



INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH (IISER) THIRUVANANTHAPURAM

SCOPE OF WORK

NAME OF WORK: **Operation and Maintenance of 33kV and 11kV substations, 11kV Diesel Generator and LT DG sets in IISERTVM campus, Thiruvananthapuram**

1. SCOPE OF WORK:

OPERATION AND PERIODIC MAINTENANCE OF FOLLOWING INSTALLATIONS AND ACTIVITIES ARE TO BE CARRIED OUT:

- i. Operation and periodic maintenance of following equipments of substation consisting of
33 kV Siemens make VCB panel - 4nos.
11kV Siemens make VCB panel - 46nos.
5MVA, 33kV/11kV, Transformer(ONAN) - 2 Nos
2MVA,11kV/433V,Transformer(Cast resin)- 2 Nos
1MVA,11kV/433V,Transformer(Cast resin)- 6 Nos
1250 KVA,11KV/433V, Compact Substation- 1no.
1010KVA, 11KV, Diesel Generator- 2 Nos.
380KVA 415V Diesel Generator-1No.
160KVA 415V Diesel Generator-1No
15KVA 415V Diesel Generator-1No,
20KVAUPS-1no.
Battery Station-4sets
7.2KV, 11kv, Vacuum contactor-3nos.
Generator synchronisation Panel-4 nos.
415V, Air Circuit Breakers-100nos
Protection relays, LT panels, DBs, Internal & External electrical light fittings, earthing stations and its terminations, all HT/LT cables and its terminations etc.
- ii. Printed Log books shall be arranged and maintained by the contractor as per the format approved by IISER.
- iii. Operation and day to day maintenance of Internal electrical Installations of 33kV Main receiving station and 11kV substation-1,2,3,4 and CSS in phase-2 Hostel area covers the servicing of switch gears, protection relays, light fittings, ceiling fans, exhaust fans, wiring, LT panels etc. Proper cleaning of all equipments, floor, cable trench, ceiling, terrace top, outer surroundings of substation etc shall be done as per requirement and as detailed subsequently.
- iv. Monthly removal of bushes and vegetation around the substation premises to be done by contractor. Proper cleaning of all equipments, floor, cable trench, ceiling, terrace top, outer surroundings of substations etc shall be done as per requirement and as detailed subsequently. Expenditure for these cleaning works shall be borne by the contractor.
- v. The staff deployed by the contractor shall, as desired by the EIC carry out routine repairs/maintenance of any other equipments/installations other than those mentioned above which are likely to be installed during the period of the contract to suit the operational requirements of the Substations/IISER Campus.
- vi. The staff deployed by the contractor in SS2 shall attend daily electrical complaints/maintenance/additional works in the hostel and Central dining block area.
- vii. The staff deployed by the contractor in SS3 shall attend daily electrical complaints/maintenance/additional works in the residence area.

- viii. The staff deployed by the contractor in SS4 shall attend daily electrical complaints/maintenance/additional works in the academic area.
- ix. The duty operator will be responsible and have an overall charge for unmanned substations.

2. MONITORING OF ALL EQUIPMENTS:

- i. The Contractor shall monitor the functions of all equipments in the sub stations to make log entry of parameters, supply failure, tripping etc as per the requirements of IISER.
- ii. In case, un serviceability of equipments such as CTs, PTs, Transformers, DGs, HT VCBs, cables, cable end terminations, UPS, battery, MCB, etc. occurred and not because of negligence of operating agency, on the basis of written instruction from EIC, the operating agency shall carry out the rectification/replacement satisfactorily and bill along with original invoice of spares/service charge from the repairing agency to be submitted to IISER for processing. If IISER want to repair the equipment through OEM or authorized service dealer directly, IISER has full right to do so.
- iii. The Contractor shall not carry out any additions/alterations, shifting/removing of the installation himself. The installations shall be handed over back to IISER in good condition at the end of the contract period. Any damages to IISER property noticed due to deliberate/irresponsible attitude of contract staff shall be analysed and necessary amount will be adjusted from the contractor's bill amount/security deposit available with IISER. The decision of the EIC shall be final and binding in this regard.
- iv. Complaints of routine nature such as replacement of spares, cleaning, bush cutting etc. shall be done as per site requirement.
- v. The contractor shall make arrangements for daily monitoring and recording of the status of Central UPS kept at Chemical Science Block, Physical Science Block, Biology Science Block and Animal House in IISERTVM campus.

