INDEX

Name of Work: RMO various Electrical and Mechanical works (Internal and External) at Delhi Technological University, Bawana Road, Delhi during 2018-19

J.E(E)

Correction……..
Deletion…….
Insertion…….

NIT APPROVAL

Name of Work :-	RMO various Electrical and Mechanical works (Internal and External) at Delhi Technological University, Bawana Road, Delhi during 2018-19	
Head of Account	:-	**Maintenance & Repair Of building :Electrical**
Estimated Cost	:-	**Rs. 2,36,88,186/-**
Earnest Money	:-	**Rs. 4,73,764/-**
Security Deposit	:-	**2.5 % of gross value of the Bill**
Performance Guarantee	:-	**5% of accepted value of work**
Time allowed	:-	**12 Months**

NIT approved amounting to **Rs. 2,36,88,186/- Only (Rupees Two Crore Thirty Six Lakh Eighty Eight Thousand One Hundred Eighty Six-One Only)**

Exécutive Engineer

J.E(E)

Correction……..
Deletion…….
Insertion…….

ENGINEERING CELL

DELHI TECHNOLOGICAL UNIVERSITY

Shahbad Daulatpur, Bawana Road, Delhi – 110042

Tender Notice

The **Executive Engineer, Delhi Technological University, Shahbad Daulatpur, New Delhi** on behalf of the DTU, invites online item rate in two bid system through e-tendering from appropriate class of CPWD/MES/BSNL/Railway registered contractors for electrical work.

NIT. No.	Name of work	Estimated Cost	Earnest money	Time Allowed	Start date & time of submission of tender	Time and date of opening	Date of opening of Price Bid
1.	RMO various Electrical and Mechanical works (Internal and External) at Delhi Technological University, Bawana Road, Delhi during 2018-19	RS. 2,36,88,186/-	RS. 4,73,764/-	12 Months	10.00 AM On dt.	3.30 PM On dt.	After A/A.

2. i) Contractor who fulfill the following requirement to apply. Self-attested copies of completion issued by the officer not below the rank of Executive Engineer for the work of RMO various Electrical and Mechanical works (Internal and External) executed with central Government department /State Government Department /Central Autonomous body/State Autonomous body/ Central Public sector undertaking/City Development Authority / Municipal Corporation of city formed under any Act by Central/ State Gazette and completed. Experience of having successfully completed work.
   a) One similar works each costing 80% of the estimated cost.
   b) Two similar work each costing 60% of the estimated cost
   c) Three similar work each costing 40% of the estimated cost.

   Completion certificate of the works mentioned above completed work comprising of RMO various Electrical and Mechanical works (Internal and External) Shall be considered for the eligibility criteria.

3. Scanned copies of all required documents viz. Demand draft/ Postal order/Fixed deposit receipt of a schedule bank for EMD in favour of **Registrar, DTU, New Delhi.** Should be uploaded by the contractors for Above mention work**. Original DD/PO/FDR for EMD (Bid security) as well as signed copies of uploaded documents shall be deposited in the tender box placed in Admin. Block, Engineering Cell, DTU Delhi-42** for the same before 1530 hrs. on the last day fixed for uploading of bids failing which their bids shall not be evaluated opened. Price bid shall be uploaded on the website before the last date/time for receipt of the tender. The price bid of only those tenders will be opened whose application are found in order and approved by the competent authority.

4. This tender information may also be seen at website https://govtprocurement.delhi.gov.in Tender Detail No

5. The department reserves the right to reject or accept any or all application without assigning any reasons.

Executive Engineer

J.E(E)

Correction……..
Deletion…….
Insertion…….

INSTRUCTION TO CONTRACTOR

The contractor submitting the tender should read the schedule of quantities, additional conditions, additional specifications, particular specifications and other terms and conditions given in the NIT and drawing. The tenderer should also read the General Conditions of Contract for CPWD Works Manual 2014 with upto date correction slips, which is available as Government of India Publications, however provisions included in the tender document shall prevail over the provisions contained in the standard form. The set of drawings and NIT shall be available with the **Executive Engineer, Delhi Technological University, Shahbad Daulatpur, New Delhi**. The contractor should also visit the site of work and acquaint himself with the site conditions before tendering. The following conditions, which already form part of the tender conditions, are specially brought to his notice for compliance while filling the tender. They are requested to comply following instructions.

Tenders with any condition including that of conditional rebates shall be rejected forthwith.

The successful tenderer shall be required to submit a performance guarantee of 5% (Five percent) of the agreement amount within 15 days of issue of letter of acceptance. This period can be further extended by Engineer-in-Charge upto a maximum period of 7 days on the written request of the contractor.

Work Contract Tax, GSTIN etc. as applicable shall be borne by the contractor himself. The contractor shall quote his rated considering all such taxes.

J.E(E)

Correction……..
Deletion…….
Insertion…….

C.P.W.D. – 6

GOVERNMENT OF NCT OF DELHI
DELHI TECHNOLOGICAL UNIVERSITY,
NOTICE INVITING TENDER

1. Item rate e-tenders are invited on behalf of the Delhi Technological University from as per nit for the work and following documents are to be uploaded :

1.1 (i) The tenderer shall submit the offer under two bid systems i.e. Technical Bid and Financial Bid.
(ii) Scanned copy of Earnest Money in the favour of Registrar, Delhi Technological University, New Delhi.
(iii) Scanned copy of GSTIN Number as issued by Govt. of India/Govt. of Delhi.
(iv) Scanned copy of document Experience of having successfully completed work.
a) One similar works each costing 80% of the estimated cost.
b) Two similar work each costing 60% of the estimated cost
c) Three similar work each costing 40% of the estimated cost.
Completion certificate of the works mentioned above completed work comprising of **RMO various Electrical and Mechanical works (Internal and External)** Shall be considered for the eligibility criteria.
(v) Scanned copy appropriate class of CPWD/MES/BSNL/RAILWAY registered contractors for electrical work.
(vi) Scanned Copy of Valid Electrical license.

2. Agreement shall be drawn with the successful tenderer on prescribed Form No. CPWD 8, which is available as a Govt. of India Publication. Tenderer shall quote his rates as per various terms and conditions of the said form, which will form part of the agreement.
3. The time allowed for carrying out the work will be As per NIT from the date of start as defined in schedule 'F' or from the first date of handing over of the site, whichever is later, in accordance with the phasing, if any, indicated in the tender documents.
4. The site for the work is available.
5. Tenders forms can be down loaded upto …….... (10.00 AM)
Tender documents consisting of plans, specifications, the schedule of quantities of the various classes of work to be done and the set of terms & conditions of contract to be complied with by the contractor whose tender may be accepted and other necessary documents can be seen in the office of the Executive Engineer, Delhi Technological University, Shahbad Daulatpur, New Delhi between hours of 11.00 AM & 3.00 PM from **……. to …….** every day except on Sundays and Public holidays. Tender documents, excluding standard form, can be downloaded from the website https://delhi.govtprocurement.co.in free of cost and deposited along the following: -
6. EMD as mentioned in the tender document must be submitted through ECS/RTGS/NEFT mode only to following Bank Account. This amount shall be refunded in case of rejection of the bid or alternatively adjusted/refunded.
7. Tenders will be received online by the Executive Engineer, Delhi Technological University, Shahbad Daulatpur, New Delhi upto 03.00 PM on _____ and technical bids will be opened online by him or his authorized representative in his office on the same day and on _____ at 03.30 PM.

J.E(E)

Correction……..
Deletion…….
Insertion…….

8. The contractor whose tender is accepted, will be required to furnish performance guarantee of 5% (Five percent) of the tendered amount within the period specified in Schedule F. This guarantee shall be in the form of Deposit at call receipt of any scheduled bank/ Bankers's Cheque of any scheduled bank/ Demand draft of any scheduled bank/Pay order of any scheduled bank (in case guarantee amount is less than Rs. 1,00,000/-) or Government Securities or Fixed Deposit Receipts or Guarantee Bonds of any Scheduled Bank or the State Bank of India in accordance with the prescribed form.

9. The description of the work as follows: **As per Schedule of work.**
Copies of other drawings and documents pertaining to the works will be open for inspection by the tenderers at the office of the above-mentioned officer.
Tenderers are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders as to the nature of the ground and sub-soil (so far as is practicable), the form and nature of the site, the means of access to the site, the accommodation they may require and in general 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 and no extra charges consequent on any misunderstanding or otherwise shall be allowed. The tenderer shall be responsible for arranging and maintaining at his own cost all materials tools & plants, water, electricity, access facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of tender by a tenderer implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done and of conditions and rates at which stores, tools and plant etc. will be issued to him by the Government and local conditions and other factors having a bearing on the execution of the work.

10. The competent authority on behalf of the Delhi Technological University does not bind himself to accept the lowest or any other tender, and reserves to himself the authority to reject any or all of the tenders received without the assignment of any reason. All tenders, in which any of the prescribed conditions is not fulfilled or any condition including that of conditional rebate is put forth by the tenderer, shall be summarily rejected.
The public enterprises who avails benefits of the purchase preference should be subjected to adequate penalties for cost overruns etc.

11.. Canvassing whether directly or indirectly, in connection with tenders is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable to rejection.

12. The competent authority on behalf of the Delhi Technological University reserves to himself the right to accepting the whole or any part of the tender and the tenderer shall be bound to perform the same at the rate quoted.

13. The contractor shall not be permitted to tender for works in the CPWD Circle (responsible for award and execution of contracts) in which his near relative is posted as Divisional Accountant or as an officer in any capacity between the grades of 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 Gazetted officer in the Central Public Works Department or in the Ministry of Urban Development. Any breach of this condition by the contractor would render him liable to be removed from the approved list of contractors of this Department.

14. No Engineer of gazetted rank or other Gazetted Officer employed in Engineering or Administrative duties in an Engineering Department of the Government of India is allowed to work as a contractor for a period of two years after his retirement from Govt. Service without pervious permission of the Govt. of India in writing. This contract is liable to be cancelled if either the contractor or any of his employees is found any time to be such a person who had not obtained the permission of the Govt. of India as aforesaid before submission of the tender or engagement in the contractor's service.

15. The tender for the work shall remain open for acceptance for a period of Ninety (90) days from the date of opening of tenders. If any tenderer withdraws his tender before the said period or issue of letter of acceptance, whichever is earlier or makes any modifications in the terms and conditions of the tender which are not acceptable to the department, then the Govt. shall without prejudice to any other right or remedy, be at liberty to forfeit 50% of the said earnest money as aforesaid.

16. The Notice Inviting Tender shall form a part of the contract document. The successful Tenderer / Contractor, on acceptance of his tender by the Accepting Authority, shall within 15 days from the stipulated date of start of the work sign the contract consisting of: -

a) The Notice Inviting Tender, all the documents including additional conditions, specifications and drawings, if any, forming the tender as issued at the time of invitation of tender and acceptance thereof together with any

correspondence leading thereto.

b) Standard C.P.W.D. Form 8.

17. For composite tenders

17.1.1 The tenderer must associate with himself agencies of the appropriate class eligible to tender for the other components individually.

17.1.2. It will be obligatory on the part of the tenderer to sign the tender documents for all the components. (The Schedule of quantities, conditions and special conditions etc.)

17.1.3. After the work is awarded, the contractor will have to enter into separate agreements for each component with the officer concerned.

17.1.4 Executive Engineer in charge of minor component shall make interim payments in respect of minor component of work. Executive Engineer in charge of the major component shall make the payment against final bill of the composite contract.

17.2 The Executive Engineer in charge of the major component will call tenders for the composite work. The cost of tender document and Earnest money will be fixed with respect to the combined estimated cost put to tender for the composite tender. Security deposit will be worked out separately for each component corresponding to the estimated cost of the respective component of works. The earnest money will become part of the security deposit of the major component of work.

17.3 On acceptance of the composite tender by the competent authority the letter of award will be issued by the Executive Engineer in charge of the major competent on behalf of the Delhi Technological University, making it clear of award that the contractor will have to execute separate agreements for different components of work with the concerned officers of the respective discipline (Designation to be given).

C.P.W.D. – 8

GOVERNMENT OF NCT OF DELHI
DELHI TECHNOLOGICAL UNIVERSITY

STATE DELHI CIRCLE- E Cell
BRANCH E & M DIVISION - Electrical

Item Rate Tender & Contract for Works

Tender for the work of: - RMO various Electrical and Mechanical works (Internal and External) at Delhi Technological University, Bawana Road, Delhi during 2018-19

(i) To be submitted by 3.00 **P.M.** hours on _____ to Executive Engineer, Delhi Technological University, Shahbad Daulatpur, New Delhi (time) (date)

(ii) Eligibility criteria to be opened at 3:30 PM on _____ in the office of Executive Engineer, Delhi Technological University, Shahbad Daulatpur, New Delhi. Price Bid shall be opened at **03:30** PM on _____ in the office of Executive Engineer, Delhi Technological University, Shahbad Daulatpur, New Delhi.

TENDER

I/We have read and examined the notice inviting tender, schedule, A, B, C, D, E & F. Specifications applicable, Drawings & Designs, General Rules and Directions, Conditions of Contract, clauses of contract, Special conditions, Schedule of Rate & other documents and Rules referred to in the conditions of contract and all other contents in the tender document for the work.

I/We hereby tender for the execution of the work specified for the Delhi Technological University within the time specified in Schedule 'F', viz., schedule of quantities and in accordance in all respects with the specifications, designs, drawings and instructions in writing referred to in Rule-1 of General Rules and Directions and in Clause 11 of the Conditions of contract and with such materials as are provided for, by, and in respects in accordance with, such conditions so far as applicable.

We agree to keep the tender open for ninety (90) days from the due date of submission thereof and not to make any modifications in its terms and conditions.

Amount of Rs. as per nit is hereby forwarded in DD/FDR at call receipt of a Scheduled Bank/fixed deposit receipt of scheduled bank/demand draft of a scheduled bank as earnest money. If I/we fail to furnish the prescribed performance guarantee within prescribed period, I/we agree that the said Delhi Technological University or his successors in office shall without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely. Further, if I/we fail to commence work as specified, I/we agree that Delhi Technological University or his successors in office 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, otherwise the said earnest money shall be retained by him towards security deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein and to carry out such deviations as may be ordered, upto maximum of the 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 Clauses 12.2 and 12.3 of the tender form. Further I/We agree that in case of forfeiture of earnest money or both Earnest Money & Performance guarantee as aforesaid. I/We shall be debarred for participation in the re-tendering process of the work.

J.E(E)

Correction……..
Deletion…….
Insertion…….

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

Signature of Contractor
Postal Address

Dated ……..

Witness:

Address:

Occupation:

ACCEPTANCE

The above tender (as modified by you as provided in the letters mentioned hereunder) is accepted by me for and on behalf of the Delhi Technological University 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 Delhi Technological University.

Signature _____

Dated …… Designation _____

Correction……..
Deletion…….
Insertion…….

SCHEDULES

SCHEDULE 'A' **As per Schedule attached (Page 14)**

Schedule of quantities (Enclosed.)

SCHEDULE 'B'

Schedule of materials to be issued to the contractor free of cost.

S. No.	Description of Item	Quantity	Recovery rates in figures & words at which the material will be charged to the contractor.	Place of Issue
1	2	3	4	5
		-N/A-		

SCHEDULE 'C'

Tools and plants to be hired to the contractor.

S.No.	Description	Hire charges per day.	Place of Issue
1	2	3	4
		NOT APPLICABLE	

SCHEDULE 'D'

Extra schedules for specific requirements / documents for the work, if any. - Enclosed -

SCHEDULE 'E'

Schedule of component of Cement, Steel, Other Materials, Labour etc. for price escalation.

SCHEDULE 10 'C'

Schedule of labour rates etc for price escalation - Not Applicable.

CLAUSE 10 CC

Component of Cement
expressed as per cent of total value of work Xc **Not Applicable**

Component of Steel
expressed as per cent of total value of work Xs **Not Applicable**

Component of Materials
expressed as per cent of total value of work Xn **Not Applicable**

Component of Labour
expressed as per cent of total value of work Y **Not Applicable**

Component of POL
expressed as per cent of total value of work Z **Not Applicable**

J.E(E)

Correction……..
Deletion…….
Insertion…….

SCHEDULE 'F'

Reference to General Conditions of contract.

Name of Work: RMO various Electrical and Mechanical works (Internal and External) at Delhi Technological University, Bawana Road, Delhi during 2018-19

Estimated cost of work. : Rs. 2,36,88,186/-

(i) Earnest Money : Rs. 4,73,764/-

(ii) Performance Guarantee: 5% (Five Percent) of accepted value of Tender.

(iii) Security Deposit: 2.5% (Two and Half percent) of Gross Value of the Bill.

GENERAL RULES & DIRECTIONS:

Officer inviting tender	Executive Engineer DTU campus, Delhi
Maximum percentage for quantity of items of work to be executed beyond which rates are to be determined in accordance with Clauses 12.2 & 12.3	See below.

Definitions:

2 (v) Engineer –in – charge	Executive Engineer, DTU campus, Delhi
2 (viii) Accepting Authority	Vice Chancellor, DTU campus, Delhi
2 (x) Percentage on cost of materials and labour to cover all overheads and profits.	15 %
2 (xi) Standard Schedule of Rates.	DSR 2016/Market Rates
2 (xii) Department	Autonomous (Delhi Govt.)

9 (ii) Standard CPWD Form **CPWD form 8 as modified & corrected upto date.**

Clause 1

i) Time allowed for submission of Performance Guarantee From the date of issue of letter of acceptance, in days — 15 Days

J.E(E)

Correction……..
Deletion…….
Insertion…….

ii) Maximum allowable extension beyond the period provided in i) above in days — 7 Days

Clause 2

Authority for fixing Compensation under Clause 2. — Vice Chancellor, Delhi Technological University, New Delhi

Clause 2 A

Whether Clause 2 A shall be applicable — Not applicable

Clause 5

Number of days from the date of issue of letter Of acceptance for reckoning date of start — 10 days

Miles Stone(s) as per table given below:-

TABLE OF MILE STONES (S)

S.No.	Description of Milestone(Physical)	Time Allowed in days (from date of start)	Amount to be with - held in case of non-achievement of milestone.
AS PER TERMS AND CONDITION			

OR

S.No.	Financial Progress	Time Allowed (from date of start)	Amount to be with - held in case of non-achievement of milestone.
AS PER TERMS AND CONDITION			

Time allowed for execution of work — 12 Months

Clause 6

Clause applicable (6, 6A) — The Clause 6A applicable for the work whose Estimated Cost put to tender is Rs. 15 Lakh & above

Clause 7

Gross work to be done together with net payment/ adjustment of advances for Material collected, if any, since the last such payment for being eligible to interim payment.

