools and plants, scaffolding, temporary buildings and other things connected therewith shall be at the risk of the contractor until the work has been delivered to the Engineer-in-Charge and a certificate from him to that effect obtained. In the event of the work or any materials properly brought to the site for

incorporation in the work being damaged or destroyed in consequence of hostilities or warlike operation, the contractor shall when ordered (in writing) by the Engineer-in-Charge to remove any debris from the site, collect and properly stack or remove in store all serviceable materials salvaged from the damaged work and shall be paid at the contract rates in accordance with the provision of this agreement for the work of clearing the site of debris, stacking or removal of serviceable material and for reconstruction of all works ordered by the Engineer-in-Charge, such payments being in addition to compensation upto the value of the work originally executed before being damaged or destroyed and not paid for. In case of works damaged or destroyed but not already measured and paid for, the compensation shall be assessed by the Superintending Engineer concerned. The contractor shall be paid for the damages/destruction suffered and for the restoring the material at the rate based on analysis of rates tendered for in accordance with the provision of the contract. The certificate of the Engineer-in-Charge regarding the quality and quantity of materials and the purpose for which they were collected shall be final and binding on all parties to this contract.

Provided always that no compensation shall be payable for any loss in consequence of hostilities or warlike operations (a) unless the contractor had taken all such precautions against air raid as are deemed necessary by the A.R.P. Officers or the Engineer-in-Charge (b) for any material etc. not on the site of the work or for any tools, plant, machinery, scaffolding, temporary building and other things not intended for the work.

In the event of the contractor having to carry out reconstruction as aforesaid, he shall be allowed such extension of time for its completion as is considered reasonable by the Engineer-in-charge.

CLAUSE 44

The contractor shall comply with the provisions of the Apprentices Act, 1961 and the rules and orders issued thereunder from time to time. If he fails to do so, his failure will be a breach of the contract and the Superintending Engineer may, in his discretion, cancel the contract. The contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provisions of the said Act.

CLAUSE 45

Security Deposit of the work shall not be refunded till the contractor produces a clearance certificate from the Labour Officer. As soon as the work is virtually complete the contractor shall apply for the clearance certificate to the Labour officer under intimation to the Engineer-in-charge. The Engineer-in-charge on receipt of the communication shall write to the Labour officer to intimate if any complaint is pending against the contractor in respect of the work. If no complaint is pending on record till after 3 months after completion of the work and/or no communication is received from the Labour officer to this effect till six months after the date of completion it will be deemed to have received the clearance certificate and the security deposit will be released if otherwise due.

14.0 C.P.W.D. SAFETY CODE

Suitable scaffolds should be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except such short period work as can be done safely from ladders. When a ladder is used, an extra mazdoor shall be engaged for holding the ladder and If the ladder is used for carrying materials as well suitable footholds and hand-hold shall be provided on the ladder and the ladder shall be given an inclination not steeper than 1/4 to 1 (1/4 horizontal and 1 vertical.)

Scaffolding of staging more than 3.6 mt. (12ft.) above the ground or floor, swung or suspended from an overhead support or erected with stationary support shall have a guard rail properly attached or bolted, braced and otherwise secured at least 90 cm. (3ft.) high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends there of with only such opening as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

Working platforms, gangways and stairways should be so constructed that they should not sag unduly or unequally, and if the height of the platform or the gangway or the stairway is more than 3.6 m (12ft.) above ground level or floor level, they should be closely boarded, should have adequate width and should be suitably fastened as described in (2) above.

Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of person or materials by providing suitable fencing or railing whose minimum height shall be 90 cm.(3ft.)

Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9m. (30ft.) in length while the width between side rails in rung ladder shall in no case be less than 29 cm. (11 1/2") for ladder upto and including 3 m. (10 ft.) in length. For longer ladders, this width should be increased at least 1/4" for each additional 30 cm/1 foot of length. Uniform step spacing of not more than 30 cm shall be kept. Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites or work shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The contractor shall provide all necessary fencing and lights to protect the public from accident and shall be bound to bear the expenses of defence 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 cost which may be awarded in any such suit, action or proceedings to any such person or which may, with the consent of the contractor, be paid to compensate any claim by any such person.

Excavation and Trenching - All trenches of 1.2 m. (4ft.) or more in depth, shall at all times be supplied with at least one ladder for each 30 m. (100 ft.) in length or fraction thereof Ladder shall extend from bottom of the trench to at least 90 cm. (3ft.) above the surface of the ground. The side of the trenches which are 1.5 m. (5ft.) or more in depth shall be stepped back to give suitable slope or securely held by timber bracing, so as to avoid the danger of sides collapsing. The excavated

materials shall not be placed within 1.5 m. (5ft.) of the edges of the trench or half of the depth of the trench whichever is more. Cutting shall be done from top to bottom. Under no circumstances, undermining or undercutting shall be done.

Demolition - Before any demolition work is commenced and also during the progress of the work, All roads and open areas adjacent to the work site shall either be closed or suitably protected. No electric cable or apparatus which is liable to be a source of danger or a cable or apparatus used by the operator shall remain electrically charged.

All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.

All necessary personal safety equipment as considered adequate by the Engineer-in-Charge should be kept available for the use of the person employed on the site and maintained in a condition suitable for immediate use, and the contractor should take adequate steps to ensure proper use of equipment by those concerned:- The following safety equipment shall invariably be provided.

Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective gloves and goggles.

Those engaged in white washing and mixing or stacking of cement bags or any material which is injurious to the eyes, shall be provided with protective gloves and goggles.

Those engaged in welding works shall be provided with welder's protective eye-shields.

Stone breaker shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.

When workers are employed in sewers and manholes, which are in active use, the contractors shall ensure that the manhole covers are opened and ventilated atleast for an hour before the workers are allowed to get into the manholes, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to the public. In addition, the contractor shall ensure that the following safety measure are adhered to :

Entry for workers into the line shall not be allowed except under supervision of the JE or any other higher officer.

At least 5 to 6 manholes upstream and downstream should be kept open for at least 2 to 3 hours before any man is allowed to enter into the manhole for working inside.

Before entry, presence of Toxic gases should be tested by inserting wet lead acetate paper which changes colour in the presence of such gases and gives indication of their presence.

Presence of Oxygen should be verified by lowering a detector lamp into the manhole. In case, no Oxygen is found inside the sewer line, workers should be sent only with Oxygen kit.

Safety belt with rope should be provided to the workers. While working inside the manholes, such rope should be handled by two men standing outside to enable him to be pulled out during emergency.

The area should be barricaded or cordoned off by suitable means to avoid mishaps of any kind.

Proper warning signs should be displayed for the safety of the public whenever cleaning works are undertaken during night or day. .

No smoking or open flames shall be allowed near the blocked manhole being cleaned.

The malba(debris) obtained on account of cleaning of blocked manholes and sewer lines should be immediately removed to avoid accidents on account of slippery nature of the malba(debris).

Workers should not be allowed to work inside the manhole continuously. He should be given rest intermittently. The Engineer-in-Charge may decide the time up to which a worker may be allowed to work continuously inside the manhole.

Gas masks with Oxygen Cylinder should be kept at site for use in emergency.

Air-blowers should be used for flow of fresh air through the manholes. Whenever called for portable air blowers are recommended for ventilating the manholes. The Motors for these shall be vapour proof and of totally enclosed type. Non sparking gas engines also could be used but they should be placed at least 2 metres away from the opening and on the leeward side protected from wind so that they will not be a source of friction on any inflammable gas that might be present.

The workers engaged for cleaning the manholes/sewers should be properly trained before allowing to work in the manhole.

The workers shall be provided with Gumboots or non sparking shoes bump helmets and gloves non sparking tools safety lights and gas masks and portable air blowers (when necessary). They must be supplied with barrier cream for anointing tile limbs before working inside the sewer lines.

Workmen descending a manhole shall try each ladder stop or rung carefully before putting his full weight on it to guard against insecure fastening due to corrosion of the rung fixed to manhole well.

If a man has received a physical injury, he should be brought out of the sewer immediately and adequate medical aid should be provided to him.

The extent to which these precautions are to be taken depend on individual situation but the decision of the Engineer-in-Charge regarding the steps to be taken in this regard in an individual case will be final.

The Contractor shall not employ men and women below the age of 18 years on the work of painting with products containing lead in any form. Wherever men above the age of 18 are employed on the work of lead painting, the following precaution should be taken:-

- i) White lead, sulphate of lead or product containing these pigment, shall not be used in painting operation except in the form of pastes or paint ready for use.
- ii) Measures shall be taken, wherever required in order to prevent danger arising from the application of a paint in the form of spray.
- iii) Measures shall be taken, wherever practicable, to prevent danger arising out of from dust caused by dry rubbing down and scraping.
- iv) Facilities shall be provided to enable the working painters to wash during and on the cessation of work.

The following precaution should be taken while painting:

White lead, sulphate of lead or product containing these pigment, shall not be used in painting operation except in the form of pastes or paint ready for use.

Measures shall be taken, wherever required in order to prevent danger arising from the application of a paint in the form of spray. Measures shall be taken, wherever practicable, to prevent danger arising out of from dust caused by dry rubbing down and scraping. Adequate facilities shall be provided to enable working painters to wash during and on cessation of work.

Overall shall be worn by working painters during the whole of working period.

Suitable arrangement shall be made to prevent clothing put off during working hours being spoiled by painting materials.

Cases of lead poisoning and suspected lead poisoning shall be notified and shall be subsequently verified by medical man appointed by Institute.

Institute may require, when necessary medical examination of workers.

Instructions with regard to special hygienic precautions to be taken in the painting trade shall be distributed to working painters.

When the work is done near any place where there is risk of drowning, all necessary equipments should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision, should be made for prompt first aid treatment of all injuries likely to be obtained during the course of the work.

Use of hoisting machines and tackle including their attachments, anchorage and supports shall conform to the following standards or conditions :

- i)
 - (a) These shall be of good mechanical construction, sound materials and adequate strength and free from patent defects and shall be kept repaired and in good working order.
 - (b) Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength and free from patent defects.
- ii) Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years should be in charge of any hoisting machine including any scaffolding winch or give signals to operator.
- iii) In case of every hoisting machine and of every chain ring hook, shackle swivel and pulley block used in hoisting or as means of suspension, the safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load. In case of a hoisting machine having a variable safe working load each safe working load and the condition under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.
- iv) The contractor shall notify the safe working load of the machine to the Engineer-in-Charge whenever he brings any machinery to site of work who may get it verified.

Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards. Hoisting appliances should be provided with such means as will reduce to the minimum the risk of accidental descent of the load. Adequate precautions should be taken to reduce to the minimum the risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energised, insulating mats, wearing apparel, such as gloves, sleeves and boots as may be necessary should be provided. The worker should not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near places of work.

These safety provisions should be brought to the notice of all concerned by display on a notice board at a prominent place at work spot. The person responsible for compliance of the safety code shall be named therein by the contractor.

To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangements made by the contractor shall be open to inspection by labour officer or other department or Engineer-in-Charge or their representatives.

Notwithstanding the above clauses from (1) to (15) there is nothing in these to exempt the contractor from the operations of any other Act or Rule in force in the Republic of India.

1. APPLICATION

These rules shall apply to all buildings and construction works in IITM in which twenty or more workers are ordinarily employed or are proposed to be employed in any day during the period during which the contract work is in progress.

2. DEFINITION

Work place means a place where twenty or more workers are ordinarily employed in connection with construction work on any day during the period during which the contract work is in progress.

3. FIRST AID FACILITIES

- i) At every work place there shall be provided and maintained, so as to easily accessible during working hours, first-aid boxes at the rate of not less than one box for 150 contract labour or part thereof ordinarily employed..
- ii) The first-aid box shall be distinctly marked with a red cross on white back ground and shall contain the following equipment
 - a) For work places in which the number of contract labour employed does not exceed 50 Each first-aid box shall
 1. 6 small sterilised dressings
 2. 3 medium size sterilized dressings.
 3. 3 large size sterilized dressings.
 4. 3 large sterilized burn dressings.

5. 1 (30ml) bottle containing a two per cent alcoholic solution of iodine
6. 1 (30 ml) bottle containing salvolatile having the dose and mode of administration indicated on the label.
7. 1 snakebite lancet.
8. 1 (30 gms.) bottle of potassium permanganate crystals
9. 1 pair scissors
10. 1 copy of the first-aid leaflet issued by the Director General, Factory Advice Service and Labour Institutes, Government of India.
11. 1 bottle containing 100 tablets (each of 5 gms) of aspirin.
12. Ointment for burns
13. A bottle of suitable surgical antiseptic solution.

b) For work places in which the number of contract labour exceed 50.

Each first-aid box shall contain the following equipments.

- 12 small sterilised dressings.
 - 6 medium size sterilised dressings.
 - 6 large size sterilised dressings.
 - 6 large size sterilised burn dressings.
 - 6 (15 gms.) packets sterilised cotton wool.
 - 1 (60 ml.) bottle containing two per cent alcoholic solution iodine.
 - 1 (60 ml.) bottle containing salvolatile having the dose and mode of administration indicated on the label.
 - 1 roll of adhesive plaster.
 - 1 snake bite lancet.
 - 1 (30 Gms) bottle of potassium permanganate crystals.
 - 1 pair scissors
 - 1 copy of the first-aid leaflet issued by the director General Factory Advice Service and labour Institutes / government of India.
 - A bottle containing 100 tablets (each of 5 Gms) of aspirin.
 - Ointment for burns.
 - A bottle of suitable surgical antiseptic solution.
- iii) Adequate arrangements shall be made for immediate recoument of the equipment when necessary.
 - iv) Nothing except the prescribed contents shall be kept in the First-aid box.
 - v) The first-aid box shall be kept in charge of a responsible person who shall always be readily available during the working hours of the work place.
 - vi) A person in Charge of the First aid box shall be a person trained in First-aid treatment, in the work places where the number of contract labour employed is 150 or more.
 - vii) In work places where the number of contract labour employed is 500 or more and hospital

facilities are not available within easy distance from the works. First-aid posts shall be established and run by a trained compounder. The compounder shall be on duty and shall be available at all hours when the workers are at work.