3. PREVENTIVE MAINTENANCE:

- i. This section specifies the Preventive maintenance requirements of various installations covered under this contract.
- ii. A brief indication of various maintenance checks is mentioned in "ANNEXURE-1" for up keeping of major Electrical & Mechanical installations. However, the detailed schedule for maintenance check shall be prepared by the successful tenderer and got the same approved by the Engineer in charge. However, for carrying out preventive maintenance checks for HT VCBs, Transformers, DGs, HT cable termination etc. shall be executed only after the permission is obtained from electrical section of IISER.
- iii. During the period of the contract, if any other maintenance checks are found to be necessary on any installations, as per original equipment manufacturer or sound engineering practice, the same shall be carried out and no extra claim shall be admissible in this regard. As far as possible maintenance checks shall be carried out during holidays or lean periods without affecting the power supply system/services. The

- contractor shall maintain necessary records for the maintenance checks. An one time check-up by the authorised service agency for the DG sets shall be executed during the period of contract.
- iv. Measurement of earth resistance for all earth pits/mats and meggering of insulation value of all the cables, etc., are to be carried once during the contract period and result to be submitted to the Engineer-in-Charge. One of such testing will be carried out within two months from date of start failing which recovery will be made as per clause no: 15(ii) of scope of work. All earth pit cover shall be painted once in a year with black enamel paint and numbering in yellow point shall be given as per register along with value.
 - v. Preventive maintenance activities specified for the respective system has to be carried out, in time specified by the EIC. Preventive maintenance activities for the system(s) covered in the contract have been detailed in the proceeding annexure. Frequency of certain preventive maintenance activities can be changed by EIC as per guidelines issued from IISER and any additional activities can be added from time to time.
 - vi. Printed registers have to be maintained, for entering all the maintenance activities as per appendixes which shall be signed by the contractor and the Engineer-in-Charge or their authorized representatives. The requirement and format of the log books/registers shall be finalized in consultation with Engineer-In-Charge. Following tentative log books are to be maintained by the agency.
 - a) Maintenance register of earth value(33kV MRS, 11kV SS1,SS2 & SS4)
 - b) Log book for monitoring 33kV side voltage,current,11kV side voltage ,current, frequency, power supply interruption details with time, reason etc.
 - c) Maintenance log books as per Annexure-A to E.
 - d) Daily log book (Shift hand over, take over between staffs, brief of work done, details any incident, complaint etc.).
 - e) Attendance register.
 - f) History equipments register for all major.
 - vii. All required registers shall be procured by the Contractor and after completion they shall become property of IISER. The Contractor has to return the completed registers to the EIC.
 If the Contractor fails to carry out 100% of the preventive maintenance activities on each and every type of installation covered in the scope of work as per the preventive maintenance schedule, recovery as per clause no: 15(iii) of scope of work shall be made.
 - a. The agency shall liaise with KSEB for up keeping the power supply system and coordinate for planned maintenance by KSEB with minimum downtime. All necessary assistance shall be offered by the agency on behalf of IISER.

viii. **BREAKDOWN MAINTENANCE:**

During award of contract, agency shall report the incidence of breakdown immediately to IISER and necessary co-ordination and follow up action till rectification of defect by the concerned agency form part of the scope of work.