J.E(E)

Correction……..
Deletion…….
Insertion…….

Clause 10 A

List of testing equipment to be provided by the contractor at site lab. Not applicable.

Clause 10 B (ii)

Whether Clause 10 B (ii) shall be applicable Not applicable

Clause 10 CA

Material covered under the Clause Not Applicable

Clause 10 CC

Clause 10 CC to be applicable in contracts With stipulated period of completion exceeding The period shown in next columns. As Applicable

Clause 11

Specifications to be followed execution of work — As per CPWD General Specification for Elect. Works and Gen. electrical specifications 2013 direction of Engineer-in-Charge amended upto date correction slips

Clause 12

12.2 & 12.3	Deviation limit beyond which Clause 12.2. & 12.3 shall apply for building work	50%
12.5	Deviation limit beyond which clauses 12.2 & 12.3 shall apply for foundation work.	N.A.

Clause 16

Competent Authority for deciding reduced rates.upto 5% of Contract value — Vice Chancellor, New Delhi

Clause 18

List of mandatory machinery, tools & plants to be deployed by the contractor at site — As per scope of work and direction of Engineer-in-Charge

J.E(E)

Correction……..
Deletion…….
Insertion…….

Clause-19:- The contractor shall obtain a valid license under the contract labour (R&A) Act, 1970: and the contract labour (Regulation & Abolition) Central Rules, 1971 before the Commencement of the work & continue to have a valid license until the completion of the work. The contractor shall also comply with provisions of the inter-state Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979

Clause 19 L: The E.S.I. & E.P.F. Contribution on the part of employer in respect of this contract shall be paid by the contractor. These contributions on the part of employer paid by the contractor shall be reimbursed by the Engineer-in-charge to the contractor on actual basis. The applicable & eligible amount of E.P.F. & E.S.I. shall be reimbursed preferably within 7 days but not later than 30 days of submission of documentary proof of payment provided the same are in order.

Clause 36 (i)

Requirement of technical representative (s) and recovery rate(s)..

S. No.	Minimum Qualification of Technical Representative	Discipline	Designation (Principal Technical/ Technical representative)	Minimum Experience	Number	Rate at which recovery shall be made from the contractor in the event of not fulfilling provision of clause 36 (i)	
						Figures	**Words**
1.	Graduate Engineer or Diploma Holder	Electrical	Principal Technical representative	2 Years 5 Years	1 1	Rs. 15000/- Per Month	Rs. Fifteen Thousand Per Month

Clause 42

i) (a) Schedule/ statement for determining theoretical quantity of cement & bitumen on the basis of Delhi Schedule of Rates 2016 printed by C.P.W.D. — Not Applicable.

ii) Variations permissible on theoretical quantities : Not applicable

(a) Cement for works with estimated Cost put to tender not more than Rs. 5 Lakhs. : Not applicable

For works with estimated cost put to : Not applicable

J.E(E)

Correction……..
Deletion…….
Insertion…….

	Tender more than Rs. 5 lakhs.		
b)	Bitumen All works.	:	Not applicable
c)	Steel Reinforcement and structural steel Sections for each diameter, section and category	:	Not applicable
d)	All other materials	:	Not applicable

RECOVERY RATES FOR QUANTITIES BEYOND PERMISSIBLE VARIATION

SI. No.	Description of Item	Rates in figures and words at which recovery shall be made from the Contractor. Rates in schedule 'B' plus 10% in case materials issued by the Department.	
		Excess beyond permissible variation.	Less use beyond the permissible variation.
1.	Cement	NOT APPLICABLE	
2.	Steel reinforcement		
3.	Structural sections		
4.	Bitumen issued free		
5.	Bitumen issued at stipulated fixed price.		

J.E(E)

Correction……..
Deletion…….
Insertion…….

Technical Specification

I. 415 V. SWITCHGEAR MAIN BOARD (L.T. /DG / CAPACITOR PANEL) / FLOOR MOUNTED MDB / UMDB.

1. Description of work

This section covers the detailed requirements for installation, testing & commissioning of L.T. Panel / Capacitor Panel suitable for 415 Volts, 3 phase, 50 HZ 4 wire system, in line with schematic diagram, schedule of quantities and as specified.

2. INSTALLATION

The installation work shall cover assembly of various sections of the panels, lining up, grouting the units etc. After connecting up the bus bars etc. all joints shall be protected with necessary insulated shroudings. A common earth bar as per IS specifications shall be run at the back of panel connecting all the sections for connection to frame earth system. All protections and other small wirings for indication etc. shall be completed before calibration and commissioning checks are commenced. All relays, meters etc. shall be mounted and connected with appropriate wiring.

3. TESTING & COMMISSIONING

a) TEST AT MANUFACTURERS WORK

All routine tests specified in IS : 8623: shall be carried out

b) Testing And Commissioning at Site

Commissioning checks and tests shall include all wiring checks and checking up of connections. Primary/Secondary injection tests for the relay adjustment/setting shall be done before commissioning in addition to routine meager test. Checks and tests shall include the following :

i) Operation checks and lubrication of all moving parts.

ii) Interlock function checks.

iii) Continuity checks of wiring, fuses etc. as required.

iv) Insulation test : when measured with 500 V megger the insulation resistance shall not be less than 100 mega ohms.

v) Trip test and protection gear test.

c) Test witness

Tests shall be performed in the presence of the Engineer-in-Charge. The contractor shall give at least fifteen days advance notice of the date when the tests are proposed to be carried out.

II. CONDUITING AND WIRING

1. GENERAL

The system of wiring shall consist of single-core/multi-core PVC insulated Copper conductor FRLS wires in Metallic conduits concealed/exposed or Raceways as called for.

2. CHECKING OF DRAWINGS

Before commencing the conduiting work, the Contractor shall carefully examine the drawings indicating the layout of conduits, check the number and size of conduits with respect to number of wires , location of junction boxes, sizes and location of switch boxes and other relevant details. Any changes suggested by the Contractor shall be got approved from the Consultants before the actual laying of conduits. Any discrepancy found in the drawings shall be brought to the notice of the Architects/ Consultants promptly before execution of the work.

3. Material

Conduits shall be black enameled mild steel and be solid drawn or lap welded conduits, stove enameled inside and outside with minimum wall thickness of 1.6 mm for conduits upto 25 mm diameter and 2 mm wall thickness for conduits above 25 mm diameter. The conduits shall be delivered to the site in original bundles and each length of conduit shall bear the label of the manufacturer. The number of insulated copper conductor wires that may be drawn in the conduits of various sizes are given below and the conduit fill shall not exceed 40%. The minimum size of conduits shall be 25mm diameter for lighting and outlets and conduit size shall be increased as per relevant IS code depending on the number of wires. Wires shall be PVC insulated copper conductor and ISI marked.

4. CONDUIT FILL :-

The maximum number of 650/1100 Volts grade single core PVC insulated copper conductor wires that may be drawn in the conduits of various sizes are given below.

Size of wire	Size of Conduit (MS)			
Area of the wire Sq. mm	25 (Number of wires maximum)	32	40	50

1.5	10	14	-	-
2.5	8	12	-	-
4.0	6	10	14	-
6.0	5	8	11	-
10.0	4	7	9	-
16.0	2	4	5	12
25.0	-	2	2	6
35.0	-	-	2	5

5. CONDUIT CONNECTIONS:-

The threads of pipe and sockets shall be free from grease and oil and shall be thoroughly cleaned before making the screwed joints. All joints shall be fully water tight. Junction boxes and running joints shall be provided at suitable places to allow for subsequent extension if any, without undue dismantling of conduit system. As far as possible, diagonal run of conduits and adaptable boxes, back outlet boxes, switch boxes and the like must be provided with entry spouts and smooth rubber bushes. Joint between conduit and iron clad distribution boards and control gear shall be effected by means of conduit couplers into each of which will be coupled smooth rubber bushes from the inside of box or case.

Conduit system shall be vertical and straight as far as possible. Traps where water may accumulate from condensation shall be avoided, however if it is unavoidable suitable provision for draining the water shall be made. Separate conduits shall be run for lighting and 15 amps power outlet wiring. Wires belonging to different phases shall no be run in the same conduit. For every phase wire a separate neutral wire shall be run. Conduits connections for MS conduits shall be screwed metal to metal and be painted with one coat of self etching zinc chromate primer and two coats of enamel paint. The threads and sockets shall be free from grease and oil. Connections between screwed conduit and sheet metal boxes shall be by means of a rubber bush. The joints in conduits shall be free of burrs to avoid damage to insulation of conductors while pulling them through the conduit. External conduits (exposed to elements) should be insulated through clamp and water tight fitting.

6. BENDS IN CONDUIT :-

Where necessary, bends may be carried out by means of conduit bends and/or circular inspection boxes with adequate and suitable inlet and outlet screwed joints. In case of recessed system, each junction box shall be provided with a cover properly secured and flushed with the finished wall/ceiling surface, so that the conductors inside the conduit are accessible. No bends shall have radius less than 2.5 times the outside diameter of the conduit. Special spring may be used for bending the conduit. Heating to soften the conduit for bending is not allowed.

7. Fixing of conduits

Conduits and junction boxes shall be kept in position with the help of proper hold fasts while the walls, slabs and floor are under construction. Fixing of standard bends or elbows shall be avoided as far as practicable and all curves maintained by bending the conduit pipe itself with a ling radius which will permit easy drawing of conductors. All threaded joints of conduit pipes shall be treated with approved preservative compound to secure protection against rust. Conduits shall be arranged so as to facilitate easy drawing of wires through them. Adequate no. of junction boxes shall be provided. All conduits shall be installed away from steam and hot water pipes. After the conduits, junction boxes, outlet boxes and switch boxes are installed in position, their openings shall be properly plugged or covered, so that, water, mortar, insects or any other foreign matter does not enter into the conduit system. Where called for, surface conduits shall be fixed by means of spacer bar saddles at intervals not more than 500 mm from both sides of fittings or accessories. The staples or saddles of galvanished mild steel flat, properly treated, shall be secured and fixed by means of nuts and bolts/rawl plugs and brass machine screws at 600 mm intervals. Cutting of horizontal chases shall be avoided. Fixing of standard bends or elbows shall as far as possible, be avoided.

8. CHASE IN THE WALL

The chase in the wall shall be neatly made and shall be of ample dimensions to facilitate the recessing of conduit and flushing with cement plaster. All these shall invariably be done during the construction stages itself, as otherwise breaking and flushing to the original finish may not be practicable at subsequent stages.

9. EXPANSION JOINTS

When crossing through expansion joints in the buildings, the conduit sections across the joints shall be jointed through flexible conduits (non metallic) of the same size as rigid conduits. Alternatively, the two sections shall be jointed by means of over sized conduit lengths with over lapping on both ends. The gaps in between the two pipes shall be suitably, cemented to prevent the ingress of moisture. In addition, it shall technically be a desirable arrangement to provide MS boxes of suitable size at both ends for termination of PVC conduits and jointing through flexible (non metallic) conduits.

10. protection

Correction……..
Deletion…….
Insertion…….

To minimize condensation or sweating inside the conduit pipes, all outlets of conduit system shall be adequately ventilated. All socketed connections shall be made fully water tight by use of proper jointing compound.

11. SWITCH – OUTLET AND JUNCTION BOXES

All outlets for switch and other receptacles shall be equipped with rust proof outlet boxes of MS as called for, having external and internal surface true to finish. Where called for, outlet boxes for receiving switches shall be fabricated to approved sizes and covered with approved White Polycarbonate modular cover plate. All boxes shall have adequate number of knock- out holes of required diameter and an earthing terminal screw. The junction boxes and switch/socket outlet boxes shall be provided with approved White Polycorbonate modular cover plate secured to the box with brass countersunk screws. Outlets exposed to the weather shall be fully water tight, complete with rubber gasketed covers. The outlet boxes shall be painted with two coats of bituminous paint before they are fixed in position. Outlet boxes fixed in concrete shall be of a minimum depth of 75 mm and the wall thickness of the boxes and spouts shall not be less than 2mm. Outlet boxes fixed in wall shall be of a minimum depth of 50 mm and the wall thickness of the boxes and spouts shall not be less than 18 guage.

12. Inspection Boxes

Rust proof inspection boxes of cast iron and of required size, having smooth external and internal finish shall be provided to permit periodical inspection and to facilitate removal and replacement of wires when required. Inspection boxes shall be mounted flush with ceiling/finished wall surface and shall be provided with screwed cover of 1.5 mm thick M.S. cover plate secured to the box with brass screws. Adequate holes shall be provided for ventilation in inspection box covers. The minimum size of inspection boxes shall be 75 mm x 75 mm.

13. Telephone/computer System

Conduits, junction boxes, draw boxes, outlet boxes and covers for telephone/ computer system shall be as described under relevant clauses of the specifications. Conduits for telephone/computer system shall be atleast 300 mm away from the electrical conduits. The conduits for telephone/computer wiring shall be of specified size and shall terminate at outlets, as indicated on the drawings.

14. Bunching of wires

Wires carrying current shall be so bunched in the conduit that the outgoing and return cables are drawn into the same conduit. Cables originating from two different phases shall not run in the same conduit.

15. Drawing Conductors

The drawing and jointing of copper conductor wires and cables shall be executed with due care so as to avoid any damage to the wire. While drawing insulated wires into the conduit, care shall be taken to avoid scratches and kinks which cause breakage of conductor. There shall be no sharp bends. Insulation shall be shaved off like sharpening of a pencil, and it shall not be removed by cutting it across the wiring. Oxide-inhibiting grease shall be liberally applied at all terminal points. Strands of wire shall not be cut for connecting at terminations. The terminals shall have sufficient cross sectional area for all strands and shall have flat ends. The pressure applied to tighten terminal screws shall be just adequate (neither too much nor too less). Conductors having nominal cross sectional area (exceeding 10 sq. mm) shall always be provided with cable sockets. At all bolted terminals, brass flat washers of large area and steel spring washers shall be used. Brass nuts and bolts shall be used for all connections.

PVC insulated wires of 650/1100 Volts grade shall be used for all internal wiring works. The sub-circuit wiring for points shall be carried out in looping system and no joints shall be allowed in the length of the conductors. No wire shall be drawn into any conduit, until all works, that may cause injury to the wires is completed. Care shall be taken in pulling the wires so that the insulation is not damaged. Before the wires are drawn into the conduit, the conduits shall be thoroughly cleaned of moisture, dust, dirt, or any other obstruction by forcing compressed air through the conduits.

16. Joints

All joints shall be made at main switches, distribution boards, socket outlets, lighting outlets and switch boxes only. Conductors shall be continuous from outlet to outlet.

17. Mains and Sub-mains

Mains and sub-main wires, where called for, shall be of the rated capacity and approved make. Every main and sub-main shall be drawn into an independent adequately sized conduit. Adequate no. of draw boxes shall be provided at convenient locations to facilitate easy drawing of the sub-mains and main cables. An independent single run of earth wire of proper rating shall be provided for every single phase sub-main, and two runs of earth wire of proper rating shall be provided for every three phase submain. Where mains and sub-main cables are connected to the switchgear, sufficient extra lengths of such cables shall be provided at terminal ends to facilitate sub-sequent connections, maintenance and repairs.

18. Load Balancing

Balancing of circuits in three phase installation shall be planned before the commencement of wiring and shall be strictly adhered to.

19. Colour Code of Conductors

Colour code shall be maintained for the entire wiring installation : Red, Yellow, Blue for three phases, Black for neutral and green for earth.

III. SWITCHES, SOCKETS, OUTLETS, LIGHTING FIXTURES

1. Switch-Outlet & Junction Boxes

All Switch, socket outlets shall be provided with rust proof outlet boxes of MS as called for, having external and internal surface true to finish. Where called for, outlet boxes for receiving switches shall be fabricated to approved sizes and covered with approved White Polycarbonate modular cover plate secured to the box with brass countersunk screws. All boxes shall have adequate number of knock- out holes of required diameter and an earthing terminal screw. Outlets exposed to the weather shall be fully water tight, complete with rubber gasketed covers. The outlet boxes shall be painted with two coats of bituminous paint before they are fixed in position. Outlet boxes fixed in concrete shall be of a minimum depth of 75 mm and the wall thickness of the boxes and spouts shall not be less than 2mm. Outlet boxes fixed in wall shall be of a minimum depth of 50 mm and the wall thickness of the boxes and spouts shall not be less than 18 guage.

2. SWITCHES

All 6/16 amp switches shall be enclosed type and flush mounted type of 250 V AC grade. All switches shall be fixed inside the switch boxes on adjustable MS strips/plates with tapped holes and brass machine screws, leaving ample space at the back and sides for accommodating wires. The switch controlling the light shall be located at 1000 m.m. above finished floor level, unless otherwise indicated.

3. Wall Socket Outlets

All 6 amp wall socket outlets where called for on the drawings shall be combined type with 5 pins. All 16 amp wall socket outlets where called for shall be combined and 6 pin type. The sockets shall be erected approximately 150 mm above floor level, unless otherwise specified.

The switch controlling the point outlets and socket outlets shall be on the phase wire of the circuit. The earth terminal of the socket shall be connected to the earth terminal provided inside the box by means of insulated copper conductor wire.

4. LIGHTING FIXTURES

The light fixtures shall be assembled and installed in position complete and ready for service in accordance with the detailed drawings, manufacturer's instructions and to the satisfaction of the Architect/Consultant. Fixtures shall be suspended true to alignment plumb level and capable of resisting all lateral and vertical forces and shall be fixed as required. It is the duty of the Contractor to make these provisions at the appropriate stage of construction. All switch and outlet boxes and light fittings shall be bonded to earth through connector blocks. Wires brought out from junction boxes shall be encased in flexible pipes for connecting to fixture concealed in suspended ceiling.

IV. WALL MOUNTED DISTRIBUTION BOARDS

This section covers the detailed requirement for supply, installation, testing and commissioning of DB's suitable for 415 Volts, 3 Phase, 50 HZ, 4 wire system.

1. MCB DISTRIBUTION BOARDS

1.1 Distribution Boards shall be suitable for operation on 3 phase/single phase 415/230 Volts, 50 Hz.

1.2 The Distribution Boards shall comply with the relevant Indian Standards and Indian Electricity Rules and Regulations.

