

JAMIA HAMDARD

HAMDARD NAGAR, NEW DELHI - 110062

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Expression of Interest (EOI)

For

**Conducting Electrical Energy Audit and Electrical
Safety Audit at Jamia Hamdard Campus, New Delhi**

1. General Information

1	Name of the work	Expression of Interest (EOI) For Conducting Electrical Energy Audit and Electrical Safety Audit at Jamia Hamdard Campus, New Delhi-62
2	Cost of EOI	Rs. 1000.00 Demand Draft in favour of “Jamia Hamdard” New Delhi (Non refundable)
3	Last date of submission and Date and time of opening of bid.	25.07.2022 at 3.30 PM

Jamia Hamdard invites expression of interest (EOI) for conducting Electrical Energy Audit of Jamia Hamdard Campus, New Delhi from Certified Energy Auditors Firms by Bureau of Energy efficiency (BEE) or empanelled accredited Energy Auditors firms for Performance Achieve Trade (PAT).

The bidders are requested to visit the site before submitting their final offer.

2. Objective:

The objective of Energy Audit is-

1. To have Energy Performance Assessment of equipment and utilities in the electrical sub-station, Electric power distribution, HVAC systems, Electric motors and drives, Fans and blowers, Water pumping systems, UPS systems, Lighting systems, Diesel generator sets, Solar Power Plant etc. and other associated installation & equipment of various buildings of the University including study of energy consumption pattern and management of power demand in the building.
2. Based on the above observations, to identify opportunities for energy saving and to have recommendations for the same alongwith cost benefit analysis.

The objective of electrical safety audit is to review the conditions of the existing electrical installation and to recommend measures for further strengthening the system in order to eliminate the electrical/fire hazards and to improve the safety of the personnel and University's assets. The Electrical Safety audit shall mainly focus on:

1. Identifying the potential electrical/fire hazards
2. Providing Safe working environment
3. Smoothing the operation & maintenance of electrical installations.
4. Avoiding loss of human life and University properties.

Ensuring the compliance with relevant codes and practice, statutory rules and regulations.

3. Details of Premises of University:

(The details given are indicative only and are not exhaustive. The contract will cover all existing and future premises of University within the campus.)

The Campus receives 11 KV power supply from BSES which is step down to 440 V at 11/440 KV Transformers and further distributed to all the campus buildings through LT panels distribution system and underground cables.

Additionally, diesel generator sets of 1010 KVA and 500 KVA, are provided to cater essential applications during power outages.

4. Equipment Details:

The tentative details of building & list of equipment/ electric installations, but not limited to, for which audit is to be conducted are detailed below:

A. List of VRF Unit and ductable AC installed at various location of Jamia Hamdard

S.No.	Location	Type and capacity	Make
1.	Hamdard Archive Research Centre	AC plant 140TR (4x35TR)	Train
2.	Cluster Classes Gr. Floor, Central Library Building	VRF system 156HP	Samsung
3.	D/o Chemistry Gr. Floor, SCLS Building	VRF system 30HP	Samsung
4.	Rufaida School of Nursing	VRF system 58HP	Samsung
5.	Rabia Masjid	HVAC 55TR (16.5TRx2, 11TRx2)	Hitachi
6.	D/o Biotechnology 3 rd floor, SCLS	Ductable 31TR	Voltas
7.	Daksh skill centre	VRF system 32HP	Mitsubishi
8.	SPER	VRF system 24HP	Samsung

B. Detail of other ACs

About 1000 Nos. of ACs (window/split/cassette /Tower)

C. List of Pump motors

S.No.	Name of motors	capacity	Qty	Description	Location
1.	Submersible Pump	5HP	01	360' depth 25 stage	AMHR Hostel back side area
2.	Submersible Pump	5HP	01	480' depth 31 stage	Near maintenance Store
3.	Submersible Pump	5HP	01	460' depth 25 stage	Near HCC area
4.	Submersible Pump	6HP	01	460' depth 31 stage	Near Sub Station-2
5.	Submersible Pump	3HP	01	300' depth 33 stage	Near Sub Station-3
6.	Submersible Pump	5HP	01	400' depth 25 stage	New Nursery herbal garden
7.	Submersible Pump	5HP	01	400' depth 25 stage	New Nursery

					herbal garden
8.	Submersible mono block Pump	7.5HP	01	Booster	Near Scholar House Pump Well
9.	Submersible mono block Pump	7.5HP	01	Booster	AMHR underground tank
10.	Submersible mono block Pump	5HP	01	Booster	Near underground tank of HIMSR back side
11.	Submersible (SP) Pump	1HP	01	Booster	Near SCLS back side
12.	Submersible mono block Pump	5HP	1+1	Booster	Near SCLS back side underground tank
13.	Submersible mono block Pump	3HP	01	Booster	Near AMHR underground use for HAHCH
14.	Submersible mono block Pump	10HP	1+1	Booster	Colony purpose
15.	Submersible mono block Pump	7.5HP	1+1	Booster	For FISH near gate no.06
16.	Submersible mono block Pump	10HP	01	Booster	For FISH near gate no.06
17.	Mono block Pump	12.5HP	1+1	Booster	JLN Hostel, Ibne batoota underground tank