4. DURATION OF CONTRACT:

This contract shall be for a period of 365days. IISER reserves the right to extend the period of contract a period up to 120 days on the same terms and conditions, accordingly validity of performance guarantee and security deposit BG also to be extended. If required IISER reserves the right to terminate the contract fully or partially by giving 30 days' notice in writing to the contractor. If in the opinion of the Engineer-in-Charge, it is observed that the contractor is not doing the works satisfactorily as per the terms and conditions of contract, then the Contract can be terminated with immediate effect without giving any reasons thereof.

5. SECURITY:

- i. The Contractor and his employees shall abide by the security regulations framed by IISER from time to time. He shall apply for entry permits submitting the list of personnel being engaged for this work. Any incidental charges for this purpose are required to be borne by the Contractor.
- ii. Loss of any pass shall also attract a penalty as stipulated by the Issuing Authority.
- iii. Any employee of the Contractor who is found to be incompetent to carry out the work(s) or misbehaves shall be intimated to the Contractor, who in turn, has to arrange for a substitute. Apart from arrangement of substitute the Contractor shall ensure that the pass issued to the original employee is returned to the Issuing authority, failing which, penalty as decided by the Authority shall be imposed.
- iv. The contractor has to take moral responsibility for the overall character of the staff employed by him or intends to engage. The contractor has to make sure that no staff should be remaining in the IISER premises after his duty is over.
- v. The contractor shall issue uniform, safety shoes etc and photo identity card to all its employees deployed in the IISER premises and same shall be displayed/used all the time when on duty.

6. LABOUR REGULATIONS:

- i. The Contractor shall abide by the provisions of all applicable laws including the Minimum Wages Act, Labour Laws in respect of the services to be rendered under this contract. It is to be clearly understood by the contractor and intimated by him to his employees deployed for the purpose that this service agreement shall not constitute any relationship of employer/employee between IISER on the one hand and employees of the contractor on the other.

- ii. The rates quoted by the Contractor shall be inclusive of the necessary ESI subscription for the personnel and contribution towards EPF shall be made as applicable. certified copies of certificates / receipts showing details like amount, names and PF/ESI account numbers of beneficiaries from the PF and ESI shall be submitted by the contractor every month before claiming payment, failing which, an amount equivalent of monthly subscription amount shall be deducted from the bill and shall be reimbursed to contractor only upon production of requisite documentary proof and decision of EIC in this regard shall be final and binding to the contractor. The Contractor should display a board with relevant particulars as per the labour regulations after taking over the site.
- iii. The contractor shall engage the necessary manpower who are physically fit, sound in health and having knowledge of safety regulations, the staff deployed for this contract shall be on the permanent rolls of the Contractor. Normally any staff should not be deploy more than one shift per day. If it is unavoidable then agency has to pay him as per labour regulations for additional shift.
- iv. Agency has to pay the wages of staffs not less than the minimum wages mentioned in the Minimum Wages Act and Labour Laws on following category throughout the contract period, failing which his tender will be cancelled. Any financial liability incurred by IISER will be adjusted from the dues of agency including by encashing the BG.
 - 1) Operator
 - 2) Operator assistant
 - 3) DG operator/mechanic.

7. QUALIFICATION OF STAFF DEPLOYED AND MINIMUM REQUIREMENTS OF MANNING FOR OPERATION AND MAINTENANCE:

- i. The details in respect of qualifications and experience of each employee shall be submitted to the EIC, within (15) fifteen days of the issue of the work order.
- ii. The Contractor has to deploy required manpower including reliever in addition to minimum staff requirement shown in Clause no: 20. Any operational failure due to lack of minimum manpower shall lead to a penalty as per clause no:15(i). While deciding the nature of failure and levy of penalty, the decision of the Engineer-in-charge shall be final and binding on the Contractor. Any consequential damage caused to IISER property which is attributable to lack of timely attention shall be recovered from the Contractor's bill at prevailing rates and its decision of the EIC shall be final and binding in this regard.