2. FABRICATION DETAILS AND COMPONENTS

2.1 The Distribution Boards shall be metal enclosed, CRCA sheet steel cubical, indoor, dead front, wall mounting type. The Distribution board shall be totally enclosed, completely dust and vermin proof. Gaskets between all adjacent units and beneath all covers shall be used to render the joints dust proof. Doors and covers shall be fully gasketed with foam rubber and/or rubber strips and shall be lockable. Sheet steel used in the construction of Distribution Boards shall be 18 guage CRCA sheets and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet metal shall be seam welded, all welding slag grounded off and welding pits wiped smooth with plumber metal.

2.2 The distribution boards shall be mounted at height of 1200 mm from floor to bottom of panel unless otherwise specified. All the panels and covers shall be properly fitted square with the frame, and holes in the panel correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with hank nuts. Self-threading screws shall not be used in the construction of Distribution boards.

Knockout holes of appropriate size and number shall be provided at top and bottom to drill holes for cables/ conduit entry as required, as per site conditions.

Removable sheet steel gland plates shall be provided at top and bottom to drill holes for cables/conduit entry as required, as per site conditions.

The distribution boards shall be installed recessed or surface mounted on walls by fastening to suitably grouted studs of not less than 12 mm diameter.

2.6 The distribution boards shall be provided with 3 pole neutral miniature circuit breaker with neutral link (TPN MCB) or double pole miniature circuit breakers (DP MCB) of appropriate capacity as incoming as per the Schedule of Quantities. The distribution boards shall be provided with 3 numbers double pole earth leakage circuit breakers (DP RCCB) one for each

phase or four pole residual current circuit breaker on the incomer as per Schedule of Quantity. The distribution board shall be provided with single pole miniature circuit breakers (SP MCB) or TP MCB as outgoing, as per Schedule of Quantity.

2.7 MCB's shall be provided on the phases of each circuit. The individual banks of MCB's shall be detachable. There shall be ample space behind the banks of MCB's to accommodate all the wiring. All the distribution boards shall be completely factory wired, ready for conections. All the terminals shall have adequate current rating and size to suit individual feeder requirements. Each circuit shall be clearly numbered from left to right to correspond with wiring diagram. All the switches and circuits shall be distinctly marked with a small description of the service installed.

3. MINIATURE CIRCUIT BREAKERS

Minature circuit breakers shall be quick make and break type, and shall conform to relevant Indian Standards. The housing shall be heat resistant and having a high impact strength. The fault current withstand capability of the MCB's shall not be less than 9000 amps at 230 Volts. MCB's shall be flush mounted and shall be provided with trip free manual operating lever 'ON' and 'OFF' indications. The contacts shall be provided to quench the arc immediately. MCB shall be provided with magnetic thermal releases for over current and short circuit protection. The overload or short circuit device shall have a common trip bar in the case of DP and TPN miniature circuit breakers. The contact closing shall be independent of operator speed. The terminal shall be protected against any finger contact to IP 20 degree of protection with no restriction for line & load.

4. RESIDUAL CURRRENT CIRCUIT BREAKERS

All live parts of earth leakage breakers shall be totally enclosed in an insulated heat resistant housing. The operating mechanism shall be quick make and break, trip free and shall be able to isolate automatically the electrical circuit under sustained earth fault. The rated sensitivity shall be 100 mA, with a maximum permissible earth fault loop impedance of 1650 Ohms.In case of three phase DB with all single phase outgoings, three nos. DP RCCB one for each phase shall be provided. In case of three phase DB with three phase/single phase outgoings four pole RCCB shall be provided in the incoming itself.

5. TESTING AND COMMISSIONING

Commissioning checks and tests shall include all wiring checks and checking up of connections.

a. Operation checks and lubrication of all moving parts.

b. Continuity checks of wiring, etc. as required.

c. Insulation test : When measured with 500 V meggar, the insulation resistance shall not be less than 100 mega ohms.

V. CABLE WORK

This section covers detailed requirements for supply, laying, testing and commissioning of cables.

1. GENERAL

MV cable shall be supplied inspected, laid, tested and commissioned in accordance with drawings, specifications, relevant Indian Standards Specifications and cable manufacturer's instructions. The cable shall be delivered at site in original drums with manufacturer's name clearly written on the drum.

2. MATERIAL

2.1 The MV power cable of 660/1100 V. grade shall be XLPE insulated Aluminium conductor armoured cable conforming to IS : 1554 (part - I). MV cable shall be 3.5/4 core of size and type as specified.

2.2 The MV control cables shall be PVC insulated copper conductor armoured cable.

3. STORAGE AND HANDLING

a. All cables shall be inspected upon receipt at site and checked for any damage during transit.

b. Cable drums shall be stored on a well drained, hard surface, preferably of concrete, so that the drums do not sink in the ground causing rot and damage to the cable drums.

c. During storage periodical rolling of drums once in 3 months through 90o shall be done. Rolling shall be done in the direction of the arrow marked on the drum.

d. It should be ensured that both ends of the cable are properly sealed to prevent ingress/absorption of moisture by the insulation.

e. Protection from rain and sun shall be ensured. Sufficient ventilation between cable drums, should be ensured during storage.

f. The drums shall always be rested on the flanges and not on the flat sides.

g. Damaged battens of drums etc. should be replaced, if necessary.

h. When cable drums have to be moved over short distances, they should be rolled in the direction of the arrow, marked on the drum.

i. For transportation over long distances, the drum should be mounted on cable drum wheels strong enough to carry the weight of the drum and pulled by means of ropes. Alternatively, they may be mounted on a trailer or on a suitable mechanical transport.

j. When unloading cable drums from vehicles, a crane shall preferably be used. Otherwise the drum shall be rolled down carefully on a suitable ramp or rails, where necessary.

k. While transferring cable from one drum to another, the barrel of the new drum shall have a diameter not less than that of the original drum.

l. The cables shall not be bent sharp to a small radius. The minimum safe bending radius for all types of PVC cables shall be taken as 12 times the overall diameter of the cable. Wherever practicable, larger radius should be adopted. At joints and terminations, the bending radius of individual cores of a multi core cable shall not be less than 15 times its overall diameter.

m. Cable with kinks and straightened kinks or with similar apparent defects like defective armouring etc. shall be rejected.

n. Cables from the stores shall be supplied by the contractor as per the site requirement in pieces cut in the stores.

4. INSTALLATION

4.1 GENERAL

The cable installation including necessary joints shall be carried out in accordance with the specifications given herein. For details not covered in these specifications, I.S. 1255 shall be followed.No straight through joint shall be permitted in the system. The cables shall be supplied as per cable schedule submitted by the contractor & approved by Engineer-in-Charge.

4.2 ROUTE

i. Before the cable laying work is undertaken, the route of the cable shall be decided by the Architect in consultation with Owner representative..

ii. While shortest practicable route shall be preferred, cable runs shall generally follow fixed developments such as roads, footh-paths etc. with proper offsets so that future maintenance, identification etc. are rendered easy. Cross country run to shorten the route length is not desirable as it would lead to route identification and maintenance problems, besides posing difficulties during later development of open areas etc.

iii. While selecting cable routes, corrosive soils, ground surrounding sewage and effluent etc. shall be avoided. Where this is not feasible, special precautions as approved by the Architect shall be taken.

iv. As far as possible, the alignment of the cable route shall be decided taking into consideration the present and future requirements of other agencies and utility services affected by it, the existence of any cable in the vicinity as may be indicated by cable markers or cable schedules or drawing maintained for that area, possibilities of widening of roads/lanes, storm water drains etc. Cable routes shall be planned away from the drains and should be within the property.

v. Whenever cables are laid along well demarcated or established roads, the MV cables shall be laid further from the kerb line than HV cables.

vi. Cables of different voltages and also power and control cables shall be kept in different t renches with adequate separation. Where available space is restricted, MV cables shall be laid above HV cables.

Where cables cross one another the cable of higher voltage shall be laid at a lower level than the cable of lower voltage.

4.3 WAY LEAVE

4.3.1 It may be necessary to obtain way leave for the cable route from the appropriate authorities some of whom are listed below:

a) Drainage, Public Health and Water Works.

b) Telephones and Telegraphs.

c) Gas works.

d) Other Undertakings.

e) Owners of properties.

4.3.2 Where necessary, joint inspection with representatives of other authorities may be arranged so that mutual interests are safeguarded. In case of private property, Section 12/51 of the Indian Electricity Act shall be complied with.

4.4 PROXIMITY TO COMMUNICATION CABLES

Power and communication cables shall as far possible cross at right angles. Where power cables are laid in proximity communication cables the horizontal and vertical clearances shall not normally be less than 60 cms.

4.5 LAYING METHODS

4.5.1 Cables shall be laid direct in ground or in pipes/closed ducts, in open ducts or on cable trays suspended from slab depending on site conditions.

4.5.2 Laying in Pipes/Closed ducts :

4.5.2.1 In location such as road crossing, entry to building, on poles, in paved areas etc. cables shall be laid in pipes or closed ducts.

4.5.2.2 GI or Hume Pipes (spun reinforced concrete pipes) shall be used for such purposes. In the case of new construction, pipes as required shall be laid alongwith the Civil works and jointed according to the instructions of the Engineer-in-Charge as the case may be. The size of pipe shall be as indicated in the electrical drawings. GI pipe shall be laid directly in ground without any special bed. Hume pipe (Spun reinforced concrete pipe) shall be laid over 10 cm. thick cement concrete 1:5:10 (1 cement :5 coarse sand : 10 graded stone aggregate of 40mm nominal size) bed, after which it shall be completely embeded in concrete. No sand cushioning or tiles need be used in such situations. Unless otherwise specified, the top surface of pipes shall be at a minimum depth of 1mtr. from the ground level when laid under roads, pavement etc.

4.5.2.3 Where steel pipes are employed for protection of single core cables feeding AC load, the pipe should be large enough to contain both cables in the case of single phase system and all cables in the case of polyphase system.

4.5.2.4 The pipes on road crossing shall preferably be on the skew to reduce the angle of bends as the cable enters and leaves the crossings. This is particularly important for high voltage cables.

4.5.2.5 Manholes of adequate size as decided by the Engineer-in-Charge shall be provided to facilitate feeding/drawing in of cables and to provide working space for persons. They shall be covered by suitable manhole covers with frame of proper design. The construction of manholes and providing the cover is not in the scope of this Contract and shall be got executed and paid for by the Engineer-in-Charge through another agency.

4.5.2.6 Pipes shall be continuous and clear of debris or concrete before cable is drawn. Sharp edges at ends shall be smoothened to prevent injury to cable insulation or sheathing.

4.5.2.7 Pipes for cable entries to the building shall slope downwards from the building and suitably sealed to prevent entry of water inside the building. Further the mouth of the pipes at the building end shall be suitably sealed to avoid entry of water. This seal in addition to being waterproof shall also be fireproof.

4.5.2.8 All chases and passages necessary for laying of service cable connections to buildings shall be cut as required and made good to the original finish and to the satisfaction of the Engineer-in-Charge.

4.5.2.9 Cable grips/draw wires and winches etc. may be employed for drawing cables through pipes/closed ducts etc.

4.5.3 Laying on Cable Trays

Cables, where indicated in approved shop drawings, shall be laid on overhead cable trays which are suspended from ceiling or supported from wall, by anchor fasteners as required.

The Contractor shall provided for all accessories for the installation of the cable trays, such as bends, tees, reducers coupler plates, trifoil clamps and structural steel members (comprising of channels, angles, flats, rods) to be fabricated at site for structural supports for cable trays racks etc.

5. TERMINATION

Brass single compression glands shall be provided for MV cables termination

6. TESTING

i. All 650/1100 Volt grade cables before laying shall be tested with a 500 V megger or with a 2,500/5,000 V megger for cables of higher voltages. The cable cores shall be tested for continuity, absence of cross phasing, insulation resistance to earth/sheath/armour and insulation resistance between conductors.

ii. All cables shall be subject to above mentioned tests during laying, before covering the cables by protective covers and back filling and also before the jointing operations.

7. CABLE TRAYS

7.1 Prefabricated Cable trays of ladder type and associated accessories, tees, bends, elbows & reducers shall be fabricated from 12 gauge (2.6 mm thick) mild steel. Perforated cable trays and associated accessories tees, elbows, and reducers shall be fabricated from 14 guage (2 mm thick) MS steel.

Cable trays and accessories and covers shall be painted with one shop coat of red oxide zinc chromate primer and two coats of Aluminium alkyd paint.

The Contractor shall provide for all accessories for the installation of the cable trays, such as bends, tees, reducers coupler plates, trifoil clamps and structural steel members (comprising of channels, angles, flats, rods) to be fabricated at site for structural supports for cable trays racks etc.

VI. EARTHING

This section covers detailed requirements for earthing.

1. GENERAL

1.1 The non-current carrying metal parts of electrical installation shall be earthed properly. All metallic structure, enclosures, junction boxes, outlet boxes, cabinets, machine frame, portable equipments, metal conduits, trunking, cable armour, switchgear, distribution boards, lighting fittings and all other parts made of metal in close proximity with electrical circuits shall be bonded together and connected by means of specified earthing conductors to an efficient earthing system. All earthing will be in conformity with the relevant Indian Electricity Rules 1956 and Indian Standard Specification IS : 3043. Every item of equipment served by the electrical system shall be bonded to earthing system.

1.2 Every switch, lighting fixture and 5 Amp outlets shall be provided with insulated copper conductor of 1.5 sq. mm for earthing. The computer workstations shall be earthed with 2.5 sq.mm. insulated copper conductor wire.

1.3 Separate copper earth pits shall be provided for UPS, EPABX & Networking equipment.

1.4 The raceways shall not be used as a grounding conductor.

2. CONNECTION OF EARTHING CONDUCTORS

2.1 Main earthing conductor shall be taken from the earth connections at the PDB to the earthing pit. Circuit earthing conductor shall run from the exposed metal of equipment and shall be connected to any point on the main earthing conductor, or its distribution boards or to an earth leakage circuit breaker. Metal conduits, cable sheathing and armouring shall be earthed at the ends adjacent to switch boards at which they originate, or otherwise at the commencement of the run by an earthing conductor in effective electrical contact with cable sheathing. Where equipment is connected by flexible cord, all exposed metal parts of equipment shall be earthed with 2 no. G.I. strips/wires and non current carrying metallic parts with, 1 no. G.I. strips/wires.

2.2 Neutral conductor, sprinkler pipes, or pipes conveying gas, water or inflammable liquid, structural steel work, metallic enclosures cables and conductors, metallic conduits and lightning protection system conductors shall not be used as a means of earthing an installation or even as a link in earthing system. The Electrical resistance of metallic enclosures for cables

and conductors measured between earth connections at the main switch boards and any other point on the completed installation shall be low enough to permit the passage of current necessary to operate circuit breakers and shall not exceed 1 OHM.

3. EARTH CONNECTIONS

All metal clad switches and other equipment carrying single phase circuit, shall be connected to earth by a single connection. All metal clad switches carrying 3 phase shall be connected with earth by two separate and distinct connections. The earthing conductor inside the building wherever exposed shall be properly protected from mechanical injury by running the same in GI pipe of adequate size. The earthing conductor shall be painted to protect it against corrosion. Earthing conductor outside the building shall be laid 600 mm below finished ground level. The over lapping in G.I. strips in joints shall be welded. Lugs of adequate capacity and size shall be used for all termination of conductor wires. Lugs shall be bolted to the equipment body to be earthed after the metal is cleaned of paint and other oily substance and properly tinned.

4. PROTECTION FROM CORROSION

Connection between copper and galavanised equipment shall be made on vertical face and protected with paint and grease. Galvanised fixing clamps shall not be used for fixing earth conductors. Only copper fixing clamp shall be used for fixing earth conductors. When there is evidence that the soil is aggresive to copper, buried earthing conductors shall be protected by suitable serving and sheathing.

5. EARTHING STATION

5.1 PLATE ELECTRODE EARTHING

5.1.1 Earthing electrode shall consist of a Copper plate of 600 mm X 600 mm X 3 mm or G.I. plate of 600mm x 600mm x 6.3 mm as called for in the Schedule of Quantity. The plate electrode shall be buried as far as practicable below permanent moisture level but in any case not less than 3 meters below ground level. Wherever possible, earth electrode shall be located as near the water tap, water drain or a down take pipe as possible. Earth electrode shall be kept clear of the building foundations and in no case shall it be nearer than 2 meters from the outer surface of the wall.

5.1.2 The earth plate shall be set vertically and surrounded with 150 mm thick layer of charcoal dust and salt mixture. A 20 mm dia GI pipe shall run from the top edge of the plate to the ground level. The top of the pipe shall be provided with a funnel and a mesh for watering the earth through the pipe. The funnel over the GI pipe shall be housed in a masonry chamber approximately 300 mm x 300 mm x 300 mm deep. The masonry chamber shall be provided with a cast iron cover resting over a CI frame. Test facility shall be provided with test links for the earthing station.

5.2 PIPE ELECTRODE EARTHING

Earthing Electrode shall consist of G.I. medium class. 40 mm dia 4.5 m long pipe (without any joint) G.I. pipe Electrode shall be cut, tapered at the bottom and provided with holes of 12 mm dia drilled not, less than 7.5 cm from each other upto 2 M of length from the bottom. Pipe electrode shall be buried in the ground vertically with its top at not less than 200 mm below the ground level. When more than one pipe is to be installed a separation of not less than 2 M shall be maintained between two adjacent electrodes as called for in the drawings. Wherever possible, earth electrode shall be located as near the water tap, water drain or a down take pipe as possible. Earth electrode shall be kept clear of the building foundations and in no case shall it be nearer than 2 meters from the outer surface of the walls. The pipe electrode shall be set vertically and surrounded with 150 mm thick layer of charcoal dust and salt mixture. A 40 mm x 20 mm reducer shall be used for fixing of funnel with mesh. The funnel and mesh have been provided for watering the earth through the pipe. The funnel over the G.I. Pipe shall be housed in a masonry chamber 300mm x 300mm x 300mm. deep. The masonry chamber shall be provided with a cast iron cover resting over a CI frame. The breaked earth pit will be provided with test links in suitable enclosures.

6. ARTIFICIAL TREATMENT OF SOIL

If the earth resistance is too high and the multiple electrode earthing does not give adequate low resistance to earth, as specified in Clause no. 7 then the soil resistivity immediately surrounding the earth electrodes shall be reduced by adding sodium chloride, Calcium chloride, sodium carbonate, copper sulphate, salt and soft coke or charcoal in suitable proportions.