- viii) Where work places are situated in places which are not towns or cities, a suitable motor transport shall be kept readily available to carry injured person or person suddenly taken ill to the nearest hospital.

4. DRINKING WATER

In every work place, there shall be provided and maintained at suitable places, easily accessible to labour, a sufficient supply of cold water fit for drinking.

Where drinking water is obtained from an intermittent public water supply, each work place shall be provided with storage where such drinking water shall be stored.

Every water supply or storage shall be at a distance of not less than 50 feet from any latrine drain or other source of pollution. Where water has to be drawn from an existing well which is within such proximity of latrine, drain or any other source of pollution, the well shall be properly chlorinated before water is drawn from it for drinking. All such wells shall be entirely closed in and be provided with a trap door which shall be dust and waterproof.

A reliable pump shall be fitted to each covered well, the trap door shall be kept locked and opened only for cleaning or inspection which shall be done at least once a month.

5. WASHING FACILITIES

In every work place adequate and suitable facilities for washing shall be provided and maintained for the use of contract labour employed therein.

Separate and adequate cleaning facilities shall be provided for the use of male and female workers.

Such facilities shall be conveniently accessible and shall be kept in clean and hygienic condition.

6. LATRINES AND URINALS

- i) Latrines shall be provided in every work place on the following scale namely:

Where female are employed there shall be at least one latrine for every 25 females.

Where males are employed, there shall be at least one latrine for every 25 males.

Provided that where the number of males or females exceeds 100, it shall be sufficient if there is one latrine for 25 males or females as the case may be up to the first 100, and one for every 50 thereafter.

- ii) Every latrine shall be under cover and so partitioned off as to secure privacy, and shall have a proper door and fastenings.

- iii) Construction of latrines: The inside walls shall be constructed of masonry or some suitable heat-resisting non-absorbent materials and shall be cement washed inside and outside at least once a year, Latrines shall not be of a standard lower than borehole system.

- iv) Where workers of both sexes are employed, there shall be displayed outside each block of latrine and urinal, a notice in the language understood by the majority of the workers "For Men only" or

"For Women Only" as the case may be.

The notice shall also bear the figure of a man or of a woman, as the case may be.

- v) There shall be at least one urinal for male workers up to 50 and one for female workers up to fifty employed at a time, provided that where the number of male or female workmen, as the case may be exceeds 500, it shall be sufficient if there is one urinal for every 50 males or females up to the first 500 and one for every 100 or part thereafter.
- vi) a) The latrines and urinals shall be adequately lighted and shall be maintained in a clean and sanitary condition at all times.
b) Latrines and urinals other than those connected with a flush sewage system shall comply with the requirements of the Public Health Authorities.
- vii) Water shall be provided by means of tap or otherwise so as to be conveniently accessible in or near the latrines and urinals.
- viii) Disposal of excreta: - Unless otherwise arranged for by the local sanitary authority, arrangements for proper disposal of excreta by incineration at the work place shall be made by means of a suitable incinerator. Alternately excreta may be disposed of by putting a layer of night soil at the bottom of a pucca tank prepared for the purpose and covering it with a 15 cm. layer of waste or refuse and then covering it with a layer of earth for a fortnight (when it will turn to manure).
- ix) The contractor shall at his own expense, carry out all instructions issued to him by the Engineer-in-Charge to effect proper disposal of night soil and other conservancy work in respect of the contractor's workmen or employees on the site. The contractor shall be responsible for payment of any charges which may be levied by Municipal or Cantonment Authority for execution of such on his behalf.

7. PROVISION OF SHELTER DURING REST

At every place there shall be provided, free of cost, four suitable sheds, two for meals and the other two for rest separately for the use of men and women labour, The height of each shelter shall not be less than 3 m (10ft.) from the floor level to the lowest part of the roof. These shall be kept clean and the space provided shall be on the basis of 0.6 sq.m. (6 sft) per head.

Provided that the Engineer-in-Charge may permit subject to his satisfaction, a portion of the building under construction or other alternative accommodation to be used for the purpose.

8. CRECHES

At every work place, at which 20 or more women worker are ordinarily employed, there shall be provided two rooms of reasonable dimensions for the use of their children under the age of six years. One room shall be used as a play room for the children and the other as their bedroom. The rooms shall be constructed with specifications as per clause 19H (ii) a, b & c.

The rooms shall be provided with suitable and sufficient openings for light and ventilation. There shall

be adequate provision of sweepers to keep the places clean.

The contractor shall supply adequate number of toys and games in the play room and sufficient number of cots and beddings in the bed room.

The contractor shall provide one ayah to look after the children in the crèche when the number of women workers does not exceed 50 and two when the number of women workers exceeds 50.

The use of the rooms earmarked as crèches shall be restricted to children, their attendants and mothers of the children.

9. CANTEENS

In every work place where the work regarding the employment of contract labour is likely to continue for six months and where in contract labour numbering one hundred or more is ordinarily employed, an adequate canteen shall be provided by the contractor for the use of such contract labour.

The canteen shall consist of at least a dining hall, kitchen, storeroom, pantry and washing places separately for workers and utensils.

The canteen shall be sufficiently lighted at all times when any person has access to it.

The floor shall be made of smooth and impervious materials and inside walls shall be lime-washed or colour washed at least once in each year.

Provided that the inside walls of the kitchen shall be lime-washed every four months.

The premises of the canteen shall be maintained in a clean and sanitary condition.

Waste water shall be carried away in suitable covered drains and shall not be allowed to accumulate so as to cause a nuisance.

Suitable arrangements shall be made for the collection and disposal of garbage.

The dining hall shall accommodate at a time 30 per cent of the contract labour working at a time.

The floor area of the dining hall, excluding the area occupied by the service counter and any furniture except tables and chairs shall not be less than one square meter (10 sft) per diner to be accommodated as prescribed in sub-Rule 9.

(xi) a) A portion of the dining hall and service counter shall be partitioned off and reserved for women workers in proportion to their number.

b) Washing places for woman shall be separate and screened to secure privacy.

(xii) Sufficient tables, stools, chair or benches shall be available for the number of diners to be accommodated as prescribed in sub-Rule 9.

(xiii) a) 1. There shall be provided and maintained sufficient utensils crockery, furniture and any other equipment necessary for the efficient running of the canteen.

2. The furniture utensils and other equipment shall be maintained in a clean and hygienic condition.

b) 1. Suitable clean clothes for the employees serving in the canteen shall be provided and maintained.

2. A service counter, if provided, shall have top of smooth and impervious material.

3. Suitable facilities including an adequate supply of hot water shall be provided for the cleaning of utensils and equipments.
- xiv. The food stuffs and other items to be served in the canteen shall be in conformity with the normal habits of the contract labour.
- xv. The charges for food stuffs, beverages and any other items served in the canteen shall be based on 'No profit, No loss' and shall be conspicuously displayed in the canteen.
- xvi. In arriving at the price of foodstuffs, and other article served in the canteen, the following items shall not be taken into consideration as expenditure namely:
- a) The rent of land and building.
 - b) The depreciation and maintenance charges for the building and equipments provided for the canteen.
- The cost of purchase, repairs and replacement of equipments including furniture, crockery, cutlery and utensils.
- The water charges and other charges incurred for lighting and ventilation.
- The interest and amounts spent on the provision and maintenance of equipments provided for the canteen.
- xvii. The accounts pertaining to the canteen shall be audited once every 12 months by registered accountants and auditors.

10. ANTI-MALARIAL PRECAUTIONS

The contractor shall at his own expense, conform to all anti-malarial instructions given to him by the Engineer-in-Charge including the filling up of any borrow pits which may have been dug by him.

11. The above rules shall be incorporated in the contracts and in notices inviting tenders and shall form an integral part of the contracts.

12. AMENDMENTS

Institute may, from time to time, add to or amend these rules and issue directions - it may consider necessary for the purpose of removing any difficulty which may arise in the administration thereof.

15.0 C.P.W.D. Contractor's Labour Regulations

1. SHORT TITLE

These regulations may be called the CPWD/PWD (DA Contractors Labour Regulations).

2. DEFINITIONS

1) Workman means any person employed by contractor directly or indirectly through a subcontractor with or without the knowledge of the Institute to do any skilled, semiskilled or unskilled manual, supervisory, technical or clerical work for hire or reward, whether the terms of employment are expressed or implied but does not include any person :

a) Who is employed mainly in a managerial or administrative capacity: or

b) Who, being employed in a supervisory capacity draws wages exceeding five hundred rupees per mensem or exercises either by the nature of the duties attached to the office or by reason of powers vested in him, functions mainly of managerial nature: or

c) Who is an out worker, that is to say, person to whom any article or materials are given out by or on behalf of the principal employers to be made up cleaned, washed, altered, ornamental finished, repaired adopted or otherwise processed for sale for the purpose of the trade or business of the principal employers and the process is to be carried out either in the home of the out worker or in some other premises, not being premises under the control and management of the principal employer.

No person below the age of 18 years shall be employed to act as a workman.

ii) Fair wages means wages whether for time or piece work fixed and notified under the provisions of the Minimum Wages Act from time to time.

iii) Contractors shall include every person who undertakes to produce a given result other than a mere supply of goods or articles of manufacture through contract labour or who supplies contract labour for any work and includes a subcontractor.

iv) Wages shall have the same meaning as defined in the Payment of Wages Act.

i) Normally working hours of an adult employee should not exceed 9 hours a day. The working day shall be so arranged that inclusive of interval for rest, if any, it shall not spread over more than 12 hours on any day.

ii) When an adult worker is made to work for more than 9 hours on any day or for more than 48 hours in any week, he shall be paid over time for the extra hours put in by him at double the ordinary rate of wages.

iii) a) Every worker shall be given a weekly holiday normally on a Sunday, in accordance with the provisions of the Minimum Wages (Central) Rules 1960 as amended from time to time irrespective of whether such worker is governed by the Minimum Wages Act or not.

b) Where the minimum wages prescribed by the Government under the minimum Wages Act are not inclusive of the wages for the weekly day of rest, the worker shall be entitled to rest day wages at the rate applicable to the next preceding day, provided he has worked under the same contractor for a continuous period of not less than 6 days.

c) Where a contractor is permitted by the Engineer-in-Charge to allow a worker to work on a normal weekly holiday, he shall grant a substituted holiday to him for the whole day on one of the five days immediately before

or after the normal weekly holiday and pay wages to such worker for the work performed on the normal weekly holiday at overtime rate.

4. DISPLAY OF NOTICE REGARDING WAGES ETC.

The contractor shall before he commences his work on contract, display and correctly maintain and continue to display and correctly maintain in a clear and legible condition in conspicuous places on the work, notices in English and in the local Indian languages spoken by the majority of the workers giving the minimum rates of wages fixed under Minimum Wages Act, the actual wages being paid, the hours of work for which such wage are earned, wages periods, dates of payments of wages and other relevant information as per Appendix 'III'.

5. PAYMENT OF WAGES

The contractor shall fix wage periods in respect of which wages shall be payable.

No wage period shall exceed one month.

The wages of every person employed as contract labour in an establishment or by a contractor where less than one thousand such persons are employed shall be paid before the expiry of seventh day and in other cases before the expiry of tenth day after the last day of the wage period in respect of which the wages are payable.

Where the employment of any worker is terminated by or on behalf of the contractor the wages earned by him shall be paid before the expiry of the second working day from the date on which his employment is terminated.

All payment of wages shall be made on a working day at the work premises and during the working time and on a date notified in advance and in case the work is completed before the expiry of the wage period, final payment shall be made within 48 hours of the last working day.

Wages due to every worker shall be paid to him direct or to other person authorised by him in this behalf.

All wages shall be paid in current coin or currency or in both.

Wages shall be paid without any deductions of any kind except those specified by the Central Government by general or special order in this behalf or permissible under the Payment of Wages Act 1956.

A notice showing the wages period and the place and time of disbursement of wages shall be displayed at the place of work and a copy sent by the contractor to the Engineer-in-Charge under acknowledgment.

It shall be the duty of the contractor to ensure the disbursement of wages in the presence of the Junior Engineer or any other authorised representative of the Engineer-in-Charge who will be required to be present at the place and time of disbursement of wages by the contractor to workmen.

The contractor shall obtain from the Junior Engineer or any other authorised representative of the Engineer-in-Charge as the case may be, a certificate under his signature at the end of the entries in the "Register of Wages" or the "Wage-cum Muster Roll" as the case may be in the following form:

"Certified that the amount shown in column No has been paid to the workman concerned in my presence on
at....."

6. FINES AND DEDUCTIONS WHICH MAY BE MADE FROM WAGES

(i) The wages of a worker shall be paid to him without any deduction of any kind except the following:

a) Fines

b) Deductions for absence from duty i.e. from the place or the places where by the terms of his employment he is required to work. The amount of deduction shall be in proportion to the period for which he was absent.

c) Deduction for damage to or loss of goods expressly entrusted to the employed person for custody, or for loss of money or any other deduction which he is required to account, where such damage or loss is directly attributable to his neglect or default.

d) Deduction for recovery of advances or for adjustment of overpayment of wages, advances granted shall be entered in a register.

e) Any other deduction which the Central Government may from time to time allow.

ii) No fines should be impose on any worker save in respect of such acts and omissions on his part as have been approved of by the Chief Labour Commissioner.