D. Details of D.G. Sets Installed at Jamia Hamdard Campus

S.No.	Location	Make	Rating	Qty	Remarks
1	Sub Station no.1 and Nano Building	Stamford Cummins	500KVA	01 no.	Operational
2	Sub Station no.2	Stamford Cummins	1010KVA	01no.	Operational
3	Trolley monted D.G. Set available at JH Campus for emergency	Kirloskar Cummins	125KVA	01no.	Operational

E. Details of ACBs Installed at Jamia Hamdard Campus

S.No.	Location	Make	Rating	Qty	Remarks
1	Sub Station no.2	ABB	800A	04nos.	Operational
		L&T	1000A	07nos.	Operational
2	Sub Station no.1	L&T	300A	05nos.	Do
3	Sub Station no. 5 (near Kendriya Bhandar)	L&T	800A	01no.	Do
		L&T	1000A	02 nos.	Not Operational

4	Archive Building	GE Power Control	1000A	01no.	Operational
5	Fish Building	L&T	2000A	01no.	Do
		L&T	1000A	01no.	Do
6	F/o Rehab building	L&T	800A	01no.	Do
		L&T	1000A	01no.	Do
7	Nano Building	L&T	800A	04nos.	Do
		Schneider	1000A	01no.	Do
8	F/o Science Building	L&T	800A	02 nos.	Do
9	AMHR Hostel	ABB	1000A	04nos.	Do
		ABB	1600A	02nos.	Do
10	JLN Hostel	Crompton Greaves	800A	02nos.	Do
			Total	39 nos.	

F. List of HT Panels at Sub Station No.1&2

S. No	Location	VCB			OCB			RMU			Remarks
		Make	Rating	Qty	Make	Rating	Qty	Make	Rating	Qty	
1	Sub Station No.1		NA	NA	NA	NA	NA	Schneider	400A	01 (1+3)	Operational
2	Sub Station no. 2	OLG	400A	1No.	CG	400A	3 nos	NA	NA	NA	Operational
		CG	400A	1no.	GEC	400A	2 nos	NA	NA	NA	Operational

G. List of the Transformers installed at various location of Jamia Hamdard Campus

S.No.	Location	Make	Rating	Qty	Remarks
1	Sub Station no.1	Crompton Greaves	500KV	01 no.	Operational
		Crompton Greaves	630KV	1no.	Operational
2	Sub Station no.2	Kirloskar	1000KV	01no.	Operational
		Kirloskar	400KV	02nos.	Operational
		Kirloskar	400KV	01no.	Operational
3	Nano Building	Sudhir	500KV	01 no	Operational
4	F/o Pharmacy	CG	750KVA	01 no.	Operational

H. Detail of UPS

S.No.	Details of UPS	Make	Qty	Location
1	1.5 KVA Inv. systems	Luminous	01	V.C. Office
2	05 KVA online UPS (1 Phase to 1Phase)	APC	01	V.C. Secretariat, Board Room, V.C. Office etc.
3	10 KVA online UPS systems (1 Phase to 1Phase).	Emerson	04	Main Data Center, Gr. Flr., Admn. Block
4	40 KVA online UPS systems (3 Phase to 3Phase)	Reilo Pci	01	Computer Center, 1 st floor, Library Building
5	05 KVA online UPS systems (1 Phase to 1Phase)	APC	01	Computer Center, 1 st floor, Library Building
6	10KVA online UPS systems (3 Phase to 1 Phase)	Orion	01	Hamdard Convention Center
7	20KVA online UPS System (3 Phase to 3Phase)	Orion	01	Archives Building (Auditorium)
8	30KVA online UPS systems (Make 3 Phase to 3Phase)	Hitachi	01	Central Library Building, Cluster Class rooms, Ground floor
9	05 KVA online UPS systems (1 Phase to 1Phase)	RS power	01	Central Library Building, 3 rd floor
10	03 KVA online UPS systems (1 Phase to 1Phase)	Nexus	01	Central Library Building, 3 rd floor
11	40 KVA online UPS System (3 Phase to 3 Phase)	Emerson	02	Backside of Nano Building
12	2 KVA Inv. systems (1 Phase to 1 Phase)	APC	01	V.C. Office
13	5 KVA online UPS (1 Phase to 1 Phase)	APC	01	Biotech, CIF 1 st floor, SCLS
14	5 KVA online UPS systems (1 Phase to 1 Phase).	BPS Power	01	VC Lodge
15	6 KVA online UPS systems (1 Phase to 1 Phase)	BPS Power	01	NMR Lab Gr. Floor, SPER
16	10 KVA online UPS systems (1 Phase to 1 Phase)	Eton	01	Telephone Exchange, SCLS
17	11 KVA online UPS systems (1 Phase to 1 Phase)	Eton	01	CRYOTEM Lab, SPER
18	7.5 KVA online UPS System (1 Phase to 1 Phase)	Power One	01	CRYOTEM Lab, SPER
			22	