7. RESISTANCE TO EARTH

The resistance to each earthing system shall not exceed 1.0 ohm.

VII. FIXING OF LIGHTING FIXTURES

1.0 FIXING OF LIGHTING FIXTURES

The lighting fixtures and fittings shall be assembled and installed in position complete and ready for service, in accordance with detail drawings, manufacturer's instructions and ready for service, in accordance with detail drawings, manufacturer's instructions and to the satisfaction of the Engineer's Representative. Perfect alignment and the level of the lighting fixtures shall be maintained. Fixing arrangement is detailed in relevant drawings.

1.1.0 LIGHT FIXTURES:

1.1.1 SCOPE:

Scope of work under this section shall include inspection at suppliers / manufacturer's premises at site, receiving at site, safe storage, transportation from point of storage to point of erection , erection and commissioning of light fittings, fixtures and accessories including all necessary supports , brackets, down rods and painting etc as required.

1.1.2. LIGHT FITTINGS-GENERAL REQUIREMENTS:

Fixture shall be installed at mounting heights as detailed on the drawings or instruction on site by the Employers representative.

Fixtures and/or fixture outlet boxes shall be provided with hangers to adequately support the complete weight of the fixture highly secured to a fixture stud in the outlet box. Extension pieces shall be installed where required to facilitate proper installation. Design of hangers and method of fastening other than shown on the drawings or here in specified shall be submitted to the Employer's representative for approval.

Pendant fixture within the same room or area shall be installed plumb and at a uniform height from the finished floor. Adjustments of height shall be made during installation as per instruction's of Employer 's representative.

Flush mounted and recessed fixtures shall be installed so as to completely eliminate light leakage within the fixture and between the fixture and adjacent finished surface.

Fixture shall be completely wired and constructed to comply with the regulations and standards for Electric light fixtures, unless otherwise specified.

Fixture with. Flanges shall be provided for plaster ceiling.

Lamps for permanent installation shall not be placed in the fixtures until so directed by the Employer's representative and this shall be accomplished directly before building portions are ready for occupation.

2.1.4 LED fittings.

Surface mounted fixtures longer than two feet shall have one additional point of support besides the outlet box fixture stud when installed individually. Pendant, individually fixtures four feet long and smaller shall be provided with twin stem/conduit hangers. Stems shall have ball aligners or similar devices and provided for a minimum of 25 mm vertically adjustment. Stems shall be of appropriate length to suspend fixtures at require mounting height.

2.1.10 INSTALLATION

The light fixtures and fittings shall be assembled and installed in position complete and ready for service, in accordance with details, drawings, manufacturer's instructions and to the satisfaction of the Engineer. Wires brought out from junction boxes shall be encased in GI flexible pipes for connecting to fixtures concealed in suspended ceiling. The flexible pipes shall be provided with a checknut at the fixture end.

Pendant fixtures specified with overall stem lengths are subject to change and shall be checked with conditions on the job and installed as directed. All suspended fixtures shall be mounted rigid and fixed in position in accordance with drawings, instructions and to the approval of the Engineer.Fixtures shall be suspended true to alignment, plumb, level and capable of resisting all lateral and vertical forces and shall be fixed as required.All suspended light fixtures etc. shall be provided with concealed suspension arrangement in the concrete slab/roof members. It is the duty of the Contractor to make these provisions at the appropriate stage of construction. Wires shall be connected to all fixtures through connector blocks.

VIII. UPS

1. Technology : PWM IGBT with high frequency (25 KHz or more) or better Technology.

2. Power : On-Line UPS with upgradability minimum 50% (specify the limit, process and cost implication for expanding the power rating).

3. Product Certification /Testing : One of the following

a) ERTL
b) ETDC
c) Sameer
d) STQC
e) I E C
f) ISO 9001

4. Operating Temperature: 0-40 degree Centigrade

5. Humidity : Upto 95%

6. Output Frequency : 50 Hz +/- 0.01% Hz

7. Wave form : Pure Sine Wave

8. Transient Response : +/- 1% maximum under following conditions:

a) Loss or Return of Input AC supply
b) 100% step load

9.	Recovery Time	:	To nominal voltage in less than 10 milli second.
10.	Efficiency (over all)	:	Minimum 95% at full load.
11	.Load Power Factor	:	0.8 lag to unity.
12.	Crest Factor	:	Greater than 3:1
13.	MTBF	:	Minimum 100000 hrs.
14.	Switch over time	:	Zero
15.	Overload Rating	:	110% for 30 minutes 125% for 10 minutes 200% for 1 minutes
16.	Noise	:	Less than 65 dB at 1 mtr.
17.	Switching speed	:	Minimum 2 KHZ

18. Indication : Mains ON/OFF, /Battery HIGH/LOW, Battery ON, Invertor ON/TRIP, O/P HIGH/LOW, Battery HIGH/LOW, Alarm for Battery Discharge.

19. Protection : Input - Over/Under voltage, Over Current.Battery - Over/Under Voltage, Over Current Battery Low Alarm/Trip.

Output - Over/Under Voltage, Over Current. Output - Short Circuit Over Temperature DC Over Current

20. Control Circuitory : Microprocessor based control circuitory be provided and all indications will be digitally displayed using microprocessor based software.

21. Metering : Digital display with multifunctional key panel indicate.

- Output Voltage/Current
- DC Voltage/Current
- Output Frequency

22. Communication Port : SNMP Card

23. Diagnosis & Configuration software : Compatible with Unix/Windows.

J.E(E)

Correction……..
Deletion…….
Insertion…….

24. Out look : Compact size with aesthetically good look (specify the size and weight)

25. Battery: Lead Acid, S.M.F. for 30 minutes back-up under full load. Battery sizing calculations to be submitted.

26. UPS failure : During failure in the UPS equipment the static switch automatically transfer the A.C. load directly to the AC. line in less than 1/4 cycle so that transfer does not affect critical equipment operation.

27. Harmonic Distortion of wave Form : Total harmonic distortion (THD) should be below 2% for linear load and below 3% for nonlinear load.

28. Maintenance by pass switch : The portion of UPS module used to connect the alternator supply to critical load while electrically isolating static switch and invertor for maintenance purpose.

29 Battery disconnect switch : The switch used to electrically isolate the storage batteries from UPS module.

30. Static Transformer Switch : The switch senses an invertor shutdown signal or degradation of invertor output item. It shall automatically transfer the loads from one invertor to the alternative AC power without interruption.

31. Retransfer to invertor : The static transfer switch shall be capable of automatically retransferring the load back to invertor after the invertor has returned to normal voltage and stabilized for period of time.

32. Quality assurance : The manufacturer shall have quality assurance program with check on incoming parts and final products. A final test procedure for product shall include a check of all performance specifications and a minimum 24 hour running.

33. Installation Drawings : After the receipt of order a minimum two sets of installation drawings showing outline dimension, weights and connections and a one line drawing of the UPS shall be sent to the purchaser to be used in planning the installation of the system.

34. Product Documentation : Manufacturer shall supply a comprehensive set of product documentation for:

1. Installation
2. Operation
3. Maintenance

This should include complete outline and external connection drawings and schematic and physical wiring diagrams as well as parts list and parts layout down to the smallest components level. It should include startup and service manuals with complete privation and remedial maintenance and trouble showing instructions. This should include all ancillary equipment and accessories.

35. Training : It is important that at least -2 personnel who are to be responsible for operation and maintenance of UPS be trained at the manufacturer site.

36. Spare parts : The recommended spare parts for 5 years of maintenance are to be listed and should be quoted along with main modules.

37. Material and workmanship. : 1) Workmanship shall be first class in every respect.

2) All material shall be new and of best commercial grade.

3) Brackets and securing hardware shall be electroplated with corrosion resistance material.

4) Internal wiring conductors shall be combined into cable or bundles and shall be tied securely together and numbered or coded to correspond with documentation.

38. Storage Battery : The storage battery shall be furnished with racks connecting hardware and standard service resistance material accessories. The battery shall be delivered charged and filled ready for service.

39. Service Report : Assigned field service report describing start-up and on site testing shall be furnished.

40. Maintenance : If the battery is taken out of service for maintenance by manually opening battery disconnect switch the UPS shall continue to function and meet all the performance criteria specified except.

41. Invertor Efficiency : 96% minimum

42. Protection Class : IP - 20

43. Make of Components

a. Switches : M/s Merlin Gerin / Telemechanique

b. MCCB : M/s L&T / Siemens/ABB/ GE Power/ Legrand

44. Isolation Transformer : Required KVA, 415 Volts, K-13

a.	IS Code	:	As per IS-2026-Part II-1977
b.	Class of Insulation	:	Dry Type, H Class
c.	Input frequency	:	50 Hz. +/- 5%
d.	Configuration	:	Delta-Star
e.	Input (Primary) Voltage	:	395-415V-435V, AC, 3 Wire
f.	Input voltage tolerance	:	10%/-10%
g.	Output (secondary) voltage	:	415V, AC, 3PH 4 Wires
h.	Winding Conductor	:	Electrolytic Grade Enamel Copper conductor, Rectangular H Class, Dual coat strip
i.	Core Material	:	Low loss Special Grade Silicon Steel material
j.	Insulating Class	:	H
k.	Design & testing	:	As per ANSI 57.110 and UL 1561 guidelines for non linear load with K factor 13
l.	Input isolator (MCCB)	:	To be Provided
m.	Cable Entry	:	Input & Output, Front Bottom
n.	Protection	:	IP-20
o.	Cooling	:	Forced Air Cooled (Top Suction)
p.	Member Thickness	:	Load Bearing :- 2.5mm
	Doors	:-	1.6mm
	Covers	:-	1.2mm

The contractor shall make his own arrangement of tools for maintenance of Sub Station/Electrical Installations equipments & following T&P shall always be available at the site of work by the contractor:-

a) Tong tester
b) Gloves- 4 Sets
c) First Aid Box
d) Crimping Tool Kit
e) Meggar (5kV HT and 500 Volts LT)
f) Spanner Set
g) Screw Driver set
h) LN Keys set
i) Earth Tester
j) Blower
k) Hammer, Drill Machine & Spade
l) Different size of aluminum ladder for maintaining the campus street light of different height and fans & fittings.

J.E(E)

Correction……..
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Insertion…….

m)Every wireman/operator should have plier, screw driver of different size, tester for day to day maintenance work.

Note :- The rates quoted shall be inclusive of wages of Electrician/ E&M Operator /Wireman/Khallasi etc i/c relievers, cleaning material, uniform and all taxes and duties etc. as applicable. However service tax, ESI/EPF will be reimbursed to the contractor, on production of proof of deposit of the same with respected govt. department.

J.E(E)

Correction……..
Deletion…….
Insertion…….

LIST OF APPROVED MAKES FOR ELECTRICAL INSTALLATION WORK

S.NO.	DESCRIPTION	MAKES
1	11 KV HT VCB PANEL/EARTH TRUCK	ABB/ SCHNEIDER / SIEMENS
2	VCB – 11 KV	ABB-VMAX / SCHNEIDER–EVOLIS / SIEMENS 3AH5
3	VACUUM CONTACTOR	EPCOS / ABB/ SCHNEIDER
3	11KV / 433 VOLT IOL FILLED TRANSFORMER	SUDHIR / ABB/ SCHNEIDER VOLTAMP/ CROMPTON GREEVES
4	MAIN L.T. PANEL	VIDHYUT CONTROL/ C & S/ NEPTUNE RISHA CONTROL
5	MDB'S / LIFT PANELS / METER BOARDS / FEEDER PILLARS	VIDHYUT CONTROL/ C & S/ NEPTUNE RISHA CONTROL
6	CAPACITOR BANK	DUCATI/ EPCOS/ LEGRAND
7	AIR CIRCUIT BREAKER	ABB (E MAX-PR122)/L & T (U POWER OMEGA-MTX 3.5) SCHNEIDER/ SIEMENS (3WL-ETU45B)/ LEGRAND (DMX3-MP4LSIG) C&S
8	MCCB	SIEMENS 3VL/ L&T (D-SINE)/ ABB T-MAX LEGRAND (DPX3)/ SCHNEIDER/ C&S
9	MPCB	SCHNEIDER/ L&T/ ABB/ SIEMENS LEGRAND (CTX3)/ C&S
10	SWITCH FUSE UNIT AND LINKS	ABB / SIEMENS /SCHNEIDER/ L & T
11	CHANGEOVER SWITCH	HPL – SOCOMEC/ HH ELCON
12	CURRENT TRANSFORMER	ECS/ PRAGATI/ KALPA/AE
13	POTENTIAL TRANSFORMER	ECS/ PRAGATI/ KALPA/AE
14	ELECTRONIC DIGITAL METER WITH LED DISPLAY	NEPTUNE / SECURE/ SUPERIOR
15	MASTER TRIP & AUXILIARY RELAY (ELECTROMECHANICAL)	SCHNEIDER/ ABB/ ALSTOM
16	PROTECTIVE RELAY (NUMERICAL) (O/C, E/F, REF, DIFF)	SCHNEIDER/ SIEMENS/ ABB
17	POWER CONTACTOR &	L&T/ SCHNEIDER (T SYS)/ ABB

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Correction……..
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S.NO.	DESCRIPTION	MAKES
	AUXILIARY CONTACTOR	
18	AUXILIARY RELAY	OMRON/ ABB/ SCHNEIDER
19	OVER LOAD RELAY	L&T / SCHNEIDER/ ABB /SIEMENS
20	TIMERS	SCHNEIDER/ ABB/ SIEMENS/ GIC
21	PROTECTIVE RELAY (IDMT TYPE)	CSPC/ SCHNEIDER/ ABB
22	PROTECTIVE RELAY (NUMERICAL)	CSPC/ SCHNEIDER/ ABB
23	APFC RELAY (MICROPROCESSOR BASED)	EPCOS/ DUCATI/ CONZERV
24	SYNCHRONIZING/AMF RELAY	DEIF
25	TVSS	ASCO/ERICO
26	PLC	ALLEN BRADLEY/SCHNEIDER/SIEMENS
27	CURRENT TRANSFORMER	G & M / AE/ KALPA /PRAGATI
28	POTENTIAL TRANSFORMER	G & M / AE/ KALPA /PRAGATI
29	INDICATING LAMP (LED TYPE)	ESBEE/SCHNEIDER/SIEMENS/VAISHNO
30	PUSH BUTTON (SPRING RETURN)	ESBEE/SCHNEIDER/SIEMENS/VAISHNO
31	DIGITAL MULTI FUNCTION METER	NEPTUNE/SCHNEIDER-CONZERV SECURE/SOCOMEC
32	SELECTOR SWITCH	KAYCEE/L & T/SIEMENS/SALZER
33	TERMINAL BLOCKS	ELMAX/CONNECTWELL/PHEONIX WAGO
34	ANNUNCIATER	MINILEC /ALAN
35	BATTERY CHARGER/POWER PACK	MAHAMAI/VOLSTAT/AE/ALAN
36	11 KV CABLES	POLYCAB/KEI/UNIVERSAL
37	1.1 KV CABLES	RALLISON/POLYCAB/SKYTONE/KEI
38	CABLE GLANDS (SINGLE/DOUBLE COMPRESSION)	STEPWELL/COMET/BALGIA/SMI
39	LUGS	DOWELLS CRIMPING TYPE (BILLER INDIA PVT. LTD.) HAX (BRASS COPPER ALLOY INDIA LTD.)

J.E(E)

Correction……..
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Insertion…….

S.NO.	DESCRIPTION	MAKES
40	TERMINALS	ELMEX/WAGA/PHOENIX
41	CABLE TRAY	SLOTCO/RICO STEEL/STEELWAYS/MEM
42	MS CONDUIT AND ACCESSORIES	B.E.C/JINDAL HISAR/TATA / MK/AKG
43	PVC CONDUIT AND ACCESSORIES	B.E.C/POLYPACK/AKG/ANCHOR
44	PVC INSULATED COPPER CONDUCTOR WIRES 650/1100 VOLTS GRADE FRLS / ZHFR / FR	FINOLEX/SKYLINE/POLYCAB R.R. KABLE/BATRA HENALY
45	DISTRIBUTION BOARDS (POWER COATED WITH DOUBLESHUTTER) / ELCB / RCCB / MCB	LEGRAND (DX3)/HAGAR/SIEMENS
46	ANCHOR FASTNER	HILTI/FISHER
47	WELDING RODS	ADVANI/
48	PAINTS	ICI/ASIAN/SHALIMAR
59	INDUSTRIAL SOCKET OUTLETS	NEPTUNE (BALS)/CLIPSAL
50	SWITCHES AND SOCKETS OUTLETS	HAVELLS/NORTH WEST/LEGRAND (MYRIUS) WIPRO (STYLUS PLUS)/MK (BLENZE)
51	LIGHT FFIXTURS	HAVELLS/ PHILIPS/C&S
52	LIGHTNING PROTECTION SYSTEM (ESE TYPE)	LPI /ERICO
53	ANY OTHER MAKES	APPROVED BY OWNER / ARCHITECT / ENGINEER-IN-CHARGE
54	EXHAUST FAN/ WALL MOUNTED FAN	ALMONARD, CROMPTON GREAVES, HAVELLS, ALSTORM
55	TELEPHONE CABLE AND WIRES	NATIONAL /HEVELLS/HPL

J.E(E)

Correction……..
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Insertion…….