Note: - An approved list of Acts and omissions for which fines can be imposed is enclosed. Appendix 'X'

iii) No fine shall be imposed on a worker and no deduction for damage or loss shall be made from his wages until the worker has been given an opportunity of showing cause against such fines or deductions.

iv) The total amount of fine which may be imposed in anyone wage period on a worker shall not exceed an amount equal to three paise in a rupee of the total wages, payable to him in respect of that wage period.

v) No fine imposed on any worker shall be recovered from him by installment, or after the expiry of sixty days from the date on which it was imposed.

vi) Every fine shall be deemed to have been imposed on the day of the act or omission in respect of which it was imposed.

7. LABOUR RECORDS

The contractor shall maintain a Register of persons employed on work on contract in Form XIII of the CL (R &A) Central Rules 1971 (Appendix IV)

The contractor shall maintain a **Muster Roll** register in respect of all workmen employed by him on the work under Contract in Form XVI of the CL (R&A) Rules 1971 (Appendix V).

The contractor shall maintain a **Wage Register** in respect of all workmen employed by him on the work under contract in Form XVII of the CL (R&A) Rules 1971 (Appendix VI)

(iv) Register of accident : The contractor shall maintain a register of accidents in such form may be convenient at the work place but the same shall include the following particulars :

Full particulars of the labourers who met with accident

Rate of wages

Sex

Age

Nature of accident and cause of accident

Time and date of accident

Date and time when admitted in Hospital

Date of discharge from the Hospital

Period of treatment and result of treatment.

Percentage of loss of earning capacity and disability as assessed by Medical officer.

Claim required to be paid under Workmen's Compensation Act.

Date of payment of compensation

Amount paid with details of the person to whom the same was paid.

Authority by whom the compensation was assessed.

Remarks

- v) The contractor shall maintain a **Register of Fines** in the Form XII of the CL (R &A) Rules 1971 (Appendix-XI)
The contractor shall display in a good condition and in a conspicuous place of work the approved list of acts and omissions for which fines can be imposed (Appendix-X)
- vi) The contractor shall maintain a **Register of deductions for damage or loss** in Form XX of the CL (R&A) Rules 1971 (Appendix-XII)
- vii) The contractor shall maintain a **Register of Advances** in Form XXIII of the CL (R&A) Rules 1971 (Appendix-XIII)
- viii) The contractor shall maintain a **Register of Overtime** in Form XXIII of the CL (R&A) Rules 1971 (Appendix-XIV)

8. ATTENDANCE CARD-CUM-WAGE SLIP

The contractor shall issue an **Attendance card – cum – wage slip** to each workman employed by him in the specimen form at (Appendix-VII)

The card shall be valid for each wage period.

The contractor shall mark the attendance of each workman on the card twice each day, once at the commencement of the day and again after the rest interval, before he actually starts work.

The card shall remain in possession of the worker during the wage period under reference.

The contractor shall complete the wage slip portion of the reverse of the card at least a day prior to the disbursement of wages in respect of the wage period under reference.

The contractor shall obtain the signature or thumb impression of the worker on the wage slip at the time of disbursement of wages and retain the card with himself.

9. EMPLOYMENT CARD

The contractor shall issue an Employment Card in Form XIV of the CL (R&A) Central Rules 1971 to each worker within three days of the employment of the worker (Appendix-VIII).

10. SERVICE CERTIFICATE

On termination of employment for any reason whatsoever the contractor shall issue to the workman whose services have been terminated, a Service certificate in Form XV of the CL (R&A) Central Rules 1971 (Appendix-IX)

11. PRESERVATION OF LABOUR RECORDS

All records required to be maintained under Regulations Nos. 6&7 shall be preserved in original for a period of three years from the date of last entries made in them and shall be made available for inspection by the Engineer-in-Charge or Labour Officer or any other officers authorised by the Institute in this behalf,

12. POWER OF LABOUR OFFICER TO MAKE INVESTIGATIONS OR ENQUIRY

The labour officer or any person authorised by Institute on their behalf shall have power to make enquiries with a

view to ascertaining and enforcing due and proper observance of Fair Wage clauses and the Provisions of these Regulations. He shall investigate into any complaint regarding the default made by the contractor or subcontractor in regard to such provision.

13. REPORT OF LABOUR OFFICER

The labour officer or other persons authorised as aforesaid shall submit a report of result of his investigation or enquiry to the Engineer-in-charge concerned indicating the extent, if any, to which the default has been committed with a note that necessary deductions from the contractor's bill be made and the wages and other dues be paid to the labourers concerned, In case an appeal is made by the contractor under Clause 13 of these regulations, actual payment to labourers will be made by the Engineer-in-charge after a decision has been given on such appeal

i) The Engineer-in-charge shall arrange payments to the labour concerned within 45 days from the receipt of the report.

14. APPEAL AGAINST THE DECISION OF LABOUR OFFICER

Any person aggrieved by the decision and recommendations of the labour officer or other person so authorised may appeal against such decision to the Chairman (EU) concerned within 30 days from the date of decision, forwarding simultaneously a copy of his appeal to the Superintending Engineer concerned but subject to such appeal, the decision of the officer shall be final and binding upon the contractor.

15. PROHIBITION REGARDING REPRESENTATION THROUGH LAWYER

i) A workman shall be entitled to be represented in any investigation or enquiry under these regulations by :-

a) An officer of a registered trade union of which he is a member.

b) An officer of a federation of trade unions to which the trade union referred to in clause (a) is affiliated.

c) Where the employer is not a member of any registered trade union, by an officer of a registered trade union, connected with the industry in which the worker is employed or by any other workman employed in the industry in which the worker is employed.

ii) An employer shall be entitled to be represented in any investigation or enquiry under these regulations by :-

An officer of an association of employers of which he is a member

An officer of a federation of associations of employers to which association referred to in clause (a) is affiliated.

Where the employer is not a member of any association of employers, by an officer of association of employer connected with the industry in which the employer is engaged or by any other employer, engaged in the industry in which the employer is engaged.

(iii) No party shall be entitled to be represented by a legal practitioner in any investigation or enquiry under these regulations.

16. INSPECTION OF BOOKS AND SLIPS

The contractor shall allow inspection of all the prescribed labour records to any of his workers or to his agent at a

convenient time and place after due notice is received or to the Labour Officer or any other person, authorised by the Central Government on his behalf.

17. SUBMISSIONS OF RETURNS

The contractor shall submit periodical returns as may be specified from time to time.

18. AMENDMENTS

The Central Government may from time to time add to or amend the regulations and on any question as to the application/Interpretation or effect of those regulations the decision of the Executive Engineer concerned shall be final.

16.0 LIST OF APPROVED MAKE / BRAND

S.NO	DESCRIPTION	NAME
1	Main switches	L & T/GE/Siemens
2	LT UG Cables-1100 volt grade	Universal/Gloster/Polycab
3	Cable glands	Dowells/Cabend/Jainson/Comet
4	Lugs/sockets (copper & Aluminium)	Dowells/Jainson/Comet
5	Current Transformers	Kappa/Sceintific/Jothi
6	HRC Fuse bases & links	L&T/GE/SIEMENS
7	Control fuses & HRC fuses	GE/ L & T/Standard/C & S
8	Insulation tape-PVC	Steel grip/Deer
9	Cable joint	RPG heat shrinkable/Delton heat shrinkable
10	GI Pipes	TATA/JINDAL(Class-B – Medium)
11	HT vacuum circuit breaker	Siemens
12	Distribution transformer	Volt amp/Siemens/Alstom/Crompton Greaves
13	Battery & Battery chargers	Amarraja/HPL knife
14	HT UG cable	Universal/NICCO/CCI
15	MV Panels	CPRI approved panel builders

17. TECHNICAL SPECIFICATIONS

1.0 11 kV SWITCHGEAR

1.1 DESIGN CRITERIA

A	Cubical	
1.0	Type: Fully compartmentalised metal clad horizontal draw out sheet steel enclosed conforming to IP42 and fully type tested as per IS 3427-1997/ IEC 298-1990/ IEC 694-1996. Further inter compartment partitions shall also conform to IP42.	
2.0	Thickness of sheet steel	
2.1	Sides/ bottom/ partition between panels	2mm hot rolled sheet steel
2.2	Front and rear hinged door and covers	2mm cold rolled sheet steel
3.0	Rated voltage	
3.1	Nominal system voltage	11 kV, 3phase, 50Hz, 3wire
3.2	Rated voltage for switchgear	12 kV, 3phase, 50Hz, 3wire
4.0	Continuous rated current	630 A (As per SLD) at 45 ⁰ C
5.0	Short circuit with stand capacity of switch board including busbars.	
5.1	Short time rating	18.4 kA (rms) for 3 secs
5.2	Dynamic rating	46.0 kA peak
6.0	Insulation level	
6.1	Impulse withstand voltage	75 kV peak
6.2	One minute PF withstand voltage	28 kV (rms)
7.0	Busbars	
7.1	Material of busbars	High conductivity electrical grade copper
7.2	Temperature rise of busbars at rated current over 45 ⁰ C ambient	40 ⁰ C
7.3	Inter panel busbar chamber partition	Cast resin bushings to be provided
7.4	Busbar joints	1 Cadmium plate bolts and tinned surface 2 Flexible connection if required
7.5	Insulation	Epoxy resin/ FRP encapsulation of busbars jumpers etc., for full insulation level i.e impulse of 75 kV peak and power frequency test voltage of 28 kV rms for one minute

7.6	Phase identification	Heat shrinkable color PVC sleeves
7.7	Support insulators	Non hygroscopic, non-tracking, epoxy resin cast insulator
8.0	Auxiliary connections	Silver plated, 16 A plug and socket with " necessary Intel1ocks.
9.0	Safety shutters	Automatically operated shutters with facility to lock the busbar and cable side shutters independently. Possibility of independent operation of busbars and cable side shutters may be confirmed.
10.0	Locking facility	1. Special door locking with key. 2. Integral locking facility for carnage position lock
11.0	Accessories with each cubicle	
11.1	Panel illumination lamp with switch	To be provided in metering compartment
11.2	Space heater	240V, AC, 50 Hz heater with thermostat & control switch
11.3	3 pin power socket with switch	To be provided
11.4	Base channels	Base channels as required shall be supplied as part of cubicle for grouting / welding to the plate inserts provided in the floor
11.5	Termination accessories	
		Compression type brass cable glands and tinned copper lugs for HT power, L T power and control cables to be terminated in the panels
11.6	Name plates, inscription plates for components, switches, feeder identifications	As specified
11.7	Flexible copper connections between hinged doors and cubicle for earthing	To be provided
11.8	Breaker accessories visible and accessible from outside with the cubicle door closed	
		-Breaker position visible and accessible TEST / SERVICE
		-Breaker ON/OFF, spring charged
		-Mechanical "trip" push button accessible from outside with panel door closed
		-Mechanical "close" push button accessible only after opening the door
		-Earth switch ON/OFF position
11.1 1	Breaker operation counter	To be provided
11.1 2	Components to be mounted on the front door of cubicle in the relay & metering compartment	Push buttons, control and selector switches (operating height shall not exceed 1800mm), lamps, meters, relays (all as per approved layout).
11.1	-Termination of incomer and	11 kV (E) cable termination with entry from bottom with cable

3	outgoing	sizes as per enclosed single line diagram.
11.1 4	-Termination of control cable	Bottom cable entry at the front / rear side of cubicles with necessary shielding / protection from HT cable termination.
11.1 5	Terminals	LT power, control, CT, DC, AC terminals shall be segregated and identified.
11.1 6	Indication lamps	
	Spring charged, breaker healthy, breaker ON, OFF, TRIP and heater ON.	
12.0	Operational clearances	
12.1	In front for withdrawal of truck	2.0 m
12.2	At the back of the panel	1.0 m
13.0	Minimum safety clearances in air	
13.1	Between phases	127 mm
13.2	Between phase and earth	127 mm
14.0	Control schemes	As per approved drawings of mfr
B	Breaker	
1.0	Type	Vacuum Circuit Breaker
2.0	Rated voltage	12 kV
3.0	Design ambient	45 ⁰ C
4.0	Ratings	
4.1	Rated current in IP 4X enclosure at 45 ⁰ C	630 A
4.2	Symmetrical breaking capacity	18.4 kA (rms) at 12 kV
4.3	Making capacity and dynamic stability rating	46.0 kA peak
4.4	Short time current rating	18.4 kA rms for 3 secs
5.0	Insulation level	
5.1	One minute PF withstand value	28 kV RMS
5.2	1.2/50 microsecond impulse withstand value	75 kV peak
6.0	Operating duty	0-3 min-co-3 min-co
7.0	Total break time	Less than 5 cycles
8.0	Critical current	Shall be restrike free
9.0	Arc extinction medium	Vacuum
10.0	First pole to clear factor	1.5
11.0	Operating mechanism	
11.1	Type of closing	Spring charged, stored energy – manual independent closing