5. **Scope of Work:**

The Audit activities shall include the following:

- a. **Pre Audit:** Meeting with University's technical team, Visual inspection of the site & verification of various documents regarding energy consumption and electrical installation.
- b. **Audit:** Auditing and performance analysis to determine the condition of electrical

installation as detailed below.

c. Review of key documents and records.

Submission of **Final report** to University as per discussions with the University with suggestions and recommendations for possible areas of energy conservation and cost analysis.

The energy audit shall cover the following, but not limited to:

a. Building Energy Bills Analysis

Analysis of energy consumption pattern in the building with respect to peak demand, load pattern, power factor for the last 02 years.

b. Electricity Supply and Distribution network-

i. Distribution Transformer

Study and analysis of the utility pattern of transformers, checking no load losses of the transformers, including all day Efficiency of each transformer etc. Load distribution pie chart for building (lighting loads, power loads and AC load) Energy consumption by services in the building

ii. LT Distribution Panels

1. General inspection of the LT distribution panel(s) for its maintenance and working including checking all the meters mounted on it.
2. Performing Thermography for the cable termination wherever required and analysis of the observations.
3. Study on Metering system and suggestion for improvement.
4. Detailed examination of the existing energy use of the facility with break up.
5. Study and examination of judicial use of electric energy, cost balance with break up.
6. Performance evaluation of installed capacitors to ensure deliverance of desired output, level of losses, management of system power factor and operation of capacitors.

iii. Power Factor study

1. Running power factor in the facility at main incomers and its distribution networks.
2. Identify ways to maintain power factor and yield better system performance.

iv. Phase voltage and current unbalance

1. Measurement of input current and voltage.
2. Variation in current & voltage waveform between phases.
3. Comparison of the unbalanced system with the prescribed limits.

4. Analyze and calculate the line losses in the distribution system as per available data obtained and datasheet so present.

v. Harmonics Study

1. Identify various levels of voltage & current harmonics.
2. Calculation for total harmonics distortion.
3. Suggestions/ recommendations to improve the level of harmonics in system.

c. Air Conditioning systems

i. Centralized Air Conditioning System

Performance evaluation of existing central air conditioning system(s) in all the areas, measurement and analysis of indoor temperatures and suggest optimizing the energy utilization.

ii. Chillers

1. Measuring all the operating parameters such as water flow (If the actual flow found to be in variation with the designed flow, the same needs to be adjusted to match designed flow before taking observations) inlet & out water temperatures, gas suction & discharge pressure, Power Consumption etc. after stabilizing the parameters.
2. Calculation of operating Input KW per TR (IKW / TR) of Chillers at minimum three different available load conditions for each chiller.
3. Comparison of actual parameters with the design values, and suggestion for corrective actions to be implemented.

iii. Motor load & Pumps Survey

1. To find out efficiency and loading on motors based on the results obtained, recommend means for energy saving. Study the effect of rewinding, phase/current unbalancing, type of starters for big size motors, possible use of VFDs etc.
2. Measuring all the operating parameter such as water flow, suction & discharge head, power consumption etc.
3. Performance Evaluation of chilled water & Condenser water pumps and compare the same with the design or generally expected efficiency of such pumps.

iv. Package precision Air Conditioners | Split or window air conditioners

1. Evaluation of operating Coefficient of Performance (COP) of Precision and package Air Conditioner. Identification and suggestions for performance improvement and energy saving potential.
2. Calculation of actual tonnage and comparison of actual parameters with the design values and corrective actions.

d. Uninterrupted Power Supply (On-Line)

1. Measurement and analysis UPS loading, redundancy, operating efficiency, no load and on load losses, load pattern to suggest measures for energy cost reduction, Measurement, and analysis of Harmonics as per standards and total harmonic distortion calculations.
2. Numerical Values of operating load losses, no load losses, and operating efficiency of UPS.

e. Lighting

1. Examination of the performance of existing lighting system in all the areas, measurement of illumination levels and comparison with standards, etc
2. To look possibilities to reduce energy use by incorporating energy efficient lighting system.
3. Study of operating electrical parameters like voltage, current etc in the lighting circuits.