GENERAL CONDITIONS

1. The staffs engaged for the work shall be qualified as per relevant trade rules and also as per Indian Electricity Rules 1956 amended up to date.
2. The Contractor shall provide all necessary tools and plants to his workmen.
3. It is the responsibility of the contractor to keep the electrical installations neat & clean.
4. (a) The contractor shall supply Consumable petty material such as cotton waste, grease, duster, soap, fuse wire, CTC gland, packing, gasket etc. within the scope of work without any claim of additional payment.
   (b) This contract includes the maintenance of all batteries with necessary material i.e. distilled water, petroleum jelly, acid, terminal lead, poles etc i/c. periodic cleaning for which nothing extra shall be paid.
   (c) Labour component for major breakdowns at site is covered within the scope of this contract, only day to day complaints of routine nature are within the scope of this contract
5. The materials used in the work will be got approved from the Engineer-in-charge before use in work.
6. All dismantled materials shall be property of Government and shall be returned to the department, in the store of JE (E) In charge of work.
7. The contractor shall assess the requirement of materials for preventive maintenance & break downs and intimate the Engineer-in-Charge of the work well in advance for taking procurement action by the department.
8. Log books, periodic inspection books & history books for all the services shall be supplied and maintained by the contractor as per Proforma decided by Engineer-in-Charge & same shall be submitted along with running / final payment. Proper register shall be maintained by contractor for consumable materials used at site.
9. If the contractor fails to maintain the services to the satisfaction of the Engineer-in-charge then the department maintain the installations by alternative arrangement, the expenditure thus incurred will be recovered from the contractor.
10. The contractor or his representative, labour will not remove / disturb / dislocate the existing equipments and its parts from its positions until and unless it is authorized by the Engineer-in-Charge. The entire installations should be intact at any time of inspections and as handed over to him at the time of initial taking over for maintenance and operation. The contractor shall be responsible for any damage or theft and shall have to make good to its original shape and description as and when damage / theft etc is noticed or taken place.
11. Persons engaged in maintenance works should be competent for the type of work involved and should have necessary license.
12. In case any accidents during the Operation / maintenance of the equipment leading to injuries / damages to human beings / equipments and / or loss of life , the contractor shall be fully responsible for settling all claims and indemnify the department against any claim arising out of such accidents.
13. Water and electricity for operation / maintenance of the plant will be arranged by the department free of cost.

J.E(E)

Correction……..
Deletion…….
Insertion…….

14. This contract can be terminated any day by the Engineer-in-Charge without assigning any reason at any time during the period of contract. No claim for any compensation will however be entertained due to such termination prior to the expiry of stipulated period of Contract.
15. The contractor will have to continue the maintenance further period after the expiry of this contract at the same rates and conditions of this contract if asked for.
16. This is a purely service contract and the persons employed by the contractor are his own employees and they will have no claim for right of employment in the department. The staff employed by Contractor shall always use a rubber stamp "An employee of M/s. _____" wherever they put their signature on log book, complaint register, diary or any record.
17. The maintenance staff employed shall be present in neat uniform with shoes, badges & Jackets (Address Marked) whenever on duty, the uniform to staff of contractor is liability of contractor. If it is not provided recovery of Rs. 100/- shall be made per day per person.
18. Planned shutdown shall be taken up for the preventive maintenance for the electrical systems in Consultations with the Engineers.
19. A permanent Telephone Contact No. for emergency contact to the contractor shall be given by the contractor to Engineer-in-charge. Failure to response on such telephonic contact number shall attract penalty.
20. The contractor shall arrange to render efficient services as outlined above. However in case he fails to maintain the services to the satisfaction of the Engineer-in-charge and the department has to incur any expenditure to maintain the installations by alternative arrangement the expenditure thus incurred will be recovered from the contractor, for which Engineer-in-Charge decision shall be final.
21. The rates shall be included all taxes, etc. The department will pay nothing extra on this account.
22. The contractor can be terminated by Engineer-in-Charge without assigning any reason by issue of notice period of 30 days at any time during the contract. No claim for any compensation will however been entertained due to such termination of period prior to expiry of stipulated period of contract.
23. Tenderer shall visit the site and acquaint himself with site condition existing, restriction in movement, working hours, security aspects, condition of equipments before quoting for the job. No complaints for loss of labour shall be entertained at later stage on this account.
24. Tenderer shall inspect the installation / plant to be operated and list out the shortcomings in the tender documents. No claim at later stage shall be entertained towards such item.
25. In case any problem the operator should intimate to his contractor as well as Engineer-in-Charge immediately to resolve the problem.
26. The staff provided by the contractor shall be well qualified to operate and monitor the installation as per the requirement.
27. Engineer in charge is not satisfied with the performance of maintenance service, the contract shall be terminated in prior to one month notice.
28. All local safety security, regulations shall be observed strictly.
29. All the materials, whatsoever, to be supplied and provided by the contractor should be of standard and approved quality. These should be got approved from the Engineer-in-Charge of his authorized representative before installation. No payment will be made for any unapproved or sub standard/ rejected materials used on the work. Rejected materials should be removed from the site

of work within 48 hours failing which the same will be liable for removal by the department at the risk and cost of contractor without any liability.

30. Work shall be carried out as per CPWD Specifications wherever applicable. Safety procedure as indicated in CPWD Specifications of Electrical work //Fire Fighting /fire alarm/ D.G Set and Sub Station work should be followed.
31. The rates quoted shall be inclusive of wages of Electrician/ E&M Operator /Wireman/Khallasi etc i/c relievers, cleaning material, uniform and all taxes and duties etc. as applicable. However service tax, ESI/EPF will be reimbursed to the contractor, on production of proof of deposit of the same with respected govt. department.

32. The contractor shall take all precautions for safety of the workmen. If any accident/mis-happening occurs the department shall not be responsible for the same. If any compensation is to be paid to the victim, the firm shall pay the same and no claim in this account shall be entertained by the department.

33. All the cleaning material i.e. soap, duster, PVC tape roll etc. shall be arranged by the contractor at his own cost for cleaning of Electrical Installation & fans, switch gears, DB, Main control panel, Water supply pump, Fire Alarm System/ Wet Riser System/ D.G Set/ Sub Station equipment etc. If cleaning of installation is not found satisfactory at any time, a recovery of Rs. 200/- per occasion noticed per Sub Head shall be made from the bill of contractor.

34. In case the department staff is posted or due to some other reasons, the department reserve the right to terminate the contract in full or part thereof.

35. The contractor shall furnish name & contact number of the persons, who should be contacted during emergency.

36. No T&P shall be issued to the contractor.

37. The contractor shall Provide Biometric Attendance Machine in support of the attendance of the staff and the same shall be got periodically checked from JE (E) / AE (E) concern. Failure to which suitable recovery will be made from the contractor bill as decided by the Engineer-in-charge. Nothing Extra shall be paid on Account of Biometric Machine installation and maintenance

38. In case of any damage to any equipment due to negligence of the contractor's staff the same will have to be made good by the contractor at his cost. Failure to which suitable recovery will be made from the contractor bill as decided by the Engineer-in-charge.

J.E(E)

Correction……..
Deletion…….
Insertion…….

39. Before the start of contract, the contractor is bound to submit the following details alongwith supporting papers of the workers proposed Sub Head wise to be engaged by him. After receipt of confirmation of their suitability from Engineer-in-charge or his authorized representative, they shall be deployed on duty.
    (A) Name & Postal Address with I.D. proof
    (B) Police Verification Certificate
    (C) Photograph with specimen signature.
    (D) Qualification and experience.
    (E) Bank Accounts Details
    (F) ESI/EPF Details

    Before start of work the agency has to got approved detail of workers from Engineer-in-Charge & has to take over the site from J.E. in charge of site.

40. The contractor shall replace the staff, in the event of misconduct by him.

41. The contractor/ Firm is advised to visit the site of work before quoting the rates, in order to ascertain the quantum and location of works.

42. It shall be entirely the responsibility of the contractor to ensure that no unlawful act is done by his persons while on duty. In case any theft/ loss of departmental property takes place due to the negligence or carelessness of his personnel, the contractor will be held responsible and shall make good the same.

43. Therefore said terms and conditions shall be read in conjunction with the general rules and directions for the guidance of Contract form PWD -8.

44. <u>Terms of payment and other facilities for workers.</u>

41.1 The contractor is bound to distribute the salary/ wages to his worker by 7th of each month, positively, by NEFT / ECS as feasible and the report for the same shall be submit to this office. Payment to the contractor shall be made by 15th of every month after receipt of bill complete with all documents mentioned in Sl. No. 16

44.2 The contractor shall deduct worker subscription towards Provident Fund and ESI, as per rules, he shall deposit the same along with his contribution into the respective accounts of the worker and submit the detail to this office for verification.

44.3 On completion of the work or completion of 12 months (from the date of start of the work) whichever is earlier, the contractor shall have to disburse bonus as per Delhi Govt. rates for casual labour to the each worker employed in this work and will submit the proof of having disbursed the bonus, before the release of the final payment.

J.E(E)

Correction……..
Deletion…….
Insertion…….

44.4 The contractor shall take all precaution for safety of the workmen. If any accident / mis-happening occurs, the department shall not be responsible for the same. Consequently any compensation payable shall be at the contractor cost.

J.E(E)

Correction……..
Deletion…….
Insertion…….

Internal Electrical installations & External Lights

1. Persons engaged in maint. works should be competent for the type of work involved and should possess necessary License.
2. Safety procedures as indicated in appendix E to the General Specification for internal work [Part-I: Internal 2005/ 2013] should be duly followed.
3. The number of items to be maintained in a bldg. may be many like fittings, fans, DBs, Earth sets, etc. In order to achieve compliance to the prescribed periodicities for the various activities on them as per the schedule each of these items may be divided into convenient numbers, to carry out the respective activities in sub periods in a cyclic [sequential] order. For example if DB's are to be checked every month and there are 50 DBs in a building these may be checked @ two-three DBs everyday in a sequential order so that all DBs are checked in a month.
4. Maintenance activities carried out as per these schedules should be noted in the maintenance register. When tests are carried out the test results should be recorded with appropriate identification reference. [For example: SDB 7 earth pit No. 4 R/M- wing A etc.]
5. The voltages of supply, total load, current and PF should be noted in logbook everyday, preferably during peak loading time of the day. [In the case of isolated/unattended buildings where it is not feasible to log daily, the period may be increased to weekly or fortnightly as feasible]
6. Inspection of Electrical Installation is intended primarily from Fire Safety consideration. Following points need to be observed as part of inspection and corrective action as necessary should be taken immediately including co-ordination with the client department & Concerned Engineer-in-charge at site as may be required.
    a) Check that- there is no sign of heating up, burning smell, discoloration or sparking at any of the boards [SDBs as well as main boards], and rising mains. These may occur due to over loading or loose termination. Highly unbalanced loading may cause heavy neutral floating currents and consequent heating of neutral conductors and terminals.
    b) No temporary wiring exists anywhere in the bldg.
    c) There is no joint in cords connecting the WTAC units/ Voltage regulators/office equipments like photocopier, PC, etc
    d) No bare wiring exists over the flooring without mechanical protection by a metallic conduit/channel.
    e) The shaft/spaces for electrical services are not misused for storage or dumping rubbish.
    f) The spaces in the front of DBs and sockets are free [without any storage of files/ papers etc]
    g) No addition/alterations are done by the user department to the electrical installation by themselves.
7. Record of loading upto DB level [in each phase in case of 3-ph DBs] should be maintained after measurements using a clip on ammeter. Such measurement should be done as far as possible during peak season [summer & winter] when the loads are likely to be the highest.

8. While cleaning fittings and fans, the fixing/suspending arrangements should also be checked and attended to as necessary. Care should be taken that the alignment is not disturbed.

J.E(E)

Correction……..
Deletion…….
Insertion…….

a) In the case of ceiling fans remove the blades and wash the same with detergent without causing deformation of blade angle. Check the shackle and replace if damaged. Check that down rod is fully screwed upto the last
Thread on both ends and the threads are not loose. If so required replace the down rod of the same size, thickness and length of threading [not less than 20 mm]. Check split pins and replace if any strain deformation or damage is observed. If any other system of suspension had been adopted check the soundness of the same and tighten as necessary. Fix fan blades tightly to the body. Operate the fan at different speeds, the run should be without wobbling/noise.

b) As per specification lubrication needs to be done as necessary. In such cases the fan needs to be brought down after removing the blades. The old grease should be replaced with a fresh one after cleaning the bearing. If damaged the bearing should replaced. When reinstalling the fan the suspension bolts should be well tightened.

9. Insulation tests should be done during monsoon season as per clause 11.2 of CPWD Specifications for Electrical Works Part-I Internal-2005/2013.

10. Earth continuity tests and earth electrode resistant test should be conducted during summer season as per clause 11.4 and 11.5 of the above Specification.

11. It is proposed to provide maintenance services for Electrical & Mechanical Installations at site on Round the clock 7 days a week basis. The contractor shall render the services even on Holidays in case of urgency & requirement, without claiming extra charges/amount for the same.

12. The Details of installation included in the above contract of work.

13. The workers should be provided with adequate tools to enable them to perform their duties efficiently. The sundries materials like cotton waste, grease, distilled water for batteries and fuse wires required for the maintenance and operation shall be provided by the contractor within the amount tendered by him. Other than the material specified above required for maint. & operation shall be regulated through demand cum-consumption register which will have linkage with complaint register.

14. The contractor and or his representative, labour should not remove, disturb, and dislocate the existing equipment and its parts from its position until and unless it is authorized by the Engineer-in-Charge in writing. The entire installation should be intact at any time of inspection. Care shall also be taken not to damage installation by improper handling etc. The contractor shall be responsible for any damage or theft and shall have to make good to its original shape and description as and when damage/theft etc. is noticed or taken place due to wrong operation of the equipment or negligence of the contractor's staff.

15. The contractor will provide Uniform to all staff engaged by him. The suitable identification mark shall be engraved on the pocket of the shirt. The identity card shall be issued by the contractor duly signed by the Engineer-in-Charge. The cost of the uniform and identity card will be born by the contractor.

J.E(E)

Correction……..
Deletion…….
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16. To start with, the contractor shall maintain a complaint register which will monitor the time and receipt/attending the complaint. The contractor shall be responsible for getting signature of the occupant in token of attendance of the complaint in workers diary. The complaint shall be attended to on the same day as early as possible.
In case the contractor fails to attend the complaint in reasonable time [within the same day] then deptt. shall be free to get the complaint attended through other agency and shall deduct the amount from the bill of the contractor at double the rate spent on such work. The judgment of the Executive Engineer will be final in accessing the expenditure involved for attending the fault by the other agency.

17. The contractor shall clean HT/LT switchgears, bus-bars by air blower once in three months.

17.1. The contractor shall examine for cracks and deposits on the bushing/isolators every three months and clean them.

17.2 The Contractor shall clean the contact points of L T switchgears including ACB, contactors and relays of AMF panel etc. with the help of CTC every three months.

17.3 The contractor shall maintain the TRIP supply battery unit as per the recommendation of battery manufacturer. The contractor shall check specific gravity of electrolyte in each cell, DC voltage per cell and final output DC voltage of battery bank with the help of suitable Hydrometer and cell testing voltmeter. This shall be done once in a fortnight.

17.4 Necessary inspections and checking shall also be done in respect of cell terminal post, cell connection, battery joints, interior connection and action for prompt cleaning/ replacing damaged connection, nut & bolts and petroleum jelly shall be applied as and when required. The contractor shall maintain the distilled water level in the batteries. All the entries for the above shall be recorded in the log-book of batteries.

18 Proper preventive maintenance of electrical installation particularly for the following items of work shall be carried out as per period stated against them. The contractor should chalk out the suitable Programme for doing the test result and inform the Engineer-in-charge in advance and same shall be noted in suitable register maintained by the contractor.

Earth Testing	Once in a Year
Insulation Test	Once in six months.
Cleaning of installation	Once in Three Months
Transformer Testing	Once in a Year

19 The contractor and or his representative, labour should not remove, disturb, and dislocate the existing equipment and its parts from its position until and unless it is authorized by the Engineer-in-Charge in writing. The entire installation should be intact at any time of inspection. Care shall also be taken not to damage installation by improper handling etc.
The contractor shall be responsible for any damage or theft and shall have to make good to its original shape and description as and when damage/theft etc. is noticed or taken place due to wrong operation of the equipment or negligence of the contractor's staff.

20 This Contract includes the following:

a) Replacement of materials either consumable and or non-consumable including parts accessories fixture equipment switchgear, lamps fluorescent tubes.
b) Operation of switch gears (HT & LT both)
c) Cleaning of installation including general cleaning of sub-station.

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d) Check indicating lamp.
e) Consumables like electrolyte, distilled water & Jelly.

The department shall supply all the materials for item (a & b) above and the contractor will have to make his own arrangement for supply of materials for other items above.

21. This contract does not include the following:
    a) Spare parts for repairs.
    b) Consumable like HRC fuses, fuel oil, lub./engine-oil and transformer oil.
    c) Overhauling of machineries and equipment.
    d) Rewinding of Alternator.
    e) Repairs of LT and HT joints.
    f) Repairs of Transformer.
    g) Repair to Incoming OCB's, HT, bus-bar, relays, batteries and battery charger.

ADDITIONAL SPECIFICATION, FOR DRINKING WATER SUPPLY PUMP SETS

1. Deputing necessary trained and technically qualified staff to operate the pump installation Round the clock as per the direction of Engineer-in-charge.
2. Maintaining and up keeping of every associated equipment and machinery such as water level indicator, automatic operators, associated electrical panel and accessories in proper functional condition.
3. Recording of all parameters in logbook as prescribed by the department.
4. Bringing to the notice of the department. Any defect mal-functioning of any pump, motor electrical panel, switches, etc. which required immediate attention of the department.
5. Keeping proper watch & ward of the equipment and machinery installations.
6. Servicing and up keeping of the equipment such as motors terminal boxes, pump, incoming cables, cable terminations and associated electrical panel in accordance with the maintenance routine specified. [Annexure –A]
7. Making good losses or damages to the equipment and machinery or any part there-of if as a result of negligence or default of operating staff. The decision of the Engineer-in-charge in this respect being final.
8. Informing the department well in advance about the requirement of any spares and other items necessary for satisfactory operation of the pump installation.
9. Replacement of the spares as supplied by the department and commissioning of pumps or equipment as the case may be.
10. The Contractor would be required to operate the pump in three shift and ensure to depute technically qualified operational staff as below.
    The staff employed shall have following qualification and experienced, practical experience of three years in handling E & M plants including normal running, maintenance knowledge of motor pumps including engines. Moreover he should also have: -

    a) Elementary knowledge of working of pumps and starters (DOL & FASD type)
    b) Familiar to identify & use of mech. tools e.g. spanner, pliers, screw drivers, etc.
    c) Able to identify tools and lubricants commonly used.

d) Be able to start, stop operate a pump and carry out operation e.g. priming, opening and closing of valves tightening of glands and lubricants application.
e) Ability to handle simplex mech. tools e.g. spanners, pliers, screw drivers etc.
f) Ability to read to instrument like pressure gauge, ammeter, voltmeter, APFC, Power Factor etc. & to maintain a daily log book of readings & instruments.