11.2	Method of closing	Manual and motor drive
11.3	Spring charging motor	
	-Rated voltage	230 V, AC
	-Operating voltage	80 -110 % of rated voltage
11.4	Closing coil	
	-Rated voltage	110 V, DC
	-Operating voltage	80 -110 % of rated voltage
11.5	Shunt trip coil	
	-Rated voltage	110 V, DC
	-Operating voltage	50 -110 % of rated voltage
12.0	No. of poles / phase	One
13.0	No. of breaks / pole	One
14.0	Auxiliary contacts	8 NO + 8NC (silver plated contacts)
15.0	Rating of auxiliary contacts	10 A at 240 V AC, 5 A at 110 V DC
16.0	Wiring of auxiliary contacts	All auxiliary contacts shall be wired contacts to terminal block, external to draw out truck
17.0	Test service position of breaker	Without opening the door, Draw out type
18.0	Material of fixed and moving contacts	Silver plated copper fixed and moving contacts with self aligning feature having sufficient contact pressure
19.0	Breaker fully type tested as per	IEC-56-1987 and IS 13118-1991
20.0	Surge diverters in case of VCB's	To be provided as per requirement.
C	Current transformer	
1.0	Type/ratio	Resin cast, bar primary and 75A/5A
2.0	No. of cores, burden, accuracy	2 cores, 15 VA, 5P20 for protection and Class-1.0 for metering
3.0	Short time rating	18.4 kA (rms) for 3 seconds
3.1	Dynamic stability current	46.0 kA peak
4.0	Class of insulation	Class F
5.0	Insulation level	
5.1	Impulse withstand voltage	75 kV peak
5.2	PF withstand voltage	28 kV rms
6.0	Applicable standards	IS 2705
D(i)	Indicating meters	
1.0	Type of meter	Microprocessor based composite digital meter for current, voltage, frequency, power, power factor including energy functions (kWh, kVARh & kVAh) with serial communication port (RS485) for remote data transfer

2.0	Mounting	Flush mounting
3.0	Accuracy class	0.2
4.0	Voltage / current	110 V PT, 5 A CT secondary current
5.0	Range	As specified during drawing approval
6.0	Applicable Standards	IEC 1036,688,359 & 529
D (ii)	Integrating meters	To be provided as a part of item E(i)
E	Auxiliary equipment	
1.0	Protection relays	
a)	Type	Numerical relays with built in protection, control, measurement, event, fault & disturbance recording, monitoring and self diagnosis, display, serial communication and time synchronisation features, draw out type, 110V DC aux. voltage 110 V PT & 5A CT secondary
b)	Mounting	Flush mounting
c)	Voltage / Current	i) Aux voltage 110 V DC ii) 110 V PT & 5 A CT secondary
d)	Applicable Standard	IEC 255 & 529
2.0	Control switches	
	Type & rating	16A, 440V AC, 5A, 110 V DC quick make, quick break, flush mounted stay put / spring return.
	Applicable Standards	IS 4064
3.0	Push buttons	
	a) Type & rating	2A, 110 V DC, 10A, 440 V AC, 1 NO + 1 NC flush mounted
	b) Applicable Standards	IS 1336
4.0	Indicating lamps	110V DC, clustered LED lamp, with series resistors, colored lens, and suitable .for flush mounting. Assembly for bulb IS from the front
5.0	Control circuit protection fuses	Link type HRC fuse with insulating base and holder.
6.0	Control schemes	As per drawings during approval

1.2 TECHNICAL SPECIFICATION

1.2.1 General

The specification covers design, manufacture, inspection and testing at works, packing and forwarding, delivery at site of medium voltage Indoor switchgear (11 kV, 3 phase, 50 Hz, AC).

The switchgear shall comply with latest edition of applicable codes and standards and enclosed specification and drawings. The switchgear shall be factory assembled and fully type tested as per IEC for the following:

- Current rating and fault rating
- Switching capacity
- Insulation level
- Switching over voltages

1.2.2 Type of Gear

The switchgear shall be of metal clad, dead front, air insulated, natural air cooled, fully compartmentalised, fully draw-out, self standing indoor cubicle conforming to IP42 degree of protection. Each cubicle shall be constructed on unit principle each switchboard shall comprise of number of cubicles forming a single continuous board.

It shall be possible to perform all switching operations with door closed. Interlocks required for safe switching, operation and maintenance should be provided wherever possible, mechanical interlocks shall be provided in addition to electrical Interlocks.

1.2.2.1 Cubicle

Each cubicle shall be fully compartmentalised with metallic insulating partitions having separate chambers for main busbars, CTs and cable terminations, switching device, LV chamber for metering, protection and control equipment. The metallic partitions shall be earthed and compartments thus formed shall be dust and vermin proof. This state of the compartments shall be maintained while switching device is in service position.

Pressure relief flaps, which cannot be opened from outside shall be provided to vent upwards in case of arcing faults inside the cubicle To ensure personnel safety, the following conditions shall be met for internal arcing faults Further arcing fault tests shall have been carried out on the cubicles in each compartment as per the relevant IEC standards and the necessary test certificate for the tests shall be submitted along with the offer.

- Correctly secured doors, covers etc., must not open
- Parts that may cause hazard to personnel must not fly-off.
- Earthing connections must remain effective.

LV compartment, switching device and termination compartments shall be segregated from those of adjacent cubicles. Busbar chamber shall be provided preferably with seal-off bushings to segregate busbar chambers of adjacent panels and prevent spread of fire from one panel to the next.

Lockable lift-off type front door shall be provided for switching device compartment. LV compartment shall have independent hinged door with locking facility. Rear side of cubicle shall be provided with hinged doors with locking provision of removable covers with special tools.

All mechanical indications of breaker truck/carriage positions, Breaker ON/OFF/Trip conditions, spring charged indications shall be freely visible from outside Emergency trip pushbutton shall be accessible from outside.

All control switches, indication lamps, meters, protection and auxiliary relays shall be flush mounted on the swing panel of respective LV compartment. Height of operating handles of control switches, push buttons, reset rods of relays shall be less than 1800 mm from floor level of switchgear room

Cubicle shall be suitable for bottom cable entry both for HT power cable and control cables, at the rear side of respective cubicle. However control cable entry can be from the front also.

1.2.2.2 Busbars

Busbars shall be made of high conductivity electrical grade copper Maximum temperature of busbars, joints at rated current shall not exceed the limits specified. Provision shall be made for taking up changes in length of busbars due to change in temperature. Short time thermal withstand capability and dynamic stability of busbars shall be as applicable to the switchboard

Maximum current density at rated current shall not exceed 1.2 Amp/sq. mm for copper busbars. Main busbars shall have same cross sectional area throughout its length and feeder busbars shall be rated correspondingly to feeder rating.

Main and feeder busbars shall be fully insulated (covered) to rated insulation and busbar joints shall be provided with removable insulation shrouds. Entire bus work, shall be supported on resin cast insulators of adequate creepage distance

1.2.3 Circuit breaker

a) The circuit breaker shall be three pole vacuum break, horizontal draw-out type with stored energy, spring charged manual independent closing & shunt trip mechanism.

b) The circuit breaker design shall ensure restrike free operation and have very low value of chopping current under all switching duties, switching surge voltages while switching ON or OFF of low inductive currents, locked rotor currents, capacitive currents etc., shall not exceed 25 PV (Max.) In case switching voltage is more than 2.5 PV, the value shall be indicated in the offer. In case of possibility of high transient voltage, more than 2.5 PV, metal oxide, gapless surge arrestors shall be provided. The breaker with its operating mechanism and surge arrestors shall be suitable for high frequency of operation (switching ON and OFF) and shall be able to operate reliably with a long period of interval between maintenance. Further the surge arrestors shall be provided with pressure relief vents Provision of mechanical indication for the arrestor failure is preferred

In case of switchgear With VCBs, for motor feeders surge diverters shall be provided as part of respective cubicle. Characteristics of surge diverter shall ensure full protection to the switchgear and equipment connected to the system

c) The air clearance between phases and between phase to earth at the breaker incoming and outgoing terminals shall not be less than those indicated in the IECI British Standards, corresponding to the basic insulation level of the circuit breaker or as indicated in the design criteria.

d) In case of breakers with multiple poles in each phase, equal current sharing between poles shall be ensured by means of current balance scheme. Each pole of the phase shall, preferably have rated switching and fault capacity If the poles are not identical, switching sequence shall be accordingly ensured with positive mechanical interlocks.

e) Breakers of same rating shall be identical and interchangeable at site Parts of the breaker required for maintenance, inspection or replacement shall be easily accessible.

1.2.3.1 Operating mechanism

a) All circuit breakers shall be provided with motor operated, spring charged, stored energy, manual independent closing and shunt trip mechanism with built in anti pumping feature and trip operating mechanism conforming to IEC. The shunt trip and closing coil and spring charging motor shall be suitable for AC or DC control supply indicated in design criteria.

In case of circuit breakers serving as motor feeders or substation incoming and bus coupler feeders both AC and DC shunt trip coil shall be provided

b) In case of circuit breakers with more than one operating spring, they shall be so interlocked that the springs are charged to the same extent and the breaker can be closed only if all the springs are charged to the required values.

In the event of manual charging of springs, means shall be provided through a limit switch in the operating mechanism to cut off the electrical circuit of spring charging motor on insertion of the operating lever

c) In order to ensure the reliability and long operating life for the mechanism, the mechanism shall be light, with a high mechanical strength and abrasion resistance to avoid high rate of wear / tear with few components. The number of components in the breaker and operating mechanism shall be kept to a minimum and they shall be designed to be free of undue stresses during normal or short circuit operations. Further they shall endure a high frequency of operations indicated in technical particulars All the moving parts of the mechanism requiring inspection, maintenance and lubrication shall be easily accessible

d) The life of the operating mechanism shall not be less than 10,000 operations.

e) Trip coil shall operate satisfactorily between 50% and 110% of rated voltage while closing coil and spring charging motor shall operate satisfactorily between 80% and 110% of rated voltage

The closing and tripping circuits shall be self opening on completion on their respective functions, irrespective of position of the breaker ON/OFF switch.

f) Mechanical breaker ON/OFF and spring charged indication shall be provided positively coupled to the operating mechanism and visible from the front with cubicle door closed.

Each breaker shall be provided with mechanical trip push button, accessible with door closed.

1.2.3.2 Auxiliary contacts

a. Each circuit breaker shall have required number of auxiliary contacts to control circuit changes for indication, protection, interlocking, supervision, metering and others

All auxiliary contacts shall be positively operated by the main apparatus and all contacts shall be adequate to make, carry and interrupt the currents in their circuits

Minimum of 2NO + 2NC auxiliary contacts shall be available for owner's exclusive use at site. Multiplication of breaker auxiliary contacts shall be avoided. However in case of necessity, electrically reset latched relays shall be used.

Further these contacts shall be available in both test and service positions-

b. Breaker auxiliary contacts available in test and service position and those available in service position only shall be clearly indicated.

c. Normally open and normally closed contacts shall be interchangeable at site

d. All the contacts of relays / control switch / breaker including spare contacts shall be wired up to the terminal block

e. Advance and retard contacts as required by the control circuits shall be provided Contact sequence diagram shall be provided

f. Interlock with door limit switch shall be provided to ensure that the breaker cannot be closed in service position with door open

A readily identifiable mechanical emergency trip device as well as provision for manual charging of springs through the cubicle door shall be provided for each breaker. Further interlock shall be provided to prevent accidental electrical charging of the spring during manual charging.

1.2.3.3 Breaker truck / carriage

a) The Circuit breaker with its control units, operating mechanism, isolating and interlocking gears, auxiliary switches, isolating contacts and wiring shall be carried on a horizontally withdrawable, sheet steel dead front truck! carriage on wheels / guide channels The truck / carriage shall be provided with handles for manoeuring the breaker into position. All Circuit breaker trucks/carriages of same rating shall be identical in all respects and shall be interchangeable at site. Cassette mounted breakers are also acceptable However breaker handling trolley shall be supplied

b) The circuit breaker truck / carriage shall have three clear positions viz. the service position where the control and power terminals of the circuit breaker are engaged; the test position, where the power terminals of the circuit breaker are isolated, while the control terminals remain engaged; maintenance position where both power and control terminals of the circuit breaker are isolated.

The service and test position of the circuit breaker shall be within the cubicle and it should be possible to keep the door closed, with the breaker truck / carriage in either test or service position However, the maintenance position can be with door open

c) The truck movement inside the cubicle shall be within guide ways, on metal / nylon rollers and the movement of the truck shall be smooth and reasonably effortless. At the end of the travel i.e in service position or in test position it shall be ensured that the breaker terminals engage positively. Further mechanical indications shall be provided to be visible from the front of cubicle door for the position of the truck carriage.

d) The truck/carriage shall be provided with locking arrangement for locking them in either test or service position, to prevent movement due to short circuit forces.

e) Spring loaded, sliding earth terminals shall be provided on both sides of the truck / carriage, making positive connection with the earth strip provided with cubicle to ensure that all non current carrying metal parts are securely earthed before moving the breaker truck / carriage to test and service positions The location of the earth terminal shall be such that, it should be first to make and last to break to ensure personal safety All the non current carrying metal parts shall be bonded together and connected to the earth terminal by means of a separate connection. Bolted connections of the frame work of the truck / carriage shall not be used as earth continuity conductors.

f) Interlocks

Mechanical interlocks shall be provided on each truck / carriage to prevent maloperation and in particular to ensure that:

i) The truck cannot be moved in or out of its cubicle with the circuit breaker closed.

ii) The circuit breaker can only be closed when the truck is in one of the three positions i.e the service position, a definitely located test position or fully out of the cubicle in the maintenance position- The necessary contacts for the same shall be provided on the truck/ carnage at these locations

iii) The truck cannot be pushed to service position, if either set of safety shutters is not free and not in its normal closed position.

iv) The truck cannot be pushed to service position without making the connections of control isolating contacts

v) In case of plug and socket connections for isolating contacts, it shall be ensured that the correct sequence of connections is maintained.