8. SAFETY REGULATIONS AND PRECAUTIONS:

While carrying out the works, the contractor shall take adequate care and observe relevant safety precautions. Necessary safety gadgets shall be provided by the Contractor to comply with statutory regulations. He shall indemnify IISER against claims for compensation in this regard. Within 15 days of placing of the order, he should arrange for training for the personnel

engaged by him on preventive maintenance, safety regulations, safety precautions and general idea about operation of firefighting equipments, pre and post hazard activities. In continuation to the above training the Contractor should review the situation at regular intervals not exceeding 2 months and take action as per the situation. He should replace the manpower who is not responding to the training.

9. DAMAGE TO IISER PROPERTY:

Any damage caused to IISER's Installations by workers employed by the Contractor during the course of execution of the work shall be made good to the satisfaction of the EIC, failing which, the same will be recovered from the Contractor's bill if proper justification is not given by the contractor. However, the decision of EIC is final and binding on the Contractor.

10. RATES:

The party may quote the rate keeping in view the services to be maintained, manpower to be deployed, EPF/ESI and GST to be paid, etc.

11. TOOLS AND TEST EQUIPMENTS:

All the tools, test equipments and safety gadgets, special T& P and Ladders required for this work shall be provided by the Contractor as per clause no:20 of Special condition of contract.

In addition to above, Each Technician deployed on duty shall possess the following tools.

- i) Nose Pliers - 1 No.
- ii) Cutting Pliers - 1 No.
- iii) Adjustable Spanner - 1 No.
- iv) Double end type spanners - 1 set.
- v) Screw Driver set (5 blades) - 1 set.
- vi) Double test lamp set - 1 No.
- vii) Line tester - 1 No.
- viii) Wire stripper-1 No.
- ix) Ring spanner set- 1No.

12. ANCILLARY MATERIALS:

All the cleaning materials such as cotton waste, cotton cloth or duster, lubricating oil, grease etc. for this work shall be provided by the Contractor. The details of tentative cleaning materials and tools to be made available are indicated in Clause no:20 of Special condition of contract.

13. CONSUMABLE SPARES :

All consumable spares such as indication lamps, connectors etc. shall be replaced as and when required by the agency. Any materials issued by IISER if any shall be handled by the personnel with utmost care and record to be maintained, and the dismantle material is returned to EIC.

14. WORKING HOURS :

The working hours of this contract shall be round the clock (24 hour basis) on all days including Saturdays, Sundays and Public Holidays.

15. PENALTY :

- i. Any operational failure due to lack of man power will be attract penalty of Rs 1000/- per failure.
- ii. As per clause no:3(iv) the earth resistance test shall be conducted within two months from the date of start of work. If the first earth resistance test couldn't be conducted within 2 months a penalty of Rs 5000/- will be levied.
- iii. As per clause no:3, if the contractor fails to carry out the preventive maintenance activity as per schedule a penalty of, Rs 2000/-per installation per month shall be recovered. Any break down or failure including repair charges of such equipments during the period shall be levied to the agency.
- iv. If the duty staffs were found without any safety gadgets a penalty of Rs 1000/- will be levied for each occurrence.

16. DISCREPANCY/DIFFERENCE/CONTRADICTION:

Should there be any difference/discrepancy/contradiction in the provision of the specification of item of work and the description of the item given in the Bill of Quantities, the scope of item shall be taken according to the following order of preference.

- (a) Nomenclature of the items as given in the Bill of Quantities.
- (b) ADDITIONAL CONDITIONS OF CONTRACT.
- (c) Sound Engineering practice as directed by the Engineer-in-Charge whose decision in this regard shall be final and binding on the Contract.