11. After the work is awarded the contractor would be required to furnish the name, father name, qualification, local address of staff proposed to be deputed by him for the job. The staff shall be engaged after particulars are scrutinized and approved by Engineer-in-Charge. Similar procedure shall be followed if he proposes to change the staff there after.
12. For undertaking work such as cleaning and conditioning of valves etc. requiring additional man power, the same will have to be arranged by the contractor as and when required for which nothing extra shall be paid.
13. Specialized highly technical man power e.g. checking of MCCB and adjusting of settings, relays, starters, insulation tests and other such works in pumps except major repairs to pumps and motors, rewinding of motor etc. which will be required to keep the pumps in good condition will also be arranged by the contractor without extra cost for the same.
14. The Engineer-in-Charge reserves the rights to ask the contractor to remove any staff without assigning any reason what so ever the decision of Engineer-in-Charge will be final and binding on the contractor.
15. The contractor shall be fully responsible for the conduct of the staff deputed by him.
16. Place of duty shall be fixed by JE-in-charge and operator concerned shall normally be available at duty place. Before leaving place of duty operator shall make entry in the log-book.
17. The operational staff shall always be as per clause 10 above. In case of unforeseen absence from duty of the operational staff, the same will have to be filled in by making suitable arrangement immediately.
18. The contractor shall make his own arrangement for tools for electrical & mechanical work for the use of their staff. No T&P shall be issued by the department. Operating staff shall be equipped with all necessary T&P and testing equipments so as to attend to normal faults and set them right.
19. Water & power will be supplied free of cost for bonafide use at the work only.
20. All spares of all equipment will be supplied by the department free of cost for the bonafide use of works. However in case it is established that any of the spares & materials have been misused or has been wasted by the contractor staff on account of their negligence, inefficiency or any other reason for which department is not responsible.- recovery will be made from the contractor bill towards the cost of such spares/materials. Decision of Engineer-in- Charge will be final and binding on contractor.
21. In case of any damage to any equipment on account of negligence/ fault of the contractor staff, the same will have to be made good at their risk & cost. Failure of which recovery will be made from contractors bill.
22. During the concurrency of contract the pumps be shall be in physical custody of the contractor and after expiry of contract the plant shall be handed over to department in the similar condition in which it was taken over.

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23. All works e.g. overhauling of pumps, rewinding of motors, [damaged on account of no fault of contractor] replacement of valves, etc. works involving welding, repairs, painting and any other works for which machinery has been sent out for repair, testing will be arranged by the department.
24. Pump Operator is supposed to record his arrival in the logbook. At the earliest opportunity he shall also report to the JE-in-charge and get his reporting acknowledged in the log –book of pumps.
25. The department reserves the right to terminate the contract before/after the expiry of contract period without assigning any reason. This will normally be as a result of unsatisfactory performance of contract. Validity of the contract can however be extended in accordance with clause no. 3 & 4 of the form-8.
26. Before the installations are taken over for operation and maintenance, the Contractor shall duly sign the inventory with the state of pumps, motors, etc. recorded if necessary.

SCHEDULE OF PERIODIC MAINTENANCE

A DAILY CHECKS

1. The water intake level in the sump as well as in the level in Over Head tank shall be Checked and also discharge pressure, voltmeter, ammeter readings shall be checked and recorded in the log-book as and when system run.
2. Cleaning of pump house, floor and machinery& Panel.

B WEEKLY CHECKS

1. To check pump gland packing and add more packing if required.
2. Dusting or blowing inside of all electric panel with compressed air or electric blowers.
3. To check lugs/thimbles/terminal blocks of electrical motor's, switches starters, single phase preventer (SPP), indicating lamp for loose connection and to take remedial steps if required.
4. To check coupling of pumps and motor and to check alignment of pump, rectify if necessary

C WORKS TO BE DONE ON MONTHLY BASIS.

1. To check operation of valves against leaks & proper functioning & to rectify if necessary.

D WORKS TO BE DONE AFTER EVERY THREE MONTH.

1. To check and lubricate the bearings of motor and to keep proper records.
2. To check the foundation bolts of pumps, motors & to take necessary action.
3. To check all electrical motors for earthing & insulation & its proper records.
4. Servicing of switches, starters and adjust the relays and keep proper record.

ADDITIONAL SPECIFICATION, TERMS AND CONDITIONS FOR D.G. SETS.

Scope of work:- The scope of work covered by this contract is an integral part of schedule and include the following.

1) The Contractor would be required to operate the D G set on Mains Failures as and when required and ensure to depute technically qualified operational staff.
2) Fuel and lube oil required shall be supplied by department at FREE OF COST.
3) Any type of major repairs shall be done by the department. However minor rectification of faults is to be carried out by the contractor. Nothing Extra shall be paid on account of this.
4) The operator provided should be well conversant with the system installed and should be knowledgeable to rectify the minor defects.
5) Tools & Plants required for the above job shall be arranged by the contractor.
6) The contractor shall maintain a LOG-BOOK for operation and test run of D G Set in a prescribed proforma.
7) Any type of major faults/breakdown/PF malfunctioning of the system shall be brought to the notice of J E (E) and the Engineer-in-charge immediately.
8) Every day test run for 5 minutes shall be conducted for ensuring proper and smooth function of the system.
9) The department reserves the right to terminate the contract before/after the expiry of contract period without assigning any reason. This will normally be as a result of unsatisfactory performance of contract. Validity of the contract can however be extended in accordance with clause no. 3 & 4 of the form-8.
10) The workers should be provided with adequate tools to enable them to perform their duties efficiently. The sundries materials like cotton waste, grease, distilled water for batteries and fuse wires required for the maintenance and operation shall be provided by the contractor within the amount tendered by him. Other than the material specified above required for maint. & operation shall be supplied by department as and when required.
11) D.G. Operator is supposed to record his arrival in the logbook. At the earliest opportunity he shall also report to the JE-in-charge and get his reporting acknowledged in the log – book of D.G. Sets.
12) The contractor shall supply the electrical material for three month propertunity in advance before start of work. Site will be handed over later on. So that without material maintenance work may not interrupted

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MAINTENANCE ROUTINE

A DAILY CHECKS

1 Keep the D.G. Sets room clean. Wipe out dirt from external surface of engine, generator & control panels.

2 Check the levels of diesel in daily service tank, lubricant oil in engine, crank case and (in case of water cooled engines) water in radiator. Fill/top up as necessary.

NOTE: i) Oil Level should not be above the High Level Mark and Below Low Level Mark on the dipstick, the check being done before start of the engine or after about 20 minutes after stopping of running engine.

ii) Radiator cap must be properly put in position, else there can be aeration i.e. mixing of air with coolant, resulting in over-heating of the engine.

3 Inspect the engine for any leakage of diesel oil, engine oil and coolant in the respective system.

4 Check that the selector in control panel is in AUTO mode in the case of AMF sets.

5 Record the readings of voltage of supply and engine battery voltage.

B WEEKLY CHECKS

a) Check the automatic starting of engine by switching off the Main Supply to AMF panel (For AMF sets only). Non-AMF sets may be started Manually and loaded. Run the set on load for 15 minutes. Observe for any abnormality of noise, vibration, bearing surface heating (whether warm), engine pick up, voltage level and frequency.

b) Check the level of electrolyte in the battery of the engine. Top up with distilled water as necessary, if the battery needs charging (as can be judged by cell voltage), arranged for its charging early and also examine whether trickle charger (if provided) is defective. Dusting or blowing inside of all electric panel with compressed air or electric blowers.

c) Check whether all panel lamps, fuses and instruments are healthy in the control panel.

C MONTHLY CHECKS

a) Check engine radiator for air restriction if any. Clean up. Check the condition of drive belts, hose and radiator cap. Where heat rejection is through cooling tower, check that there is no blockade in spray nozzles and the CT basin is clean. Clean the strainer in water circuit.

b) Clean the battery terminals and apply grease to prevent corrosion. Check specific gravity of the electrolyte.

c) Check the exhaust system for leakage, corrosion and vibration. See whether the exhaust smoke is not very dark.

d) Check that there are no restrictions to air flow in air cleaner.

e) Check that the oil heater is functional.

f) Check coupling with alternator for any sign of fatigue.

D SIX MONTHLY CHECKS.

a) Inspect the electrical control panel and starters to see that all power/control contracts are clean, all terminals are sound and all fuses are intact. Blow out dirt

from machine windings at panels by a blower, check brushes [where provided] of alternators.

b) Inspect all cable end terminations i/c control cables. Tighten as required.

c) Check all safety controls and alarms in the set supply system.

d) Check and change filters of diesel oil, coolant and air cleaner element of the engine after checking total hours of operation and manufacturers recommendations. Drain and change the cooling water [in water cooled sets].

e) Check the belt tension. Tighten if required.

NOTE: New belts will stretch within one hour of operation, these are to be readjusted.

f) Change the crank case breather element for naturally aspirated engines. Clean the screen. Turbo charged engine.

E ANNUAL CHECK

a) Inspect the fuel tank for any sedimentation and Clean up if required.

b) Replace the engine oil as per hours of operation and recommendation of the manufacturer.

c) Check shaft alignment and condition of anti-vibration mountings, in case any abnormal noise or vibration is observed.

d) Blow through radiator core in a direction opposite to the normal flow of air (reserve flushing).

e) Conduct megger test on all cabling, mains and control wiring motors and earth test. (Earth test is to be done in summer and megger test during monsoon).

ADDITIONAL SPECIFICATION, FOR ELECTRIC SUB-STATION

1. Deputing necessary trained staff to ensure healthiness and safe installation of Sub-station once every month.
2. Maintaining & up-keeping of every associated equipment & hardware proper functional.
3. Recording all necessary parameters temperature of transformers, etc. in records/ log books as prescribed by the department.
4. Bringing to the notice of the department any defect, malfunctioning of any associated equipment or switchgear which require immediate attention of the department in due time.
5. Keeping proper watch and ward of equipment & machinery installed in sub-station premises.
6. Servicing and up keeping of switchgears, transformer and associated equipments.
7. Making good all the losses/damages to the equipment or systems if as a result of negligence or default of operating staff.
8. Informing the department well in advance about the requirement of any spares, consumable items necessary for satisfactory operation of the sub-station.
9. Replacement of the fuses, spares or switchgears, etc. as supplied by the department.
10. Recording of the maintenance activities in a prescribed manner.

Note: Technical particulars of all the sub-station equipment and installations that are covered by the scope of this schedule

Maintenance Routine

(Electrical Sub-station including APFC, H.T & LT panels and associated switchgears, etc.)

MONTHLY: -

1) Check transformer oil level & examine transformer for leaks.
2) Remove all loose external dirt with clean and dry cloth of the circuit breaker.
3) Oil of circuit breaker:
   a) Check the oil level of the circuit breaker.
   b) Check also if the oil has become thick or carbonized.
4) Contacts of circuit breaker.
   a) Check for correct alignment of contacts and proper contact pressure.
   b) Also check if three contacts close simultaneously.
   c) Examine for burning and pitting of contacts & its reconditioning.
   d) Smoothen & lubricate the contacts with petroleum jelly.
5) Auxiliary contacts of circuit breaker.
   a) Inspect for any deterioration.
   b) Check for proper contacts and apply a thin film of Vaseline.
6) Insulation of circuit breaker
   a) Clean and examine for signs of damage.
   b) Check insulation resistance.
7) Checking earth resistance & earth connections at joint in substation.
8) Conducting meagre tests for transformers, CT's, PT's
9) Check for proper supporting and level of the transformer.

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10) Tightening the loose connection after disconnecting the transformers.
11) Check for continuity and tightness; correct rating of fuses of main switch in substation.
12) Check for the transformer load condition against rated capacity, Over loading of transformer if any shall be reported to the competent authority for taking suitable action.
13) Examine transformer bushings for cracks and dirt deposits.
14) Check transformer air passage are clear. Check colour of Silica gel, Recondition of Silica gel.

QUARTERLY:-

1) Mechanism of circuits breaker.
   a) Check for tightness for all bolts, nuts and screws.
   b) Check trip plunger and reset correctly.
   c) Check and lubricate racking mechanism, truck wheels, racking inter lock and all other moving parts.
   d) Check operation of tank lowering device and lubricate as necessary.
2) Small wiring and other connection of circuit breaker.
   a) Examine auxiliary wiring and other connections for being intact.
   b) Meagre test for the control wiring, closing and tripping coils etc.
3) Indicators and measuring instruments of circuit breaker.
   a) Check for satisfactory operation, adjust where necessary.
4) CT's and PT's of circuit breaker.
   a) Examine & clean the bushings.
5) Check for proper oil level of the circuit breaker. Top up if necessary & stop any leaks.
6) Transformer connection
   i) Tighten connections, replace worn out thimbles / lugs etc.
   ii) Examine insulating beans on conductors and replace where necessary.
7) Transformer oil level
   i) Check for proper oil level through gauge glass. Top up if necessary.
   ii) Stop any leakages.
8) Bushings and arcing horns of transformer.
   i) Examine and replace the damaged gaskets.
   ii) Adjust the arcing horns for alignment and proper gaps between rods.
9) Measure voltage during maximum load period with a 0-500 voltmeter and adjust the taps, If required, to ensure proper voltage to the consumer.
10) Check the condition of the danger plate and replace if required.

YEARLY :-

1) Load balancing on phases.
   i) Check load on three phase with the help of clip on ammeter under maximum load condition and secure between the three phases balanced loading.
2) Earth testing
   i) Tighten the earth connection.
   ii) Examine and replace broken earth leads conductor with proper size.
   iii) Measure the earth resistance during the driest season of the year of
   (A) Neutral of transformer
   (B) Transformer body and other metal parts.

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SCHEDULE OF WORK

Name of Work: RMO various Electrical and Mechanical works (Internal and External) at Delhi Technological University, Bawana Road, Delhi during 2018-19

Sl.No	Description of Work / Item(s)	Qty	Units	Rate	Amount
1.00	Wiring for light point/ fan point/ exhaust fan point/ call bell point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable in surface / recessed medium class steel conduit,with piano type switch, phenolic laminated sheet, suitable size M.S. box and earthing the point with 1.5 sq.mm. FRLS PVC insulated copper conductor single core cable etc as required. Group C	400.0	Point		
2.00	Wiring for light point/ fan point/ exhaust fan point/ call bell point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable in surface / recessed steel conduit, with modular switch, modular plate, suitable GI box and earthing the point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable etc. as required. Group C	800.0	Point		
3.00	Wiring for light/ power plug with 2X4 sq. mm FRLS PVC insulated copper conductor single core cable in surface/ recessed steel conduit alongwith 1 No. 4 sq. mm FRLS PVC insulated copper conductor single core cable for loop earthing as required	800.0	mtrs		
4.00	Wiring for light/ power plug with 4X4 sq. mm FRLS PVC insulated copper conductor single core cable in surface/ recessed steel conduit alongwith 2 No. 4 sq. mm FRLS PVC insulated copper conductor single core cable for loop earthing as required	500.0	mtrs		

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5.00	Wiring for light point/ fan point/ exhaust fan point/ call bell point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable in surface / recessed medium class PVC conduit,with piano type switch, phenolic laminated sheet, suitable size M.S. box and earthing the point with 1.5 sq.mm. FRLS PVC insulated copper conductor single core cable etc as required. Group B	350.0	Point
6.00	Wiring for light point/ fan point/ exhaust fan point/ call bell point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable in surface / recessed PVC conduit, with modular switch, modular plate, suitable GI box and earthing the point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable etc. as required. Group A	800.0	Point
7.00	Wiring for light/ power plug with 2X4 sq. mm FRLS PVC insulated copper conductor single core cable in surface/ recessed PVC conduit alongwith 1 No. 4 sq. mm FRLS PVC insulated copper conductor single core cable for loop earthing as required	800.0	mtrs
8.00	Wiring for light/ power plug with 4X4 sq. mm FRLS PVC insulated copper conductor single core cable in surface/ recessed PVC conduit alongwith 2 No. 4 sq. mm FRLS PVC insulated copper conductor single core cable for loop earthing as required	400.0	mtrs
9.00	Wiring for circuit/ submain wiring alongwith earth wire with the following sizes of FRLS PVC insulated copper conductor, single core cable in surface/ recessed medium class PVC conduit as required.		
a)	2 X 1.5 sq. mm + 1 X 1.5 sq. mm earth wire	1000.0	mtrs
b)	2 X 2.5 sq. mm + 1 X 2.5 sq. mm earth wire	400.0	mtrs
c)	2 X 4 sq. mm + 1 X 4 sq. mm earth wire	1500.0	mtrs
d)	2 X 6 sq. mm + 1 X 6 sq. mm earth wire	1000.0	mtrs
e)	2 X 10 sq. mm + 1 X 6 sq. mm earth wire	200.0	mtrs
f)	2 X 16 sq. mm + 1 X 6 sq. mm earth wire	200.0	mtrs

10.00	Rewiring for light point/ fan point/ exhaust fan point/ call bell point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable and 1.5 sq.mm FRLS PVC insulatedcopper conductor single core cable as earth wire in existing surface/ recessed steel/PVC conduit including dismantling as required.. Group C	400.0	Point
10.01	Group A	250.0	point
10.02	Group B	125.0	point
11.00	Supplying and drawing following sizes of FRLS PVC insulated copper conductor, single core cable in the existing surface/recessed steel/ PVC conduit as required		
a)	2 X 1.5 sq. mm + 1 X 1.5 sq. mm earth wire	1000.0	mtrs
b)	2 X 2.5 sq. mm + 1 X 2.5 sq. mm earth wire	400.0	mtrs
c)	2 X 4 sq. mm + 1 X 4 sq. mm earth wire	1500.0	mtrs
d)	2 X 6 sq. mm + 1 X 6 sq. mm earth wire	1000.0	mtrs
12.00	Supplying and fixing of following sizes of steel conduit along with accessories in surface/recess including painting in case of surface conduit, or cutting the wall and making good the same in case of recessed conduit as required		
a)	20 mm	400.0	mtrs
b)	25 mm	400.0	mtrs
c)	32 mm	100.0	mtrs
13.00	Supplying and fixing of following sizes of PVC conduit along with accessories in surface/recess including painting in case of surface conduit, or cutting the wall and making good the same in case of recessed conduit as required		
a)	20 mm	250.0	mtrs
b)	25 mm	700.0	mtrs
c)	32 mm	100.0	mtrs
14.00	Supplying and fixing metal box of following sizes (nominal size) on surface or in recess with suitable size of phenolic laminated sheet cover in front including painting etc. as required		
a)	100 mm X 100 mm X 60 mm deep	300.0	Nos
b)	180 mm X 100 mm X 60 mm deep	500.0	Nos
c)	150 mm X 75 mm X 60 mm deep	200.0	Nos