1.2..3.4 Isolating contacts and shutters

a) Power isolating contact assembly shall have self aligning silver faced contacts with replaceable fingers or equivalent construction The moving contact shall engage with the fixed contacts through opening in the bus bar and current transformer chambers Each opening shall be covered by vermin proof spring loaded automatic safety shutters. With the safety shutter dosed, it shall not be possible to introduce even small tools such as screwdrivers and complete protection shall be offered against accidental contact with live terminal, in line with protection class of enclosure specified in the design criteria.

b) i) Independently operable, bus bar and cable end shutters shall be provided, operated by the movement of the truck/ carriage, so that when the breaker truck is moved out of service position, the shutters shall enclose the live terminals to prevent inadvertent access to these terminals.. The shutters shall be provided with independent locking arrangement

ii) The shutters shall preferably be of transparent polycarbonate material to enable visual inspection of bus bar terminals and finger contacts with the shutters closed.

iii) Shutters shall be positively operated by the travel of the truck/carriage, each shutter independently of the other

iv) Bus bar shutters shall be labelled to distinguish them from feeder shutters and both shutters shall be independently lockable in the dosed position

1.2..3.5 Auxiliary control connections

The small wiring on each truck / carriage shall be connected to the wiring on its cubicle by means of plug and socket connections or by means of spring loaded sliding finger contacts.

In case of plug and socket arrangement interlock shall be provided so that plug . is removed before the breaker is withdrawn to maintenance position and breaker cannot be moved Into service position without Inserting the plug into the socket. Further there shall be an interlock to prevent improper connections

In case of finger contact arrangement, perfect alignment of male and female contacts shall be ensured and the contacts shall be of high conductivity, electrical grade copper with silver facing Clear distinction shall be made between the contacts, those available in test and service position and those available in service position only

1.2.3.6 Cable termination

a) The cubicle shall be suitable for terminating cables as specified Sufficient space and support arrangements shall be provided for terminating specified number of power cables with bottom / top entry as specified.. If the required number of cable terminations cannot be accommodated in the respective cubicle, additional dummy panel with necessary bus bars shall be provided. Required number of compression type tinned copper lugs shall be provided. Where core balance types CTs are specified, the same shall also be enclosed inside the cubicle

b) Blank G.I gland plates gasketed and bolted to the cubicle for glanding and terminating low voltage control and power cables shall be provided.

c) Double compression type brass cable lands shall be supplied for HT cables and control cables of specified type and size Heavy duty tinned copper lugs of crimping type shall be provided

1.2.4 Instrument transformers

1.2.4.1 Current transformers

a) The instrument and protection current transformers shall be supplied as specified and shall have the ratings, outputs and accuracies as specified or required. The current transformers ratio specified are provisional and are subject to alteration and confirmation later. Where outputs and accuracies are not specified, these shall be such as may be required by the metering or protective circuit in which they are used

b) Separate cores shall be used for metering and protection

c) All current transformers shall be designed to have over current factors to withstand the fault currents of the associated system as applicable to the switchboard.

d) Current transformers used for protection shall have an accuracy limit factor not less than 15. Those used for metering shall have a saturation factor of 5

All current transformers shall have 5 Amp. secondaries and shall be of the air insulated, plain ring type encapsulated in thermal setting resin and with bar primary All CTs shall be mounted in a separate chamber on the fixed portion of the cubicle, on the outgoing side of the circuit breakers, so that circuit breaker, trucks of same rating and of different circuits having different C T ratios, are interchangeable.

Polarity of primary and secondaries of all the CTs shall be clearly marked.

e) Short time thermal rating and dynamic fault cutlet withstand rating of CTs shall match with the switch board rating

1.2.5 ACCESSORIES

1.2.5.1 Relays

1.2.5.1.1 General

a) The application, performance & testing of relays shall comply with IEC 255. All relays shall be flush mounted in dust & moisture proof cases conforming to IP51 as per IEC529 and shall match the appearance of the instruments mounted on the same panel. Each relay shall be identified with relay number indicated in the approved control schemes both on its case and on the draw out part

b) Protective relays shall be of the easy withdrawable type. Trip circuits shall be automatically broken and current transformer secondary circuits shorted, when a relay is withdrawn from its case A marking strip shall be provided in front of each terminal block and a diagram plate at the back of each case to identify connections.

c) Relay contacts shall withstand repeated operation and shall make or break the maximum currents in their circuit without deterioration All spare contacts shall also be wired upto the external terminal blocks in the cubicle

d) Relays shall carry their normal currents indefinitely and such currents as can occur under fault conditions Relay mechanism shall not be affected by vibration or external magnetic fields, which may occur in normal operation

e) All relays shall operate satisfactorily from 50 to 110% of rated voltage

1.2.5.1.2 Protective relays

a) Numerical relays with built-in protection, control, measurement, event fault & disturbance recording, monitoring & self diagnosis, display, serial communication and time synchronisation features shall be used for protection and control The relays shall be complete with all units / interfaces / interconnections required for achieving the above features and ready for connection to "SCADA".

b) Non-directional O/C & E/F relays shall be provided for transformer feeders Directional O/C & E/F relays shall be provided for all other outgoing and incomer feeders. For Directional O/C & E/F relays, it shall be possible to select the direction of operation at site.

c) The relays shall have the following min. functions / features:

i) Protection:

- independent stages of phase over current (50, 51 & 67 for directional relays & 50, 51 for non-directional relays) and earth fault protection (50N, . 51 N & 67N for directional relays, . 50N & 51 N for Non-directional relays).
- 2 thermal OIL thresholds (49).
- 2 UN thresholds (27)
- Circuit breaker failure detection (50 BF).
- Broken conductor detection (BC)
- Lockout feature (self reset / hand reset and software selectable)

ii) Control

- Circuit breaker control from local! remote with local! remote selection through password
- Blocking logic
- Selective relay scheme logic

- Two independent setting groups with provision for switch over from one setting group to another locally & remotely via. a dedicated logic input. All settings to be stored in E²PROM (Non volatile rewriting memory).
- Programmable relay inputs & outputs

iii) Measurement

- Voltage
- Current
- Frequency
- Power factor
- kW
- kVA
- kVAR
- kWh
- kVARh
- Storage of measurements in memory

iv) Event, fault & disturbance recording

- Storage of min. 75 logic events (Change of status, alarms, contact operations etc) time stamped to 1 ms.
- Storage of min. last 5 faults (each with record number, fault time, active setting group, faulted phase, protection operation & magnitude).
- Storage of min. 5 records (voltage & current wave forms distortions)

v) Monitoring

- Circuit breaker status
- Circuit breaker condition
- Trip circuit supervision
- CT & VT secondary circuit monitoring

vi) Self diagnosis

- Automatic tests including power on diagnostic & continuous self monitoring

vii) Display

- 32 alphanumeric back lit LCD in English with key information (status, faults, measurements, settings etc) Menus with pull down structure
- Dedicated LED's to indicate status of relay (trip order, alarms, power on, watch dog etc.)
- Local! Remote acknowledgement of alarm & trip LED's.
- User programmable LED's, . Min 4 Nos.

viii) Communication

- Local & remote ports Front port for local communication and rear port for remote communication
- Remote communication to be based on RS485 voltage levels and suitable for IEC 60870-5-103 protocol.
- Communication parameters to be programmed through HMI front port. Software interface to be Windows last version compatible.
- Key pad on the front panel for easy access by user to any data.
- On line setting change

ix) Other features

- Sampling rate at min. 40 samples per cycle.
- Nos. IEC twice over current curves
- CT inputs
- Same relay to be suitable for 1A & 5A C1; inputs. Separate terminals shall be available for convenient use.
- .4 VT inputs
- Programmable inputs & outputs freely configurable. Atleast two output relays changeover type suitable for trip commands
- Common relay for Wider range of aux Supply voltage
- Password protection for local & remote

- Non volatile memory for lockout state, display state, setting values, recorded events / faults etc
- Inrush current monitoring
- Power quality monitoring
- Software support for setting, measurements, faults, alarms, events, disturbance .records, monitoring & fault analysis
- Time synchronisation.
- Commissioning aids such as connection check, direction determination, status Indication of Inputs/outputs and display of test records

d) Relays which rely for their operation in an external DC supply shall be rated for 110V D.C supply. A separate potential free contact shall be provided for DC supply monitoring and alarm. The signal must be reset and the relay made automatically ready for service when the supply returns. DC/DC converters shall provide galvanic isolating between the internal static circuits and the external station battery circuits. An integrated DC voltage buffer shall ensure uninterrupted performance of the relays in case of DC voltage interruptions" 50 ms.

e) For integration into a numerical coordinated substation automation system through SCADA, relays shall be provided with necessary serial interfaces / communication modules / accessories. These interfaces/modules/accessories shall be wired up to the protective relays and shall be suitable & ready for connection to substation automation system / SCADA. Interfaces & protocols shall be unified to ensure compatibility between different manufacturers.

Communication shall use the standard protocol IEC 60870 -5 -'103. Interfaces must comply with the requirements of DIN VDE 0435 Part 303 with respect to the insulation and interference values given for circuits which are connected to external terminals The "interference radiation test" and 'test with electrostatic discharge (ESD)" and the "fast transient disturbance test" must be observed The necessary measures may also be fitted in the plug module of the corresponding interface

f) Numerical relays shall be interrogated both from an integral keypad! HMI and from the serial port. Relay settings / resetting shall be possible from relay front as well as from remote. On line setting shall be possible with out affecting the relay operation & performance Selection of indications in the display must be possible, on the relay and from remote For setting and interrogation of the set values, relay must have integral operating elements These functions must be possible without reference to the handbook, menu guided or sufficient instructions on the relay Input which

are outside the design range must be rejected. Design must prevent accidental or careless alteration of set values, e.g. a password High level of security must be built in the relay to avoid maloperation causing over protection of the system or any no operation of the relay causing under protection.

g) Provision must be available which will allow information to be interrogated from serial ports (for off-line PCs and on-line central, units). Scope of data dependent on protection type and application, e.g: System fault reporting Fault records, Status indications, Relay monitor, Line parameters, Setting values

h) Reference list and performance certificates from minimum 2 customers for the protective relays shall be furnished.

i) Copies of type tests conducted on the relays as per relevant Indian / International standards shall be furnished.

j} The vendor shall ensure availability of spare parts & maintenance support services for the relays for at least '10 years from the date of supply

1.2.5.1.3 Auxiliary Relays

Required no. of auxiliary relays shall be provided for achieving various interlocks as per approved drawings.

1.2.5.2 Indicating / Measuring instruments

1.2.5.2.1 Microprocessor based composite digital meters incorporating the features of indicating instruments and integrating meters shall be provided for 11 kV switchgear panels as shown in the single line diagram. The meters shall be capable of simultaneously measuring, displaying & communicating various electrical parameters.

1.2.5.2.2 The meters shall be suitable for 110 V, 50Hz PT supply and 5A CT secondary as shown in single line diagram. The aux Power supply shall be 110 V DC

1.2.5.2.3 The meters shall be of modular construction, 96mm x 96mm size in IP 54 enclosure.

1.2.5.2.4 The accuracy of meters shall be 0.2 and shall be true RMS type

1.2.5.2.5 Separate ports shall be available for local & remote communication Local communication shall be through HMI / Lap Top / Local PC The remote communication shall be based on RS 485' voltage levels and port shall be available for IEC60870-5-103 protocols. All necessary interfacing & wiring shall be provided making the meters ready for connection to sub-station automation system / SCADA.

1.2.5.2.6 Password protection shall be provided.

1.2.5.2.7 The following parameters shall be measured, displayed & communicated

- Voltage
- Current
- Frequency
- Power factor
- Active power (kW)
- Reactive power (kVAR)
- Apparent power (kVA)
- Active energy (kWh)
- Apparent Energy (kVAh)
- Reactive energy (kVARh)
- Max. Demand
- CT ratio
- PT ratio

1.2.5.2.8 The meters shall confirm to IEC 1036, IEC 688, IEC 359 & IEC 529

1.2.5.2.9 Meter shall also have the necessary software for predictive demand forecast and alarm by means of potential free arrangement shall be provided in order to prewarn for the demand being exceeded to enable load shedding when required

1.2.5.3 Control switches

1.2.5.3.1 All circuit breaker operating switches shall be of the pistol grip type, spring return to neutral and lockable in that position. They shall be arranged to close the breaker by being turned clockwise. The trip neutral and close positions shall be clearly indicated. The movement shall be such that the switch cannot be operated inadvertently and U1at it is mechanically interlocked to trip before close

1.2.5.3.2 Control switches shall be suitable for use in DC circuits up to 110V and AC circuits up to 440V. The switch shall have break rating of 5A at 110V DC and 16A at 440V AC. Where required, the switch shall have lost motion device. However, as a minimum one no. NAC and one no. NAT may be considered for the breaker control switch

1.2.5.3.3 Switches for any purpose other than circuit breaker operation shall be of a different design. Local remote control switches shall be stay put type, lockable in any position The switch shall be quick make, quick break type.

1.2.6 Wiring and ferrules

1.2.6.1 All control wiring shall be carried out with 1100 volts grade single core wires having stranded copper conductor of 2.5 sq.mm and power control shall be carried out with 4 sq mm minimum. The wire shall be insulated with fire resistant material HP- PVC-105 deg.C or equivalent approved by engineer

1.2.6.2 All control wiring shall be terminated using eye type tinned copper lugs on to the stud type terminals More than two wires shall not be terminated onto a single terminal.