17. QUANTITY INDICATED SHALL ALWAYS BE KEPT AT 33KV MAIN RECEIVING STATION:

I	CONSUMABLES ITEMS FOR DAY TO DAY MAINTENANCE:
a)	Cotton /Choro cloth/baniyan waste - As and when required
b)	Grease - As and when required (HPCL Linton - 2 /, Balmoro, Moly -MI or Licon -2).
c)	Lubricating oil - As and when required
d)	Insulation tape - As and when required
e)	Scrubber- As and when required
f)	Hacksaw (heavy duty and light duty) - 1 each
g)	Petroleum Jelly - 1 Kg/year.
h)	Battery water-as required
i)	Carbon tetra chloride (laboratory type CTC)/CRC/DC-2-26/ Rust remover (200 ml). - As and when required
j)	M-seal/silicon sealant- As and when required
k)	WD40 - As and when required
h)	Synthetic enamel Paint, thinner, Paint brush, emery paper- As and when required for panel markings and other touch up painting as instructed by EIC.
i)	Epoxy paint and Epoxy primer with paint brush for touching up the rusted portions of the electrical installations as and when required.

II	TOOLS & PLANTS : (contractor shall ensure serviceable tools/meters throughout the contract period)
a	Aluminium Ladders (8ft and 12ft) – 4 Sets for each substation.
b	Multimeter (digital) – 2 Nos. (Make: Fluke/ Rishab/MECO)
c	Digital IR meter 1000V and 5000 V –1 no each. (Make: Fluke/ Rishab/Megger/MECO)
d	Earth tester - 1 No. (Make: Waco or Equivalent)
e	Crimping Tool (25sqmm to 400 sq.mm including Die set) – 1set
f	Crimping Tool (up to 16 sq.mm) – 1set
g	Hexagonal socket (19 socket + 6 accessories) - 1 set.
h	Drilling machine heavy duty with hammering/ power including drill bits (up to 26mm)- 2 sets.
i	Screw Driver set (8 blade) - 1 No.
j	Screw Driver set heavy duty cross and minus - 2 Each
k	Nose pliers - 1 No.
l	Claw hammer with handle (500gms) - 1 Nos.
m	Claw hammer with handle(1000gms) - 1 Nos.
n	Torch led (Brite light, Everady) and Emergency light - 2 Nos.
o	Tong tester - 2 No. (0-1000 Amps range) (Make: Fluke/ Rishab)
p	Vacuum cleaner with air blower - 1 Each.
q	Air blower hand held type-1No.
r	Grease gun(lever type) - 1 No.
s	Allen key set up to 10 mm,5/8,1/2,9/16 sizes
t	Bearing Puller and Wire puller - 1 No each
u	H.T. Gloves (33 KV-2 Set and 11 KV-5 Sets)
v	5" angle cutter/ grinder with wheel-1no.
w	Round file-1no.
x	Hole saw cutter- As and when required
y	Torque wrench-2nos.
z	Wireless impact wrench for opening the bolts of the panels-1 no.

Note:-This arrangement is over and above the individual tools set to be issued to Technician on duty.

18. The Contractor shall be responsible to keep the above under his safe custody and watch and ward at his cost and make the above available as and when needed. The above tools and plants are in addition to the tools and test equipments covered under Clause no. 14 of SCC. After taking over the site the Contractor has to provide the T & P mentioned above immediately. If the Contractor fails to provide the T & P / consumables items for day to day maintenance, the same will be procured by IISER at the risk and cost of the Contractor and after completion of the contract period they will become the property of IISER. All the tools and test equipments shall be calibrated from Government approved laboratories and Calibration certificates shall be submitted to EIC within 30 days of award of work. The expenditure towards the calibration shall be borne by the contractor, failing which the same shall be carried out by IISER at agency's risk and cost and recovery amount will be 1.5 times of actual expenditure. The periodic calibration as required also shall be carried out by the agency.