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15.00	Supplying and fixing following piano type switch/ socket on the existing switch box/ cover including connections etc. as required		
a)	5/6 A switch	1000.0	Nos
b)	15/16 A switch	400.0	Nos
c)	3 pin 5/6 A socket outlet	400.0	Nos
d)	6 pin 15/16 A socket outlet	500.0	Nos
e)	Bell push	30.0	Nos
16.00	Supplying and fixing following modular switch/ socket on the existing modular plate & switch box including connections but excluding modular plate etc. as required.		
a)	5/6 A switch	500.0	Nos
b)	15/16 A switch	800.0	Nos
c)	3 pin 5/6 A socket outlet	400.0	Nos
d)	6 pin 15/16 A socket outlet	1200.0	Nos
e)	Bell push	20.0	Nos
f)	Stepped type regulator	200.0	Nos
g)	Blanking plate	500.0	Nos
17.00	Supplying and fixing following size/ modules, GI box alongwith modular base & cover plate for modular switches in recess etc. as required.		
a)	3 Module (100 mmX75 mm)	100.0	Nos
b)	6 Module (200 mmX75 mm)	600.0	Nos
c)	8 Module (125 mmX125 mm)	600.0	Nos
d)	12 Module (200 mmX150 mm)	30.0	Nos
18.00	Supplying and fixing 3 pin, 5 A ceiling rose on the existing junction box/ wooden block including connections etc. as required	500.0	Nos
19.00	Installation, testing and commissioning of ceiling fan, including wiring the down rods of standard length (upto 90 cm) with 1.5 sq. mm FRLS PVC insulated, copper conductor, single core cable, including providing and fixing phenolic laminated sheet cover on the fan box etc. as required.	300.0	Nos
20.00	Installation of 450 mm exhaust fan in the existing opening, including making good the damage, connection, testing, commissioning etc. as required	50.0	Nos

21.00	Dismantling of ceiling fan and painting the same with with one or more coats of spray painting with synthetic enamel paint of approved brand and manufacture to give an even shade, including cleaning of surface with detergent and replacing the damaged rubber reel, nuts and bolts with washers and safety pins, reinstalling the same as required	400.0	Nos
22.00	Providing and fixing following rating and breaking capacity and pole MCCB with thermomagnetic release and terminal spreaders in existing cubicle panel board including drilling holes in cubicle panel, making connections, etc. as required		
a)	100 A, 16 kA,TPMCCB	20.0	Nos
b)	125 A, 16 kA,TPMCCB	20.0	Nos
c)	150 A, 16 kA,TPMCCB	10.0	Nos
d)	250 A, 25 kA,TPMCCB	10.0	Nos
e)	400 A, 35 kA,TPMCCB	10.0	Nos
f)	630 A, 50 kA,TPMCCB	5.0	Nos
g)	125 A, 36kA, FPMCCB	10.0	Nos
h)	630 A, 50kA, FPMCCB	2.0	Nos
23.00	Supplying and fixing following way, single pole and neutral, sheet steel, MCB distribution board, 240 V, on surface/ recess, complete with tinned copper bus bar, neutral bus bar, earth bar, din bar, interconnections, powder painted including earthing etc. as required. (But without MCB/RCCB/Isolator)		
a)	8 way, Double door	10.0	Nos
b)	12 way, Double door	15.0	Nos
b)	16 way, Double door	10.0	Nos
24.00	Supplying and fixing following way, horizontal type three pole and neutral, sheet steel, MCB distribution board, 415 V, on surface/ recess, complete with tinned copper bus bar, neutral bus bar, earth bar, din bar, interconnections, powder painted including earthing etc. as required. (But without MCB/RCCB/ Isolator)		
a)	6 way (4 + 18), Double door	20.0	Nos

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b)	8 way (4 + 24), Double door	30.0	Nos
25.00	Supplying and fixing of following ways surface/ recess mounting, vertical type, 415 V, TPN MCB distribution board of sheet steel, dust protected, duly powder painted, inclusive of 200 A, tinned copper bus bar, common neutral link, earth bar, din bar for mounting MCBs (but without MCBs and incomer) as required. (Note : Vertical type MCB TPDB is normally used where 3 phase outlets are required.)		
a)	6 way (4 + 18), Double door	15.0	Nos
b)	8 way (4 + 24), Double door	20.0	Nos
26.00	Supplying and fixing 10 A to 32 A rating, 40/415 V, 10 kA, "C" curve, miniature circuit breaker suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required		
a)	Single pole 16-32	500.0	Nos
b)	Double pole 20-32	100.0	Nos
c)	Triple pole 25-32	100.0	Nos
d)	Triple pole and neutral 25- 32	100.0	Nos
27	Supplying and fixing following 40 -63 , curve,rating, 240/415 volts, miniature circuit breaker suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required Curve C 10 kA as per IEC 60898		
a)	40-63 A Double pole MCB	100.0	nos.
b)	40-63 A TP pole MCB	100.0	nos.
c)	40-63 A Four pole MCB	60.0	nos.
280	Earthing with G.I. earth pipe 4.5 meter long, 40 mm dia including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe etc. with charcoal/ coke and salt as required		
		20.0	Nos

Correction……..
Deletion…….
Insertion…….

29.00	Earthing with G.I. earth plate 600 mm X 600 mm X 6 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 meter long etc. with charcoal/ coke and salt as required.	20.0	Nos
30.00	Providing and fixing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required.	400.0	mtrs
31.00	Providing and fixing 6 SWG dia G.I. wire on surface or in recess for loop earthing as required.	1500.0	mtrs
	Fittings		
32.00	Supplying, fixing, testing and commissioning of Surface mounted luminaire for 20W LED 1 x 4 feet fixture with extruded thermal polycarbonate housing fixture should be of minimum 2000 lumens (6500 KELVIN) suitable for operation on 230 volt 50 Hz,Single Phase AC supply with electronic driver and all accessories complete for ceiling/wall/ Surface including wiring, connection with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable including earthing etc. as required. Similar to Philips Make, Cat No: BN 550W LED 20-6500 or equivalent preferred make.	50.0	Each
33.00	Supplying, fixing, testing and commissioning of 15W/16W Round shape LED Downlighter suitable for operation on 230V AC supply with minimum 1125 lumens. LED make shall be Nichia, Cree, Citizen having LM 80 Complied as per L70 standard tested for min. 10k hours confirming minimum 50000 burning hours of life 6500K LED's only. LED Driver shall withstand 2kV surge protection. Complete fitting similar to WIPRO make CAT NO. Garnet Slim D821665 or equivalent preferred make.	100.0	Each

34.00	Supplying, fixing, testing and commissioning of Surface Mounted 2 x 2 feet (34/38 watt CEILING LED Light fixture) or equivalent to Philips RC380B G2 LED285-6500PSU OD WH	300.0	Each
35.00	Supplying installation, testing and commissioning of 45 watt LED type street light fitting, road lighting luminaire with high power LED and unique peanut lens with choice of optics to ensure uniform distribution, higher spacing between poles and maintenance free system, Ideal for road width upto 10 mts. (Make : Philips /Crompton/ Bajaj)	50.0	Each
36.00	Supplying, fixing, testing and commissioning of 10/11W LED Bulkhead fixture with min 850 Lumens suitable for operation on 230V AC supply with minimum LED make shall be Nichia, Cree, Citizen having LM 80 Complied as per LM80 standard tested for min. 10k hours confirming minimum 50000 burning hours of life 6500K LED's only. LED Driver shall withstand 2kV surge protection. Complete fitting similar to philips make CAT NO. WT202W LED6S NW PSU S2 PCor equivalent preferred make.	40.0	Each
37.00	Pdg & fixing of of 1x18- LED 4 feet 1 no. LED tube should have better heat dissipation to work more than 30000 hours. Total system Lumen of 18w LED should be 1600-1800 Lumen per watt or above in cool day light (5700K to 6500K)(Make:- Philips/Havells) Philips - Essential LEDtube 1200mm 18W840 I /CG - /Havells -	200.0	Each
38.00	Supplying and fixing of 34 watt LED 4000 K type fitting complete comprising with energy efficient aesthetically designed 4x1 led flat panel which provides soft light and glare free symmetrical illumination constant current electronic driver i/c all connections etc. as reqd. (Make Havells model LHEWEBP6PL1W034)	15.0	Each

38.01	Supplying, Installation, testing and commissioning of 20 watt PVC box type energy efficient LED tube lights surface mounted i/c making connection etc. as reqd. (Wipro/Crompton make)	70.0	Each
38.02	Supplying installation testing and commissioning of 18 watt PLL type energy efficient LED tube in the existing CFL type fittings i/c proper wiring of the fitting alongwith suitable hanging arrangement by providing ceiling hook and chain etc. as reqd. Crompton OR equivalent in Havells / Wipro	500.0	Each
38.03	Supplying and fixing 15 watt Energy Efficient Surface mounted round LED panel with powder coated finshed in white housing i/c making connection etc as required. (Philips DN170 or in equivalent make)	50.0	Each
38.04	Supplying ,Insttalation ,testing and commissioning of 70 watt LED flood light fitting complete with all accessories. (Make:- Philips Model No:- BVP120 LED 70 CW NB FG S1 PSU GR)	40.0	Each
39.00	Supply, installation testing and commissioning of 1200 mm sweep BEE 5 star rating ISI marked ceiling fan capacitor type with double ball bearing suitable for operation of single phase AC supply with maximum power consumption of 50W ,capable to deliver 230 m3/min. speed of 320 rpm (min.) including wiring the down rods of standard length (upto 30cm) with 1.5sq,mm FRLS Insulated copper conductor single core cable etc as required.	200.0	Nos.
40.00	Supplying, fixing, testing and commissioning of following size exhaust/ fresh air fan complete with gravity louver and connection with 3 core flexible wire as required. 300 mm min 1440 RPM fresh air fan Havells make model: heavy duty or equivalent preferred makes	40.0	Each

41.00	Supply of following sizes XLPE insulated (Heavy duty) Aluminium or Copper conductor armoured cables suitable for working voltage upto and including 1100 Volts complete as required and as per specifications. 2 x 6 sq,mm, Al conductor cable2 x 6 sq,mm, Al conductor cable	650.0	RM
42.00	Supply, Receiving and fixing in position, effecting proper connections, testing and commissioning of 70 w ,green line v2 (vrp410) philips Luminaire on existing 9 Mtr MS tubular pole as per specifications, complete in all repects including nipple for fixing of Light fixture on pole.	30.0	Nos
43.00	Design, manufacture, supply, including supervision during installation, testing and commissioning of 2 mm thick MS sheet steel fabricated cubicle type Panel dust and vermin proof complete with hinged and lockable doors . The Sheet Steel shall under go minimum eight tank treatment followed by finishing treatment of powder coating with 70 micron minimum thickness. All the panels shall be floor mounted and dead front construction complete with interconnections. (Form IIIB) The panels shall be FRONT operated, with cable entry from the top. Earth bus shall be part of the panel.) (All MCB to be "C" Curve) The following provisions shall be required to be made in the Distribution Panel as detailed below: The following provisions shall be required to be made in the Distribution Panel as detailed below: All live accessible parts shall be shrouded with 1mm thick polycarbonate/3 mm thick FRP sheet and all equipment shall be finger touch proof. The busbar insulation shall be with heat shrinkable sleeves according to the colour code. SMC shrouds and busbar supports shall be used.		

43.01	All MCCB door handle shall be interlocked and lockable in OFF position. Galvanised hardware with zinc passivation shall be used in fabrication of Switchboards. Suitable Aluminium earth bus to be provided throughout the length of Switchboards. All indication lamps / illuminated push buttons shall be LED type.Coil of all motor starters shall be fed from 440 V / 230 V Control Transformer with bus bar chamber suitable for 300 Amp of suitable size of incoming and outgoing bus bar made out of 2 mm thick CRCA sheet duly painted and providing and fixing of MS frame work made by angle iron of size 40 x 40 x 5 mm of suitable dimension with Depth more than 90 cms upto 120 cms etc complete as reqd.		
43.02	2A SP MCBs shall be used as backup protections. All MCCBs shall be variable plug setting type with thermal magnetic up to 630 A rating and with microprocessor based releases above 630 A rating, line load reversibility, Ics = 100% Icu,& rotary handle. All control& power wiring shall be broughtout upto the cable alley in the terminal blocks. An approval shall be taken for each panel before manufacturing. Provision of one 6/16 amp socket & compartment lighting for each vertical section of main panel. Illuminated push button on Starter Panels of Pumps. Interlocking / Auto start command terminals for starter Panels.All breaking Capacity for ACB to be Ics=100%Icu and Icw for 1 sec..All breaking Capacity for MCCB to be Ics=100%Icu. All MCB to be C Curve		
		10.0	sqmtr
44.00	Supplying of following electrical accessories suitable for existing different type fitting/switch box etc. as required.		
44.01	Tube Starter	800.0	each
44.02	40/36 W Electronic Ballast	1000.0	each
44.03	2 x 36/40 W El. Choke	100.0	each

Correction……..
Deletion…….
Insertion…….

44.04	28 W Electronic Ballast	500.0	each
44.05	18 W Electronic Ballast	500.0	each
44.06	14 W El. Choke	50.00	each
44.07	2 x 14 W El. Choke	20.00	each
44.08	11/13 /14 W Electronic Ballast	500.0	each
44.09	14 W T8 Tube	300.0	each
44.10	14 W T5 Tube	300.0	each
44.11	28 W T5 Tube	300.0	each
44.12	36/40 W Fl. Tube	1000.0	each
44.13	9 W CFL Lamp	1500.0	each
44.14	11W CFL Lamp	1500.0	each
44.15	18 W CFL 2 Pin / 4 Pin	500.0	each
44.16	36 W CFL 4 Pin LED Crompton	1000.0	each
44.17	36 W CFL 4 Pin PLL	1000.0	each
44.18	Call Bell	50.00	each
44.19	Insulated tape 10 mtr	200.0	Roll
44.20	3.15/4 mfd Fan Capacitor	400.0	each
44.20	2.5 mfd Fan Capacitor	400.0	each
45.00	Supplying and replacement of following rating 5 A to 32 A rating, 240/415 V, 10 kA, "C" curve, residual current circuit breaker suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required.		
45.01	25 Amp 2 pole RCCB 30mA	15.0	each
45.02	40 Amp 2 pole RCCB 30mA	15.0	each
45.03	63 Amp 2 pole RCCB 30mA	15.0	each
45.04	40 Amp 4 pole RCCB 30mA	15.0	each
45.05	63 Amp 4 pole RCCB 30mA	10.0	each
46.00	Supply and replacement of Following Item/Accessories in the exisiting Street Light/Compund Light Pole /Fitting/Panel etc as reqd.		
46.01	70 W Copper Ballast Choke	70.0	Nos.
46.02	150 W Copper Ballast Choke	70.0	Nos.
46.03	250 W Copper Ballast Choke	80.0	Nos.
46.04	400 W Copper Ballast Choke	30.0	Nos.
46.05	70 W HPSV Lamp	100.0	Nos.
46.06	150 W HPSV Lamp	50.0	Nos.
46.07	250 W HPSV Lamp	150.0	Nos.

46.08	400 W HPSV Lamp	50.0	Nos.
46.09	70 W MH Lamp	30.0	Nos.
46.10	150 W MH Lamp	30.0	Nos.
46.11	250 W MH Lamp	30.0	Nos.
46.12	400 W MH Lamp	5.0	Nos.
46.13	Ignitor 70/150/250/400W MH /HPSV fitting	40.0	Nos.
46.14	Diamond Shaped roto mounted acryalic diffuser cover	20.0	Nos.
46.15	Rewinding of 1200/1400 mm ceiling fans with super enameled copper wire including inspection of fan suspension arrangement and tightness of nuts and bolts, cotter pin, rubber reel and replacement of the same wherever found defective during inspection for safe running of fan i/c cleaning the fan with detergent i/c less for old dismantle complete etc as required. (Dismantled copper wire should be retained by the firm, rate quoted accordingly)	300.0	Nos.
46.16	Rewinding of 300/450 mm exhaust fan including inspection of fan fixing arrangement and tightness of nuts and bolts i/c cleaning the fan with detergent i/c less for old dismantle complete etc as required.	50.0	Nos.
47	Providing and fixing of pole mounted box (300x200x105mm) size made out of (SMC) sheet moulded compound dust and whether proof (Sintex make GSJB-3020)	50.0	Nos.
48	Supplying and fixing metal box of 150 mm X 75 mm X 60 mm deep (nominal size) on surface or in recess with suitable size of phenolic laminated sheet cover in front including providing and fixing 3 pin 5/6 A socket outlet and 5/6 A piano type switch,connections, painting etc. as required.	75.0	Each

49.00	Supplying and fixing metal box of 180 mm X 100 mm X 60 mm deep (nominal size) on surface or in recess with suitable size of phenolic laminated sheet cover in front including providing and fixing 6 pin 5/6 A & 15/16 A socket outlet and 15/16 A piano type switch, connections, painting etc. as required.	75.0	Each
50.00	Supplying and fixing suitable size GI box with modular plate and cover in front on surface or in recess, including providing and fixing 3 pin 5/6 A modular socket outlet and 5/6 A modular switch, connections etc. as required.	25.0	Each
51.00	Supplying and fixing suitable size GI box with modular plate and cover in front on surface or in recess, including providing and fixing 6 pin 5/6 A & 15/16 A modular socket outlet and 15/16 A modular switch, connections etc. as required.	25.00	each
51.01	Supplying & fixing suitable size GI box wih modular plate and cover in front on surface or in recess including providing and fixing 25 A modular socket outlet and 25 A modular SP MCB, "C" curve including connections, painting etc. as required.	20.00	each
51.02	Supplying and fixing 3mm thick phenolic laminated sheet suitable for existing switchboards, complete as required.	4.00	sq mtr
52.00	Supplying and replacement of following parts/items in the existing panel board for Motor/Pump etc as reqd		
52.01	3 Pole Power Contactor (Type ML 2)	3.00	each
52.02	3 Pole Power Contactor (Type MNX) 80	6.00	each
52.03	Analog Timer Switch	12.00	each
52.04	Single phase preventor	10.0	each
52.05	HRC Fuse 20 to 32 Amp.	12.0	each
52.06	HRC Fuse 35 Amp. 63 Amp.	15.00	each
52.07	HRC Fuse 80 Amp. To 125amp.	15.00	each
52.08	HRC Fuse 160 Amp. to 200 Amp.	15.00	each

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Correction……..
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53.00	Supplying and replacement of fully automatic Star Delta Staters for 30 HP Motor having relay Range 20 -33 Amp. in the existing panel board for Motor/Pump etc as reqd. MU-G30 Make or L&T Eqiuvalent	4.0	Each
54.00	Supplying and replacement of fully automatic Star Delta Staters for 10 HP Motor having relay Range 15 -20 Amp. in the existing panel board for Motor/Pump etc as reqd.	4.0	Each
55.00	Taking out of submersible / monoblock-submersible pump set from the existing bore well with the help of chain pulley and tripod stand along with GI pipe i/c replacement of gaskets, nut-bolts and lowering the same after repairing etc. complete as reqd.	8.00	per job
56.00	Rewinding of following capacity 3 phase multi-stage submersible / monoblock-submersible Pump-set with suitable size water proof copper conductor wire i/c turning & polishing of shaft, replacement of GM bearing bush, thrust bush, thrust plate etc. i/c buy back of dismantle to contractor i/c connection, testing etc as reqd.		
56.01	10 HP	2.00	job
56.02	7.5 HP	1.00	job
56.03	5 HP	1.00	job
56.04	2HP to 4 HP	4.00	job
57.00	Rewinding of burnt out 30 HP 3 Phase Motor with super enamelled copper wire i/c varnishing and replacement the gland Dori, ,Bearing ,Oil Seal and making Coupling allinement and re-installation the same i/c cartage of the Motor from site to workshop to site i/c connection testing re-installation etc complete as reqd. i/c buy back of dismantle to contractor	1.00	job
58.00	Supplying and replacement of 3-phase DOL submersible starter in the existing panel / fixing on the wall surface suitable for upto 5 to 10 HP pump-set i/c drilling holes, connections, testing	3.00	job

Correction……..
Deletion…….
Insertion…….