1.2.6.3 All holes or tubes for wiring runs shall be bushed and shall have room for reasonable future additions.

1.2.6.4 Control cables when laid in HT busbar chamber, cable shall be taken through PVC conduits. No joints or tees shall be made in wires between terminals. The wire shall be identified by numbered ferrules at each end, all in accordance with the connection diagram, equipotential terminals shall have the same ferrule numbers.

1.2.6.5 All ferrules shall be made of non-deteriorating materials. They shall be white except in case of warning ferrules, which shall be red. Ring type ferrules shall have the character engraved on it. The ferrules shall be firmly located in each wire so that they cannot move freely on the wire. Wiring across hinges shall be by flexible wires. Further interlocked terminals shall be used for multiple ferruling.

1.2.6.6 The color code for control wiring shall be as enumerated below

- a) Spring charging motor and metering circuits- Black
- b) Closing, tripping, protection relays and main power supply circuits -Red.
- c) Annunciation and indication circuits -White

Alternatively colored sleeves may be provided as above at terminal connections.

1.2.7 Control circuit protection

1.2.7.1 All incoming control and power circuits shall be fed through isolating ON/OFF rotary switch and HRC fuses. Closing circuit, tripping and control circuit, lamp circuit shall be segregated and protected by independent fuses.

1.2.7.2 All fuses shall be HRC fuses with insulating base and holder All fuses shall be easily accessible by standing on the floor. Supply side shall be connected to the bottom of the fuse which shall be shrouded and the local circuit shall be taken from the top All fuses fittings shall be of same make Fuse ratings shall ensure protection coordination.

1.2.8 Inscriptions

1.2.8.1 Each unit and each component shall be clearly labeled to indicate its purpose

1.2.8.2 Owners name plates at front and back of each cubicle shall be engraved on white back ground with black lettering of 10mm size.

1.2.8.3 Each component label shall include the component symbol shown on the connection or schematic diagram.

1.2.8.4 All components mounted inside the cubicle shall be provided with screwed inscription plates

1.2.8.5 The characters to be engraved on the cubicle labels shall be furnished at a later stage

1.2.9 Earthing .

1.2.9.1 Two earth terminals shall be provided on each switch cubicle, at the back near the floor An earth bus of adequate cross section shall be fixed to these terminals The earth bar shall be electrically continuous and shall run the full extent of each board The earth bar shall be of same material as the busbars and shall have a minimum cross section of 300 sq mm copper Each unit shall be constructed to ensure satisfactory electrical continuity between all metal parts not intended to be alive and the earth terminals of the unit.

1.2.10 Painting

The switch unit cubicle shall be finished with approved color shade shall be Siemens Grey RAL 7032 Breaker truck to have same colour as cubical The sheet metal parts shall be subjected to following pre- treatment before final painting including the seven tank pre-treatment

- a) Degreasing
- b) Pickling for complete rust removal
- c) Phosphating
- d) Corrosion resistant primer painting. Two final coats spray painting shall be given.

Considering the chemically corrosive atmosphere at the location, Epoxy based primer! paint shall be used Further electrostatic powder coating is preferred..

1.2.11 Special tools

The switch board shall be supplied with a set of special tools required for its normal operation and maintenance.

1.2.11.1 Removable handles for charging the spring by hand in case of emergency, shall be provided Minimum 2 nos shall be supplied per switch board

1.2.12 Testing and commissioning

Each cubicle and switchboard shall be tested at works and at site as specified in 1.2.14.1.

1.2.13 Drawings

1.2.13.1 The following drawings / documents shall be submitted for approval after award of contract. Copies of approved drawings along with reproducible shall be furnished at the time of supply of equipment In case testing and commissioning is carried out by the supplier/contractor in lieu of final drawings.. as built drawings incorporating site modifications along with reproducible shall be furnished No. of copies and distribution of copies shall be as specified.

- Type test certificates and technical details of breakers, cubicles being supplied
- Type test certificates and Technical details of CTs, PTs being supplied
- Dimensional GA drawing of HT switchgear indicating foundation details, cable gland plate location for each cable
- Cross sectional drawing of cubicle indicating bus bars, CTs, cable, breaker, seal-off bushing, I V chambers etc
- Details of bus bar such as material, sizes, clearances, insulation details etc.
- Front view of the switchboard indicating arrangement of relays, controls, operating heights.
- Control schemes of each incomer / outgoing / feeder / breakers with complete bill of materials.

- Terminal plan and internal wiring drawings of all the cubicles.
- Inter panel wiring drawings.
- External wiring drawings.
- Excitation characteristics of protection CTs with specification.
- Operating and maintenance manuals.
- Catalogues, wiring diagrams, operating and maintenance instructions of relays, meters. However item Sl.Nos. a, b, d, g shall also be supplied along with the offer.

1.2.14 Tests

The following tests shall be conducted as per relevant IEC/IS standards and test certificates shall be furnished.

1.2.14.1 Switchgear

1.2.14.1.1 At works

- a) Dielectric test on the main circuit..
- b) Dielectric test on control and auxiliary circuits.
- c) Measurement of the resistance of the main circuit.
- d) Mechanical operation test.
- e) Tightness test..
- f) Design, functional & visual checks.

1.2.14.1.2 At site

- a) Di-electric test on the main circuit..
- b) Di-electric test on control and auxiliary circuit.
- c) Measurement of resistance of main circuit.
- d) Physical inspection

1.2.14.2 Current transformers

1.2.14.2.1 At works

- a) Ratio test
- b) Verification of terminal making and polarity.
- c) Accuracy class test.
- d) Power frequency high voltage test for 1 minute
- e) Measurements of knee point voltage and secondary winding resistance
- f) Insulation resistance test
- g) Physical inspection as per the approved drawings

1.2.14.2.2 At site

- a) Ratio test
- b) Measurement of terminal marking and polarity
- c) Measurement of knee point voltage and secondary winding resistance
- d) Power frequency withstand test for one minute along with switch board
- e) Insulation resistance test if required.
- f) Physical inspection as per approved drawing ~

2.0 DISTRIBUTION TRANSFORMER

2.1 OIL TYPE TRANSFORMER.

2.1.1 DESIGN CRITERIA

2.1.1.1.3 3 phase power supply system in which transformer is to be used

- a) Primary side (HV) max voltage 12kV
- b) System earthing Secondary Neutral Solidly earthed
- c) Max. Fault level on primary side (HV) 350 MVA RMS

2.1.1.2 Direction of power flow Unidirectional

2.1.1.3 Transformer application Industrial distribution

2.1.1.4 Transformer type

- a) Indoor/ outdoor Outdoor
- b) Dry type/liquid filled Mineral oil filled Mineral Oil filled
- c) Core type/shell .type Core type

2.1.1.5 No.of windings Two winding

2.1.1.6 Number of phases Three

2.1.1.7 Rated frequency 50 Hz

2.1.1.8 Rated no load voltage

- a) HV winding 11kV
- b) LV winding 0.433 kV

2.1.1.9 Cooling

- a) Cooling liquid Mineral oil
- b) Method of cooling ONAN

2.1.1.10 Rated kVA at no load voltage and principle tap 1000 kVA as specified

2.1.1.11 Ref. IS and whether over loading as per IS 6600-1972 required Ref. IS 2026-1977 over loading required

2.1.1.12 Max Temp.rise at rated kVA and principle tap

- a) Top oil by thermometer method over design ambient temp of 45Deg C 450 C
- b) Any winding (HV & LV) by resistance method over design ambient temp of 45°C 550 C
- c) Hot spot temp. based on the design ambient of 450 C 1050 C

2.1.1.13 Percentage impedance voltage at rated 4.75% current, frequency, principle tap and 75°C

2.1.1.14 Tappings

- a) Off-circuit/ON load Off circuit
- b) Manual/automatic Manual
- c) No of steps +5%, +2½%, 0, -2½%, -5%, -7.5 %
- d) Percentage variation/step 2½%
- e) Winding in which tappings are required HV

2.1.1.15 Short circuit withstand capability of transformer on any tapping for 3 phase and line to ground faults across LV winding Not less than 3 sec

2.1.1.16 Insulation

- a) One minute power frequency withstand voltage HV winding 28 kV RMS

LV winding 2.5 kV RMS

b) 1 2 x 50 micro second impulse withstand voltage level

HV winding 75 kV Peak

LV winding

c) Induced over voltage withstand

HV winding kV(RMS) As per IS 2026 Part III

LV winding KV(RMS) -do-

d) Insulation material Class 'A'

21.1.17 Winding insulation category

a) HV -uniform / non uniform uniform

b) LV –uniform/ non uniform uniform

2.1.1.18 Winding data

a) No.of windings Two

b) Winding material Copper

c) Winding connection

HV winding Delta

LV winding Star with neutral brought out fully insulated for connection to earth

d) Vector groups (HV-LV) Dyn 11

2.1.1.19 Core laminations

a) Type CRGO

b) Material Silicon steel

c) Thickness, mm 0.3

2. 1.1.20 Noise level in dB scale when measured Not more than 5 db above N EMA 4ft.from the transformer edge at a height of Standard publication TR-1 and 5ft. above the floor at rated voltage and load

2.1.1.21 Bushings

a) Line bushing HV Porcelain, 3 Nos.

LV Porcelain, 3 Nos.

b) Neutral bushing HV LV 2kV, 2 Nos.

c) Current rating in Amps HV 100 A

LV 2500A for 1000kVA

d) Creepage distance Not less than 31 mm/kV of rated voltage of the bushing.

f) Short time rating As applicable for transformer.

2.1.1.22 Terminal arrangement

High voltage Cable end box with air insulated disconnect chamber for cables

Low voltage Cable end box with provision for bus ducting

2.1.1.23 Radiators

Welded / detachable Detachable with shut off valves and air release plugs.

2.1.1.24 Fittings & accessories

- a) 150 mm dial type oil temp. indicator with max. reading pointer and with 2 sets of independently adjustable potential free N 0 contacts for alarm and tripping.
- b) 150 mm dial type winding temperature indicators with features same as OTI.
- c) Double float buchholz relay with potential free alarm and trip contacts, connecting pipe, isolating valves on tank side and conservator side
- d) Double diaphragm explosion vent
- e) Dehydrating breather with silica gel and oil seal.
- f) Radiators with top and bottom stop valves and drain and air release plugs.
- g) Conservator with sump and drain valve with cover plate and oil filling hole with cover plate and oil level indicator
- h) Marshalling box
- i) Air release plugs on tank cover and on radiator banks
- j) Valves with cover plates.
 - Top and bottom sampling valves.
 - Top and bottom filter valves.
 - Drain valve
 - Residual drain plug
 - Shut off valves on radiators
- k) Jacking pads and towing lugs
- l) Lifting lugs
 - For tank cover
 - For core and winding
- m) For complete transformer with oil Grounding pads
- n) Magnetic oil level gauge with alarm contact
- o) HV Cable end box with air insulated disconnect chamber
 - LV Cable end box and separate LV neutral bushing for earthing with provision for bus ducting
- p) Rating and diagram plates, identification plate
- q) Removable bi-directional rollers
- r) Inspection opening with covers
- s) Necessary Double compression cable glands and tinned copper lugs

2.1.2 TECHNICAL SPECIFICATION

2.1.2.1 General

This specification covers design, manufacture, inspection and testing at manufacturer's/their sub- supplier's works, packing and forwarding, delivery at site of oil type distribution transformers conforming to this specification and enclosed design criteria. Tenderer shall furnish data of the equipment offered along with the tender as required under questionnaire.

2.1.2.2 Transformer rating and over loading

- a) Transformers shall be capable of delivering the rated current at a voltage equal to 105 percent of the rated voltage, without exceeding the temperature limits specified for oil, winding and hot spot.
- b) Transformers shall operate satisfactorily without injurious heating at rated kVA, at any voltage with in 10% of the

rated voltage of the particular tap.

- c) Transformer shall be designed for 50 Hz :t 3% unless specified otherwise..
- d) Transformers for two or more limits of voltage or frequency or both shall operate satisfactorily at its rated kVA with out injurious heating under all the rated conditions of voltage or frequency or both provided an increase in voltage is not accompanied by decrease in frequency
- e) Transformers shall be suitable for over loading as per IS 6600 Unless specified otherwise off circuit tap switch, terminal bushings, other auxiliary components/equipments shall be designed for maximum permissible overloading. Short time over loading to the extent of 50% shall be considered for this purpose, for all transformers, unless specified otherwise
- f) Hot spot temp specified in the data sheet shall be based on design ambient temp.

2.1.2.3 Short circuit withstand capability

Transformers shall be capable of withstanding thermal and mechanical stresses during 3 phase, line to line, double line to earth and line to ground dead short circuits at the transformer terminals, for a period specified, without any injury Temp.. of the windings prior to the short circuit shall be considered as max permissible value in the normal operation. For this purpose, infinite supply system and solidly earthed systems shall be considered.