19. MANNING OF EQUIPMENTS/ INSTALLATIONS & MINIMUM QUALIFICATION REQUIREMENTS:

- i. It is required to operate and maintain the installation in the 33kV Receiving station, 11kV substations and Generators for three shifts of 8 hrs. Duration each of normal working hours from 0900hrs - 1700 hrs, 1700 hrs - 0100 hrs and 0100hrs - 0900 hrs. The agency has to provide sufficient staff as a reliever for the staff who will be on duty for week days. All the staff shall be given one day weekly off after working for 6 continuous days. No extra payment shall be made for reliever duty.
- ii.
 - a) **Operator:** He should be Degree in electrical engineering with 1 year experience/Diploma in electrical engineering with three years of experience in HT substation operation or maintenance or installation field which preferably includes handling of 33 kV/11 kV HT installations. He should have sound knowledge in maintaining the electrical system along with registers like preventive, day to day and break down maintenance etc. He should be able to guide the workers properly.
 - b) **Operator Assistant:** The operator assistant employed must be ITI certificate holders in wireman/electrical trade with one year experience in electrical wiring and maintenance works. Preference will be given experience in HT (33kV/11kV) maintenance.
 - c) **DG operator:** The DG operator employed must be ITI certificate holders preferably in Diesel engine mechanic/electrical trade and with one year experience in diesel generator operation and mechanic works. Preference will be given experience in 11kV DG maintenance.
- iii. **Uniform:** For easy identification, all the employees deployed by the agency shall be provided with at least 2 sets of uniforms and one pair of safety shoes and the colour of uniform shall be decided in consultation with IISER. Photo identity card with name, address, designation, date of birth, blood group shall be issued by the agency to all its employees deployed for the work. The employees shall be in uniform and shall wear the ID card always while on duty.

20. MINIMUM STAFF REQUIREMENTS:

This requirement is for engaging of staff on daily basis including weekly holidays and general holidays for the entire duration of contract. (The duty timing and the manpower utilization shall be as per the IISER requirement).

Sl no.	Location	Category	1 st shift	2 nd shift	3 rd shift	Total
1	MRSS/SS1	Operator	1	1	1	3
2	MRSS/SS1	DG operator	1	1	1	3
3	SS2	Operator asst.	1	1	1	3
4	SS3	Operator asst.	1	1	1	3
5	SS4	Operator	1	1	1	3
6	SS4	Operator asst.	1	1	1	3

TOTAL NUMBER OF STAFF- 18 (Excluding reliever).

Note:

- I. The duties shift shown are only for Tendering purpose. On award of work, Duty Roaster shall be put by the contractor in consultation with EIC as per the site requirement.
- II. Reliever of 1 each for Substation Operator, Operator assistant and DG operator must be available with the contractor. The leave reliever, off reliever etc. as per statutory norm shall be entrusted and quote of the agency shall be considering this aspect. Nothing extra will be paid in this regard other than the granted rate.
- III. The technicians, equipments, tools etc. engaged for attending preventive maintenance shall be separate and agency shall be engaged as per site requirement to complete the activity as per preventive maintenance schedule.

PMI SCHEDULE

1. DAILY
 - a. Physical Inspection of all the Electrical installation in the substations
 - b. Entering the electrical parameters in the respective log books.
 - c. Ensuring the General cleaning such as dust and cob web removal in substations
 - d. Station UPS, Battery bank terminations and charger to be inspected.
2. WEEKLY
 - a. Generator test run
3. MONTHLY
 - a. Cleaning of electrical installations in the substation
 - b. Checking the DB tightness
 - c. Physical inspection of HT and LT cables
 - d. Cleaning and removing of grass, bushes etc around the Substation.
 - e. Working condition of all meters and relays
4. YEARLY
 - a. Conducting BDV test of Transformer oil through KSEB and submission of the report to IISER.
 - b. Preventive maintenance of the HT & LT panels which includes cleaning, tightening the terminations and recording the IR readings in the PM register.

NOTE: PREVENTIVE MAINTENANCE FOR TRANSFORMERS & GENERATOR SHOULD BE EXECUTED AS PER THE OEM's USER MANUAL OF THE TRANSFORMER/GENERATOR