& dismantling the existing one etc. as required.

59.00	S/I/T/C of 1.5 HP Single Phase Mono submersible pump set with Motor for operation complete as required (Make : KOS -216 in Kirlosker/KSB).(for Priming purpose in Two Nos. of Pump Sets)	4.00	Each
60.00	S/I/T/C of 7.5 HP, 14-stage Borewell submersible pump set capable of delivering 120-160 LPM at a head of 124-108 mtrs directly coupled with submersible electric motor suitable for operation on 415 volts, 3 phase, 50 Hz, AC supply complete as required (Make : Kirlosker KS6B - 0830 /Crompton Model 6W8R7.5 / equivalent make in KSB).	2.00	each
61.00	S/I/T/C of 10 HP, 16-stage Borewell submersible pump set capable of delivering 120-160 LPM at a head of 146-128 mtrs directly coupled with submersible electric motor suitable for operation on 415 volts, 3 phase, 50 Hz, AC supply complete as required (Make : Kirlosker KS6B - 1030+/ Crompton Model / equivalent make in KSB).	2.00	each
61.01	Supplying, installation, tesing and commissioning of 35 mtr head, 150 cumtr per hour discharge Kirloskar make split casing pump Cat no. UP100/38 with bronze impeller, suction and discharge 150 x100 mm fitted with 30 HP, 1440 RPM Kirloskar make motor with tyre coupling and MS frame in existing pipe line i/c dismanling old damaged/burnt out pump-motor i/c making connection etc. as reqd. (Make: Kirloskar or equivalent in KSB/Crompton Greaves)	2.00	each
61.02	Supplying / Fixing of 8 mm dia steel rope 'D' shackle along with pump motor, G.I. Pipe in the borewell etc. as reqd. (USHA MARTIN/Mahadev)	2.00	each

Correction……..
Deletion…….
Insertion…….

61.03	Supplying and fixing of 3 x 4 sq.mm flat submersible cable etc. as reqd. (Finolex, Polycab, Plaza make)	200.0	meter
61.04	Supplying & fixing of following size Sluice valve in they existing system after cutting the rusted bolts and re-installation the same with new nut-bolt etc. as reqd. (Kirlosker make)		
a	100 mm Dia PN 1.6	2.0	each
b	80 mm Dia PN 1.6	3.0	each
61.05	Supplying, installation, testing and commissioning of 46 mtr head, 16.50 cumtr per hour discharge Kirlosker make DB32/40 with bronze impeller, fitted with 15 HP kirlosker make motor with type coupling and MS frame in existing pipe line i/c dismantling old damaged/brunt out pump-motor i/c making connection etc. as reqd. (Make : kirlosker or equivalent in KSB/ Crompton Greaves)	2.00	each
62.00	Servicig and overhauling of 3 Phase 440 V ACB Air Circuit breaker 800 Amp - 2000 Amp. ,overhauling isolating the ACB from supply line complete cleaning of contact with petrol and cleaning powder , checking of the shunt trip oil ,under voltage coil, NO and NC contacts , Wiring, adjustment of Contact gaps, and tightening of all nut and bolts keys, checking of spring action and its release, Cluster Contact Dismantling, SIC Contact Dismantling, Pole Assembly Dismantling, Repairing, Cleaning & Re-Assembling of all parts of ACB etc.	69.00	each
63.00	Servicing and overhauling of 11 KV HT OCB 630 Amp - 1200 Amp. , overhauling isolating the OCB from supply line complete cleaning of contact with petrol and cleaning powder ,adjustment of Contact gaps, and tightening of all nut and bolts keys, checking of spring action and its release, Repairing, Cleaning & Re-Assembling of all parts of OCB.	15.00	each

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Correction……..
Deletion…….
Insertion…….

64.00	Calibration of Over Current and Earth fault relay cleaning of wiring system calibration with secondary injection test kit setting of tripping according to the Load complete with testing and commissioning as reqd.	15.00	per job
65.00	Painting with synthetic enamel paint of approved brand and manufacture of required colour to give an even shade : One or more coats on old work) (i.e. Painting of various metalic surface i/c scraping old paint from HT Panel, LT Panel, Transformer ,Feeder Pillar ,DB's, Loose Wire Box etc as reqd.	250.00	sq mtr
66.00	Supplying & Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size direct in ground including excavation, sand cushioning, protective covering and refilling the trench etc as required.		
66.01	3.5 x 70 Sqmm	600.0	mtr
66.02	3.5 x 120 Sqmm	600.0	mtr
66.03	3.5 x 185 Sqmm	600.0	mtr
66.04	3.5 x 240 Sqmm	700.0	mtr
66.04	3.5 x 300 Sqmm	700.0	mtr
67.00	Supplying and laying of following size 3 Core ,11 KV (UE) Aluminium Conductor, Conductor screen with Extruded Semi Conducting Compound, XLPE insulated, insulation Screening with Extruded Semi Conducting Compound in combination with Copper Tape, Cores Laid up, Innersheath of PVC, Galvanised Steel Flat Strip Armoured and overall PVC Sheathed Cable Conforming to IS 7098/(part-II) 1985 in the existing masonry duct/ Cable alley/ loops/existing cable tray/angle iron frames etc as required.		
67.01	3.5 x 185 Sqmm	100.0	mtr
67.02	3.5 x 400 Sqmm	100.0	mtr

68.00	Supplying and making straight through joint with heat shrinkable kit including ferrules and other jointing materials for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 kV grade as required.		
68.01	3.5 x 70 Sqmm	6.00	Each
68.02	3.5 x 120 Sqmm	6.00	Each
68.03	3.5 x 185 Sqmm	6.00	Each
68.04	3.5 x 240 Sqmm	6.00	Each
68.05	3.5 x 300 Sqmm	10.00	Each
69.00	Development of tube well in accordance with IS : 2800 (part I) and IS: 11189, to establish maximum rate of usable water yield without sand content (beyond permissible limit), with required capacity air compressor, running the compressor for required time till well is fully developed, measuring yield of well by "V" notch method or any other approved method, measuring static level & draw down etc. by step draw down method, collecting water samples & getting tested in approved laboratory, i/c disinfection of tubewell, all complete, including hire & labour charges of air compressor, tools & accessories etc., all as per requirement and direction of Engineer-in-charge.	300.0	hour
70.00	Supply and Top up of Transformer/ Power Oil duly dehydrated in the existing transformer /HT OCB etc as rqd.	600.0	ltr
71.00	Dehyderation of transformer oil of using dehyderation machine to reach the dielectric strengths to the desired level (min 50KV/mm) etc as reqd.	6000.00	ltr
72.00	Tracing and locating of underground LT cable fault by means of fault location sensing machine including pointing out the exact place of fault complete etc. as required at site.	15.0	job

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Correction……..
Deletion…….
Insertion…….

73.00	Tracing and locating of underground HT cable fault by means of fault location sensing machine including pointing out the exact place of fault complete etc. as required at site.	6.0	job
74.00	Supplying and fixing 20mm dia 30 Mtr. Long ISI marked conforming to IS 12585/IS:444 Type II Thermoplastic Hose Pipe in the exisitng hose reel drum etc as rqs	20.00	each
75.00	Supplying and fixing 63mm dia stainless steel branch pipe with 20mm (nominal internal diameter) size stainless steel nozzle conforming to IS 903, suitable for instantaneous connection to interconnect hose pipe coupling as required.	25.00	each
76.00	Supplying and fixing 63mm dia, 15 mtr. Long RRL hose pipe with 63mm dia Male and Female stainless steel couplings duly bended with GI wire, rivets etc. conforming to IS 636 (type-A) as required.	20.00	each
77.00	Providing laying, testing & commissioning of 'C' class heavy duty MS pipe coforming to IS 1239 i/c fittings like elbows, tees, flanges, tapers, nuts bolts, gaskets etc. in ground including excavation & providing cement concrete blocks as supports, anticorrosive treatment with coaltar and asphalt tape as per IS 10221, refilling the trench etc. of following sizes complete as required. (Underground)		
77.01	150 mm	12.00	mtr
77.02	100 mm	12.00	mtr
77.03	80 mm	18.00	mtr
78.00	Providing, fixing, testing and commissioning of 15mm size quartzoid bulb type sprinklers, of rating 68 degree C. pendent with required accessories	200.00	each
79.00	Supplying and fixing of following capacity ABC power Type Fire Extinguisher at variouss location in DTU Campus as per direction of Engineer-in- charge (Life Guard /Omax /Minimax with ISI Marked)		

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Correction……..
Deletion…….
Insertion…….

79.01	6 kg	60.0	each
79.02	4 kg	10.00	each
80.00	Rewinding of burnt out 7.5 HP 3 Phase Motor pump with super enamelled copper wire i/c varnishing and replacement the gland Dori, , Bearing ,Oil Seal and making Coupling allinement and re-installation the same i/c cartage of the Motor from site to workshop to site i/c connection testing re-installation etc complete as reqd. i/c buy back of dismantle to contractor	2.00	job
81.00	Servicing of 7.5 HP 3 Phase Motor with Pump i/c varnishing, greasing , oiling and making Coupling allinement and re-installation the same.	8.0	Job
82.00	(Fire Alarm System) Comprehensive maintenance amd preventive maintenance of conventional/ intelligent fire alarm system and sector indicating panel (zonal panel) intalled at site of work including providing panel electrician and technician in general shift and replacement of defective zonal card, register, switch, on all days of the week including sundays and holidays in general shift complete as per terms and conditions	12.00	Per Month
82.01	Supplying, replacement, Testing and Commissioning of ionisation type smoke detector with mounting base i/c connection etc. as reqd.	50.00	each
82.02	Supplying, replacement, Testing and Commissioning of ROR type heat detector with mounting base i/c connection etc. as reqd.	80.00	Each
82.03	Supply, Replacement, testing and commissioning of Response Indicator etc as required.	50.00	Each
82.04	Supply, Replacement, testing and commissioning of hooters complete with addressable relay output module etc as required.	20.0	Each
83.00	Providing and fixing G.I. pipes complete with G.I. fittings including trenching and refilling etc. external work		
a)	25 mm dia nominal bore	100.0	Meter

Correction……..
Deletion…….
Insertion…….

b)	32 mm dia nominal bore	100.0	Meter
c)	40 mm dia nominal bore	100.0	Meter
84.00	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as per direction of Engineer in Charge.		
84.01	25 mm dia nominal bore	100.0	Meter
84.02	32 mm dia nominal bore	100.0	Meter
84.03	40 mm dia nominal bore	100.0	Meter
85.00	Supplying and replacing Kirloskar or equivalent make ISI marked specification 150mm dia sluice valve with flanges (Class PN 1.0) complete with non rising bronze/ss spindle with , hand wheel incuding the cost of dismentling of existing sluice valve and installation of steel sluice valve , providing and fixing rubber insertion, nuts bolts, washers etc. testing commissioning etc all complete as per direction of E-IN-Charge	2.0	each
86.00	Demolishing brick work manually/ by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer-in-charge.	5.0	Cum
87.01	Charges for gas cutting machine with LPG and Oxygen gas for cutting the dusted MS nuts and bolts with operator	1.0	shift
87.02	Charges for chain pully block, fitter/welding grade and tripod for lifting and working of the sluice valve from the chamber along with accessories tools as required by In charge	1.0	shift

87.03	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in: Cement mortar 1:4 (1 cement : 4 coarse sand)	5.0	Cumtr
87.04	Repairing of sluice valve of size 150 mm dia inculding dismantling of old Sluice Valve 150mm Diax by removing of its nut bolts with gland housing arrangement with the help of puller etc. and taking out complete assembly along with flape of sluice valve to outside from the pump house.	1.0	Job
87.05	Making of M.S Dead Flange for closing of main body from top to make hole by gas cutter at site and rubber packing, nut bolts to closed the main body of sluice valve to make leak proof arrangement in line so that pumping cannot be disturbed	1.0	Job
87.06	Dismantling of 150mm dia sluice valve flap from the nut & spindle & upper dome each part.	1.0	Job
87.07	Replacement of Bronze nut as per sample of 150mm dia sluice valve	1.0	No
87.08	Replacement of S.S. Spindle of single collar dia with machining, threading, collar and making square head for hand wheel for 150mm dia sluice valve	1.0	No
87.09	Assembling of 150mm dia sluice valve by fixing of sluice valve flape with the help of rubber packing, nut bolts. greasing etc. and gland dori with gland plate and closing of complete.	1.0	No
87.10	Credit for dismental items		
87.11	items Kirloskar or equipment make specification 150mm dia sluice valve with flanges (Class PN 1.0)	2.0	Nos
88.00	**Engifest**		
88.01	**Engifest** Providing lighting arrangements by means LED/ LED par light 100 Nos/ Spot/Sodium lighting 20 nos/Rise bulb Temporary Lighting with Halogen 150 nos of lights on tree and surrounding area of boys hostel for engifest newly developed Making connection for 3 days etc. as required	1.0	Per Job

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88.02	Providing of venue wall boundery wall including maksing cloth on Iron pipes arrangment for 450 sq etc. as required	1.0	Per Job
88.03	Providing of tin sheet boundary wall 450 sq meter with masking cloth etc. as required	1.0	Per Job
88.04	Providing of carpetting at venue of size 150ft x 30ft as required	1.0	Per Job
88.05	Hiring of suitable capacity of set silent type for general lighting sound and stage lighting of production occasion for engifest function in concert ground for 3 days including diesel during the function with operation	3.0	Per Job
88.06	Hiring of mobile toilets 9 Nos. proper flush and separate water & waste storage tanks facilities, Making connection, Systematic drainage systems for 3 days etc. as required	1.0	days
88.07	Providing of green rooms 6 nos with roof including chair for 3 days etc. as required	1.0	days
88.08	Provision of hire charges of audio system for Engifest function including 4 top , 2 RCF base, monitor 01, mixer 01, Amplifier, 6 Cordless microphone, JBL base speakers for nos 06, Microphones 01 no of set, liner mixer, for auditorium, for 3 days as per direction of Engineer -In- Charge.	1.0	days
88.09	Provision of hire charges of audio system for Engifest function including 4 top , 2 RCF base, monitor 01, mixer 01, Amplifier, 2 Cordless microphone, JBL speakers for nos 02, Microphones 01 no of set, liner mixer, DJ mixer for Convocation hall , for 3 days as per direction of Engineer -In- Charge.	1.0	days
88.10	Main Stage Backdrop With Text & Logo on Iron Frame, 24 x 10 ft. etc. as reqd direction of Engineer -In- Charge.	1.0	Per Job

G Total RS

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Form of Performance Security (Guarantee)
Bank Guarantee Bond

1. In consideration of the Delhi Technological University (hereinafter called 'The Government) having offered to accept the terms and conditions of the proposed agreement between_____ _____and (hereinafter called 'the said contractor(s) for the work "as per NIT" (hereinafter called "the said agreement") having agreed to production of an irrevocable Bank Guarantee for Rs……(Rupees _____ _____only) as a security/guarantee from the contractor(s) for compliance of his obligations in accordance with the terms and conditions in the said agreement.

   We, _____(hereinafter referred to as "the Bank") hereby undertake
   (indicate the name of the Bank)
   to pay to the Government an amount not exceeding Rs._____ (Rupees_____ _____only) on demand by the Government.

2. We, _____do hereby undertake to pay the amounts due and payable

   Under this guarantee without any demure, merely on a demand from the Government stating that the amount claimed as required to meet the recoveries due or likely to be from the said contractor(s). Any such demand made on the bank shall be conclusive as regards the amount due and payable by the bank under this Guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs_____ (Rupees_____only)

3. We, the said bank further undertake to pay the Government any money so demanded notwithstanding any dispute or disputes raised by the contractors) in any suit or proceeding pending before any court or Tribunal relating thereto, our liability under this present being absolute and unequivocal.

   The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder and the contractor(s) shall have no claim against us for making such payment.

4. We, _____further agree that the guarantee herein contained shall (indicate the name of the Bank)
   remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of the Government under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged or till Engineer-in-Charge on behalf of the Government certified 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 Government that the Government
   (indicate the name of the Bank)
   shall have the fullest liberty without our consent and without affecting in any manner our obligation hereunder to vary any of the terms & conditions of the said agreement or to extend time of performance by the said Contractor (s) from time or the postpone for any time or from time any of the powers exercisable by the Government against the said contractor(s) and to forbear or enforce any of the terms & 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 Government or any indulgence by the Government to the said Contractor(s) or by any such

Correction……..
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Insertion…….

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 guarantee except (indicate the name of the Bank)with the previous consent of the Government in writing.

8. This guarantee shall be valid upto_____unless extended on demand by the Government. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs_____ (Rs_____only) and unless a claim in writing is lodged with us within six months of the date of expiry or the extended date of expiry of this guarantee all our liabilities under this guarantee shall stand discharged.

Dated the _____day of _____for _____(indicate the name of the Bank)