2.1.2.4 Vibration and noise level

Design and manufacture of transformer shall be such as to reduce noise and vibration level, The noise level shall not be more than 5 dB above NEMA standard publication TR-1,

2.1.2.5 Harmonics

The transformer shall be designed with particular attention to the suppression of harmonics, especially the third and fifth

2.1.2.6 Flux density

- a) The max flux density in any part of the core and yokes., at normal voltage and frequency, shall be such that the flux density under over voltage condition as per clause no 2.1 22 a to d shall not exceed the max permissible values for the type of laminations used and core construction adopted.
- b) Transformer shall be designed to withstand the following over fluxing conditions, 110% of max.flux density continuous (corresponding to rated voltage.)140% for 5 seconds and 125% for 1 minute

2.1.2.7 Magnetic circuit

- a) The cores shall be constructed from high grade, low loss, high permeability cold rolled non-ageing grain oriented silicon steel laminations. Thickness of laminations shall be 0.3 mm or less, Surface insulation of laminations shall be rust resistant and have high inter laminar resistance insulation shall withstand annealing temperature as high as 850 degrees centigrade, The insulation shall be resistant to the action of hot oil. The insulation structure for the core to bolts and core to damp plates shall be such as to withstand a voltage of 2000V AC for one minute.
- b) Whenever the CRGO sheets are punched or sheared into laminations, laminations shall be annealed in a non oxidizing atmosphere to relieve stresses and restore the original magnetic properties of CRGO sheets. The laminations shall be free of all burrs and sharp projections
- c) The design of magnetic circuit shall be such as to avoid static discharges, development of short circuit paths with in itself or to the earthed damping structure and production of flux components at right angles to the plane of the laminations which may cause local heating

- d)** Oil ducts shall be provided where necessary to ensure adequate cooling The winding structure and major insulation shall not obstruct the free flow of oil in such ducts
- e)** All steel sections used for supporting the core shall be shot or sand blasted after fabrication.
- f)** The finally assembled core and coil assembly shall be rigidly fixed to the tank to avoid shifting during transport, handling and short circuits Adequate provision shall be made for lifting the complete core and coil assembly.
- g)** The supporting frame work of the cores shall be so designed as to avoid the presence of pockets which would prevent complete emptying of the tank through the drain valve, or cause trapping of air during filling.

2.1.2.8 Windings

- a)** Transformers shall be suitable for isolated/non- effectively earthed neutral system as specified.
- b)** The coil clamping arrangement and the finished dimensions of any oil ducts shall be such as not impede the free circulation of oil through the ducts.
- c)** The windings/and connections of all transformer shall be braced to withstand shocks which may occur during transport or due to short circuits, repeated peak loads and other transient conditions during service
- d)** Windings shall be subjected to a shrinkage treatment before final assembly, so that no further shrinkage occurs during service. Adjustable device shall be provided for taking up any possible shrinkage of coils in service
- e)** The conductors shall be transposed at sufficient intervals in order to minimise eddy currents and equalise the distribution of currents and temperature along the windings
- f)** Coil clamping rings shall be of steel or of suitable insulating material. Axially laminated material other than bakelised paper shall not be used.
- g)** Completed core and winding assembly shall be dried in full vacuum to eliminate presence of moisture. After drying process, the full assembly shall be impregnated with oil immediately
- h)** No strip conductor wound on edge shall have a width exceeding six times its thickness.
- i)** The winding material shall be copper.
- j)** Windings shall not have sharp bends, which might damage insulation and/or produce dielectric stresses.
- k)** Coil shall be supported using dried and high pressure compressed wedge type insulation spacers at frequent intervals.
- l)** All insulating materials used shall be compatible with transformer oil, under all service conditions.
- m)** All threaded connections shall be locked. Leads from the winding to the terminal board and bushings shall be rigidly supported to prevent injury during short circuits/vibration.
- n)** Permanent current carrying joints in the windings and leads shall be welded or brazed
- o)** Clamping bolts for current carrying parts inside the transformer shall be compatible with oil under all service conditions. specified, to be lifted by cranes or jacks, transported by road, rail or water without over straining any joints and without causing subsequent leakage of oil

2.1.2.9 Tap changer

- a)** Tap changer Tappings as specified shall be provided on the higher voltage winding of each transformer and shall be arranged so as to maintain as far as possible the electromagnetic balance of the windings
- b)** Tap changer shall be manual off circuit tap changer with no of steps and percentage variation per step as indicated is design criteria.

2.1.2.10 Oil

All transformers and all associated oil filled equipment shall normally be supplied along with first filling of oil and 10% excess quantity of oil shall also be supplied in non-returnable drums The oil shall conform to IS-335.

2.1.2.11 Transformer cooling

a) Radiators

i) Transformers shall have detachable type directly mounted radiators unless specified otherwise

ii) Bolted, gasketed, and flanged connection shall be used for connecting the radiators to the tank. All radiators shall be detachable type and shall be provided with machined or ground flanged inlet and outlet branches.

iii) Separately mounted radiator banks if specified shall be connected to the tank by flanged pipe connections It shall be possible to withdraw the transformer from service position without disturbing radiators Shut off valves blanking plate, drain plug, air release vents, shall be provided in each interconnecting pipe.

iv) Accessories

The following accessories shall be provided for each Radiator / Radiator bank Top and bottom shut off valve and blanking plate.

-19 mm dia bottom drain plug and 19mm dia top filling cum air release plug.

-Lifting lugs

-Thermometer pockets in the inlet and out let pipes with thermometers fitted, (in case of separately mounted radiator banks)

-Top and bottom filter valves for each separately mounted radiator bank.

2.1.L12 Tank

a) Tank shall be made from high quality low carbon steel and shall be oil tight welded construction.

b) The tanks of all transformers shall be complete with all accessories and shall be designed so as to allow the complete transformer filled with oil, where oil.

c) Fully assembled transformer together with its radiators, conserva10r and other fittings shall withstand for one hour, a pressure corresponding to twice the normal head of oil or 10 the normal pressure plus 35 kN/m2(5 lb/in sq) whichever is higher. measured at the base of the tank. The permanent deflection after the excess pressure has been released, shall not exceed the following.

Horizontal length of Permanent
flat plate (mm) deflection in mm

upto and including 750 5.0

751 to 1250 6.5

1251 to 1750 8.0

1751 to 2000 9.5

2001 to 2250 11.0

2251 to 2500 12.5

2501 to 3000 16.0

Above 3000 19.0

d) The base of each tank shall be so designed that it shall be possible to move the complete transformer unit by skidding in any direction without injury when using plates or rails.

e) Tank cover shall be of adequate strength and shall not distort when lifted. Inspection openings shall be provided as necessary to give easy access to bushings, testing earthing connection without removing tank cover. At least two openings of adequate size shall be provided at each end of the tank. Inspection covers shall have lifting arrangement and weight shall not exceed 25 kg

f) Tank covers shall have pockets for bulbs of oil and winding temperature indicators wherever specified, thermometer pockets shall have captive screwed top to prevent ingress of water. The pockets shall be located in the position of maximum oil temperature and it shall be possible to remove the instrument bulbs without lowering the oil in the tank

2.1.2.13 Lifting and haulage facilities

Lifting lugs shall be suitable for lifting the transformer with oil. Minimum of 4 jacking lugs, in accessible positions shall be provided to raise or lower the complete transformer with oil using hydraulic or screw jacks. Minimum height of the lugs above base shall be 300 mm excluding under base dimensions if detachable, for transformers up to 10 T weight and 500 mm for transformers above 10 T. Transformer shall be provided with detachable, bi-directional flanged wheels or rollers as specified. Means shall be provided for locking the 90 degrees swivel movements in positions parallel to and at right angles to the longitudinal axis of the tank. Wherever specified, flanged wheels shall be provided suitable for use on gauge track as specified

2.1.2.14 Terminations

a) Cable end boxes shall be provided for terminations of cables.

b) The cable box shall be air insulated type suitable for the type and number of cables specified. The size of cable box shall meet the minimum dimensional requirement of cable termination. Double compression type brass cable glands and tinned copper lugs shall be supplied. Cable boxes shall be air insulated type with clearances as specified. Further, air insulated disconnecting chamber shall be provided with inspection opening. Transformer may thus be withdrawn from its pen without disturbing cable connection. The gland plate shall be bolted type and shall be sufficiently big to remove the trifurcated cable from the cable box, without damaging the terminations

c) Cable sealing kits of specified type along with associated accessories like stress relieving cones, insulating tapes, trifurcating boot, HT insulating paste etc. shall be supplied along with transformer.

2.1.2.15 Bushings

a) Electrical characteristics of bushings shall be in accordance with 15-3347 and 15-2099. Minimum rated current of the line end bushing shall be 1.5 times the rated current of the corresponding winding. Where repeated peak loads are specified, bushing rating shall be selected accordingly.

b) Oil communicating type bushings shall be used for voltage ratings upto 36 kV. Oil used in bushings shall conform to 15-335.

c) Oil gauge shall be provided when oil in bushings is not in communication with that in the transformer

d) Clamps and fittings made of steel or malleable iron shall be hot dip galvanized. Bushings rated more than 400A shall have non-magnetic clamps and fittings only.

e) Clearances in air between live conductive parts and live conductive part to earthed structure shall be as follows:

Nominal Impulse Clearances

system voltage	test voltage	phase to phase	Phase to earth
kV RMS		(mm)	(mm)
11	75	280	140

- f) For altitude exceeding 1000m above sea level, the clearance should be increased by 3% for every additional 300m
- g) Bushings shall be suitable for atmosphere present in the place of installation.

2.1.2.16 Conservator

- a) Conservator shall be located in such a position as not to obstruct the electrical connections to the transformer. The conservator volume shall be sufficient to maintain the oil seal from ambient temp. of 5 degrees centigrade to oil temp of 90 degrees centigrade, with oil level varying within min. and max. levels.
- b) Prismatic type oil level gauge with min. and max. levels marked shall be provided. Taps or valves shall not be fitted to the oil gauge.
- c) Drain valve shall drain completely. One end of conservator shall be bolted into position so that it can be removed for cleaning purposes. If the sump is formed by extending the feed pipe into the conservator vessel the extension shall be for atleast 25 mm Oil filling hole with cap shall be provided
- d) A silica gel breather with inspection window and oil seal shall be mounted at 1.4 meter above transformer base and connected to the conservator.

2.1.2.17 Buchholz Relay

- i) Double float relay as per IS 3639
- ii) 25 mm diameter connecting pipe
- iii) Shut off valves on either sides of the buchholz relay
- iv) Pot cocks at the top and bottom of relay, drain plug, inspection window, calibrated scale, terminal box with oil tight double compression type brass gland.
- v) Potential free, self reset independent alarm and trip contacts rated to make, break and carry 2 amps at 110V DC. No auxiliary relay shall be used to multiply the contacts. Contacts are to be wired to the marshalling box

2.1.2.18 Valves and connections

All valves shall be of gun metal/cast steel, full way type with internal screw and shall be opened by turning counter clockwise when facing the hand wheel All valves opening to atmosphere shall be fitted with blank flanges. Means shall be provided for padlocking the bottom valves in open and closed position. All valves shall be provided with an indicator to show clearly the position of the valve. Oil sampling valves shall be provided at top and bottom of the main tank and these shall not be fitted on the filter valves. All transformers shall have bottom drain valve, top and bottom filter valves suitable for connecting to oil filtration unit

2.1.2.19 Joints and gaskets

All gaskets used for making oil tight joints shall be of proven material such as granulated cork-bonded synthetic rubber or synthetic rubber gaskets compatible with oil.

2.1.2.20 Explosion vent/ pressure relief device.

- a) Pressure relief device provided shall be of sufficient volume for rapid release of any pressure that maybe generated within the tank and which might result in damage to the equipment. The device shall operate at a static pressure of less than the hydraulic test pressure for transformer tank. Means shall be provided to prevent ingress of rain water.
- b) The relief device shall be mounted on the main tank and if on the cover shall be fitted with skirt projecting 25mm inside the tank and of such a design to prevent gas accumulation.
- c) If diaphragm is used, it shall be of double diaphragm type and material and situated above max oil level.

d) The equaliser pipe connecting the pressure relief device and conservator shall be provided for relieving or equalising the pressure in the pressure relief device

2.1.2.21 Thermometer

a) 150 mm dial type top oil, thermometer and winding temperature indicator for the I V windings shall be provided for all transformers.

b) Each thermometer, shall have potential free N.D alarm contact and trip contact No multiplying contactor / relay shall be used Temp. setting of each contact shall be independently adjustable at site. A manual reset type max.temp indicator shall be provided for each thermometer Each winding temp indicator shall have temp sensing element, image coil and bushing mounted current transformer.

c) Each thermometer shall be provided with remote temp. indicator along with associated accessories. The remote temp. indicators shall be connected to the marshalling box.

d) All contacts shall be rated to make 1A and break 0.5 A at 110V DC. All contacts shall be wired to marshalling box

e) In addition to the above winding temperature indicators controllers shall be provided, for control of forced cooling system of the transformer

2.1.2.22 Local Control Boxes

a) Sheet steel of 3 mm thick/cast aluminium enclosed, transformer mounted, outdoor weather proof marshalling box conforming to IP-55 enclosure shall be provided for auxiliary equipment of the transformer

b) Marshalling box shall accommodate temp indicators & controllers, terminal blocks made up of molded, non inflammable plastic material with adequate size terminals, washers, binding screws / nuts for external wire connections, white marked strips for circuit identification and molded transparent plastic cover.

c) Space heaters with temp. controller, illuminating lamp and toughened glass windows shall be provided.

d) Suitable brass glands & gland plates for terminating incoming and outgoing cables etc shall be provided in each box. All auxiliary equipment, protection and signaling contacts shall be wired to these transformer-mounted cabinets.

2.1.2.23 Earthing arrangements

a) All metal parts of the transformer with the exception of individual core laminations, core bolts and associated individual clamping plates shall be maintained at some fixed potential by earthing. The main tank top cover shall be provided with min. 2 Nos. tinned copper terminals for earthing Two nos earthing pads at diagonally opposite external ends of main tanks at its bottom, capable of carrying short circuit current for 3 seconds without injurious heating shall be provided with clamp type terminal for external connection. In addition, HV & LV cable boxes shall be provided with 2 Nos. tinned copper stud type terminals for earthing

b) Core clamping structure earthing

The top main core clamping structure shall be connected to the tank body by a copper strip of adequate cross section. The bottom clamp structure shall also be connected to the tank by one or more of the following methods.

i) By connection through vertical tie rods of the top structure.

ii) By direct metal to metal contact with tank base maintained by the weight of the core and windings.

iii) By connection to the top structure on the same side of the core as the main earth connection to the tank.

c) Earthing of coil clamping rings

Where coil clamping rings are metal at earth potential, each ring shall be connected to the adjacent core clamping structure on the same side of the transformer as main earth connections.

d) Earthing of magnetic circuit

Magnetic circuit shall be earthed at one point only. This shall be brought out of the tank cover through a suitably rated bushing and earthed through a removable link. This bushing shall be clearly identified with inscription plate. When the magnetic circuit is divided into pockets by cooling ducts parallel to the planes of laminations or by insulating material above 0.25 mm thick, tinned copper strip bridging pieces shall be inserted to maintain electrical continuity between pockets.

e) Size of Earth connection

All earth connections, except those from the individual coil clamping rings shall be done by copper conductor with min cross section of 80 sq.mm copper. Connections inserted between laminations of different sections of core shall not be less than 20 sq.mm.

2.1.2.24 Fittings and Accessories

Transformer shall be provided with fittings and accessories as specified in design criteria

2.1.2.25 Tests

a) Routine tests:

All the transformers shall be subjected to the following routine tests at the manufacturer's works. Test procedures as specified in 15-2026 shall be adopted.

i) Transformers shall be fully assembled with all fittings and accessories including I wheels to ascertain that all the parts fit correctly.

ii) Resistance of each winding of each phase at principal tap and at all other taps.

iii) Voltage ratio at all taps.

iv) Checking of voltage vector relationship.

v) Impedance voltage at rated frequency and principal tap, lowest and highest taps.

vi) Load loss at rated current.

vii) Zero sequence impedance at principal tap rated frequency.

viii) No load loss and no load current at rated frequency and 100%, 110%, of rated voltage on HV side. Test shall be repeated with 415 V, 3phase supply connected to LV side (if the LV side rated voltage is more than 415V).

ix) One minute power frequency withstand voltage test. x) Induced over voltage withstand test.

xi) Calibration of winding and oil temp. indicators.

xii) Following tests shall be conducted on oil samples drawn from transformer tank.

-break down voltage

-tan delta

-water content

-acidity

xiii) Fully assembled transformer with all fittings and accessories including conservator, radiators shall be subjected to a pressure corresponding to twice the normal head of oil or to the normal pressure plus 5 lb/sq.in, whichever is lower, measured at the base of the tank and shall be maintained for one hour.. Oil leakage shall not occur. Permanent deflection in flat plates shall not exceed the values specified.

xiv) Measurement of noise level at rated voltage and rated current.

Type test: Copies of type test conducted as per IS 2026 shall be furnished for one transformer of each rating.

2.1.2.26 Drawings

The following drawings shall be submitted for approval.

- a)** Dimensional GA drawings of transformer indicating maximum limiting over all dimensions, location of fittings and accessories, weights, shipping dimensions, accessories dismantled for transporting, dimensions of wheels/rollers, details of cable end boxes, clearances and insulation levels, bushing details etc.
- b)** GA drawing, terminal plan, wiring diagram, front view of marshalling box.
- c)** Rating and diagram plate: Specification, excitation characteristics, and terminal plan of bushing CT's. GA drawing of HV, LV, and neutral bushings with specification Manufacturer's catalogues for all relays, WTI with repeater dial, OTI etc., Operation and maintenance manual for transformer.

Scope of Work includes:

1. Obtaining CEA safety license.
2. Supplying and laying of necessary control cable between transformer auxiliary relays to HT panel, Battery charger to HT panel, incoming for the battery are included in the scope of the work with suitable cable tags for identification of cables.
3. Removing of existing HT/LT / Control cables, earthings and re terminating the same if necessary for the completion of work.
4. Painting identification to be done for the equipments/cables/busbar size etc as per the instruction of the Engineer In-charge.
 1. Minor civil works if any.

18. BILL OF QUANTITIES - SCHEDULE A

INDIAN INSTITUTE OF TECHNOLOGY MADRAS					
Name of work: Providing 1000kVA 11/0.433kV Distribution Transformer, HT/LT panels and allied cable works in Aero Space Substation at IIT Madras					
Tender No : 32/2013-14/ELDB					
SI no	Description of Work	Qty	Rate	Per	Amount
I.	VCB PANELS				
1	Supply ,Erection, Testing and Commissioning of 11kV cubicle board comprising of 11kV Draw out type VCB Panel complete with CTs, Numerical type protection relays with serial communication port as per the enclosed Technical Specification.				
1.1	Single Panel 12kV 800A HT VCB with required size of copper bus bars for interconnections between new and existing HT Panels.				
	(i) Supply	1		Set	
(Rate in words Rupees.....)					
	(ii) Erection	1		Set	
(Rate in words Rupees.....)					
II.	DISTRIBUTION TRANSFORMER				
2	Supply, Erection, Testing and Commissioning following Distribution type mineral oil filled ONAN type outdoor type transformer with complete fittings and accessories as per the enclosed Technical Specification.				
2.1	1000kVA Transformer (i) Supply	1		No	
(Rate in words Rupees.....)					
	(ii) Erection	1		Job	
(Rate in words Rupees.....)					

III	BUS-TRUNKING				
3	Supply, Installation, Testing and Commissioning of 1600A TPN fabricated air insulated bus trunking suitable for 415V 3 phase 4 wire 50HZ AC supply system (between transformer LT side and up to the incomer of the MV Panel) of Aluminium bus bars complete with bends, expansion joints, fire barriers, flexible etc end connections at both ends, earthing with 2 runs of copper earth of size 25 x 5mm strips etc including necessary supports etc as per specifications as required.	15		Mt	
(Rate in words Rupees.....)					
IV	CABLES AND TERMINATIONS				
4	Supplying & Laying of following sizes 11kV (E) HT UG Aluminium armoured XLPE Power cable in trench of 50cm wide and 100cm depth including earth work excavation in all soils and sub soils spreading 12cm thick river sand (at the bed of the trench 6 cm and after laying the cable another 6 cm) and brick cover protection top of the cable using burnt bricks and back filling, consolidated in a regular interval of 25cm thick rammed and complying with standard specification. The rate should be inclusive of cable route markers at every 50m interval as decided by the Engineer In charge				
4.1	3C X 185sqmm	50		Mt	
(Rate in words Rupees.....)					
5	Supplying and Terminating the ends of the following 11kV (E) HT UG Aluminium armoured XLPE Power cable with suitable lug / Ferrules socket and necessary jointing materials with indoor Rhychem heat Shrinkable Joint Kit.				
5.1	3C X 185 sqmm	2		Nos	
(Rate in words Rupees.....)					

6	Supplying & Laying of following sizes PVC XLPE insulated alu. Conductor armored LTUG cable in trench of 50cm wide and 75cm depth including earth work excavation in all soils and sub soils spreading 6cm thick river sand at the bed of the trench and brick cover protection top of the cable using burnt bricks and back filling, consolidated in a regular interval of 25cm thick rammed and complying with standard specification. The rate should be inclusive of cable route markers at every 50m interval as decided by the Engineer In charge				
6.1	3.5c X 400 sq.mm	800		Mt	
(Rate in words Rupees.....)					
6.2	3.5c x 240 sq mm	450		Mt	
(Rate in words Rupees.....)					
6.3	3.5c x 150 sq mm	300		Mt	
(Rate in words Rupees.....)					
7	Supplying and making end termination for following sizes alu. Conductor LT UG cable using suitable compression gland with required copper ferules / socket and other jointing materials				
7.1	3.5c X 400 sq.mm	12		Nos	
(Rate in words Rupees.....)					
7.2	3.5c x 240 sq mm	8		Nos	
(Rate in words Rupees.....)					

7.3	3.5c x 150 sq mm	8		Nos	
(Rate in words Rupees.....)					
V	MV PANEL				
8	Supply , Erection, Testing and commissioning of suitable size extendable floor mounting cubical type following LT Main Panel board suitable for 415V 3ph 4 wire 50Hz AC supply system fabricated in a compartmentalized design from CRCA sheet steel of 2mm thick for frame works and cover with 3mm thick removable gland plate ,cleaning and finishing with 7 tank process for powder coating with siemens grey having extensible type TPN copper alloy bus bar of suitable capacity as per the incomer ACB /MCCB/SDF ratings with DMC/SMC bus bar supports with short circuit withstand capacity of 31MVA / 1Second , bottom base channel of 100mmX 50mm X 5mm. .The In/Out going Cable entry should be from the rear side of the panel.				
	BUS BARS				
	Bus bars will be electrolytic copper , air insulated , R,Y,B, N(Black) PVC sleeved capable of carrying full load current for all the 3 phases and neutral continuously. The current density of copper shall be designed for 1.2A per sqmm. The bus chamber should have proper air ventilators.				
	EARTHING				
	2 separate run of 25 x 3 mm copper earth bus painted in green colour should be provided all along the panel and connected to the main grid. Interconnections should be taken to metering chamber, MCCB's, ACB's, FSU's etc so that all current carrying components are effectively earthed.				
	ADDITIONAL SCOPE OF WORK				
	The scope of work includes minor civil works like breaking of concrete floors ,construction of masonry trench and suitable MS 'Π' type channels for the proposed panel as per the instruction from the Engineer in Charge. Necessary Panel drawings , QAP and GTP have to be approved by the Engineer in charge before fabrication				

A	PANEL I (Proposed NCCRD)				
	Incomer				
	1600 TP ACB 50kA -1no (MDO independent manual spring closing mechanism-1no, microprocessor release for o/c , e/f and short circuit protection-1no, breaker ON/OFF/Trip indication Lamps) .				
	Outgoing				
	1600A 4P ACB 50kA (MDO independent manual spring closing mechanism-1no, microprocessor release for o/c , e/f and short circuit protection-1no, breaker ON/OFF/Trip indication Lamps) -1 no as BUS COUPLER				
	1000A TP ACB 50kA (MDO independent manual spring closing mechanism-1no, microprocessor release for o/c , e/f and short circuit protection-1no, breaker ON/OFF/Trip indication Lamps with 96sqmm digital Ammeter with required CT's)-1 set				
	800A TP ACB 50kA (MDO independent manual spring closing mechanism-1no, microprocessor release for o/c , e/f and short circuit protection-1no, breaker ON/OFF/Trip indication Lamps with 96sqmm digital Ammeter with required CT's)-1 set				
	630A TPN MCCB 36kA with micro processor based trip units ,front operated handle and with ON/OFF/TRIP indications-4set				
	400A TPN MCCB 36kA with micro processor based trip units ,front operated handle and with ON/OFF/TRIP indications-2set				
	1600A copper bus bars for 3phases and neutral				
	3 phase indication lamps with toggle switch-1set, microprocessor based digital multi function meter with communication port and the facility for active and reactive power measurements -1set with required CTs and control fuses etc. Necessary Spreaders / extended copper bus bars of suitable rating with required holes should be provided for the cable and bus bar terminations. The handle should be pad lockable type in both ON/OFF positions. The work should be inclusive of providing interlocking arrangement with the existing MV panel, bus coupler and the new MV panel by providing 3 locks and 2 keys arrangement.	1		Set	
(Rate in words Rupees.....)					

VI	SHIFTING WORK				
9	Shifting of the existing 3 panel 800A LT ACB from existing substation by removal of existing LT UG Cables completely from the soil or subsoil up to end terminations , earth connections etc and re-erect the panel in other substation and re-terminating the existing/new LT cables with required terminations (new LT cables will be supplied by IIT if required) with minor trench civil works. The rate should be inclusive of transport, labour/ Machineries and all tools as required.	1		Job	
(Rate in words Rupees.....)					
VII	EARTHING				
10	Supply, Erection, Testing and Commissioning of Cast iron pipe and copper plate earth as per IS - 3043 - 1987 including excavation of soil and sub soil , back filling with equal layers of salt and charcoal and the excavated soil , ramming, consolidating, Masonry construction, heavy duty cover slab etc. The CI pipe should be 100mm dia and 3mt long bolted with 600 x 600 x 3 mm thick copper plate at the bottom. 2R of 50 x 3 mm copper flats should be taken from the copper plate to the top of the CI pipe and clamping with suitable clamps	4		Nos	
(Rate in words Rupees.....)					
11	Earthing the installation with the following sizes of earth wires. The rate shall be inclusive of spacer clamp for main earth flat suitable clamping with the MS flats for earth wires including crimping of socket etc. or laying below 0.5m from ground level including earth work excavation and refilling the excavated soil.				
11.1	50 x 10 mm GI Flat	50		Mt	
(Rate in words Rupees.....)					
11.2	50 x 5 mm GI Flat	100		Mt	
(Rate in words Rupees.....)					

11.3	25 x 5mm GI flat	100		Mt	
(Rate in words Rupees.....)					
TOTAL					

Total Amount Rupees in words

.....
.....
.....
.....
.....
.....

Signature of the contractor

**-Sd-
Consultant (Electrical)**

**-Sd-
Executive Engineer (E)**