f. Diesel Generator Sets

1. General Inspection of DG set.
 - i. Checking of ventilation arrangement for the DG set room.
 - ii. Checking of loading pattern of DG Sets.
 - iii. Checking adequacy of capacity of DG set w.r.t to actual requirement along with the type of load taken on DG and evaluating its necessity.
 - iv. Checking noise level of DG sets.
 - v. Checking of effectiveness of cooling system for DG
 - vi. Checking of per unit power generation w.r.t consumption.
 - vii. Specific fuel consumption (KWH/Ltr) of DG sets.
2. The DG sets are to be tested for operational performance and parameters including Voltage, Current, KW, KWh, KVA should be recorded during the audit

g. Fire Hydrant Pumps and Domestic water Pumps

1. Performance analysis of all major motors needs to be studied for possible energy savings opportunities by the application of following items.
 - i. Possibility of on /off control
 - ii. Interlocking
 - iii. Downsizing motors etc.
- h. Energy Audit Report Observations with detailed Analysis

The report shall contain complete building information, inventory of all equipment. It should include the log sheet data collected/measured at site, analysis of data (Log sheet and actual measured), observations of operational performance of various equipment, findings, and recommendations for achieving energy and cost saving.

The Electric Safety Audit shall be carried out to shall cover the following, but

not limited to :-

1. Physical inspection of the premises with reference to applicable Indian Standards, Indian Electricity Rules and other relevant codes of Practice & identifying electrical hazards (shocks, fires, etc.).
2. Physical Inspection and review of all electrical panels, distribution boards and electrical network protection devices / system including fuses, ELCB, MCB, MCCB, ACB master electrical switch, etc. to identify the electrical hazards like shock, fire, explosion, overloading etc. and recommend electrical safety solutions. Identification of naked wires, joints, loose hanging wires, cables not dressed properly, inadequacy of installation (glands, lugs, armoured cables, cable entry sealing), broken switches, sockets etc.
3. Review of adequacy size of cables, motors, etc. based on actual load current measurements and cable current carrying capacities.
4. Review the EPM (Electrical Preventive Maintenance) program and to examine documentation, checklists, test records, etc. and to suggest recommendations as per applicable standards.
5. Preparation of Earthing layout encompassing all the accessible and working earth pits in the premises. Each earth pit should be given a unique identification number and marked.
6. To evaluate the Earthing system (installation and maintenance) based on IS 3043 (or latest available IS standards) including availability, upkeep and testing of earth pits and to suggest recommendations. Verify continuity of earth strip/conductor from the earth pit to the earth terminal of electrical equipment.
7. Identification of any unbalancing of load: The unbalancing/overloading, if any, in the electrical installation viz. transformers, LT panels, Emergency panel, Floor Distribution Panels, Distribution Boards etc shall be identified with the help of measuring equipment.
8. Identification of Hot Spots using thermal camera: The hot spots, if any, in the electrical installation panels and distribution boards shall be identified with the help of thermal imaging/thermography
9. Checking Record of test reports carried out by the OEMs or their authorized representatives for proper functioning of transformers, HT/LT switchgear and proper functioning of their protective relays, failsafe interlocking of Circuit breakers
10. Checking of Elevators for passenger and freight/bullion movement and passenger safety testing including testing of door safeties, alarms, overload protection and Automatic rescue

devices, firemen control/switch, wiring in shaft and machine room etc. provided in the lift installations and gaps if any shall be identified and indicated in the audit report.

11. Physical inspection of the sources of power supply viz Transformers, substation equipment, DG set , UPS installations and associated power distribution electrical installations including power supply systems & wirings for server rooms, IT equipment etc shall be done with reference to applicable Indian standards, Indian Electricity Rules and other relevant codes of practice. Any leakage of oil in transformer, capacitor banks, diesel/water/oil in DG sets, leakage of oil/refrigerant in AC plant, leakage of water in lift shaft, leakage of water over any electrical equipment etc to be checked.

12. Checking provisions and sufficiency of AC services comprising AC units/PAC systems and ventilation systems in areas housing electrical/IT equipment in 24x7x365 operations namely UPS systems, battery rooms, server rooms etc as per existing circulars and guidelines issued by the Bank. Checking of the alternate operation of the standby fans/AC units through timers or any OEM installed logic circuits etc for proper operation

13. Checking of the protection devices in upstream and downstream switchgears and their settings to ensure that the same are in the desired graded manner as designed as per the requirements of existing standards including setting/adequacy of ELCB and their ratings for earth leakage protection.

14. Checking of the Lightning protection system of the building and ensuring that lightning arrestors are connected to two isolated earth pits. These pits should not be connected to electrical system earth.

15. Checking of Illumination level in various working area as per standard and identifying gaps/shortfalls if any as per process/area requirement.

16. Checking of the provision of electrical shock treatment chart in Hindi and local language near electrical equipment and substation. Checking the record of the training provided to the electrical staff on electrical safety, shock treatment and to handle emergencies and artificial respiration.

17. Check availability of danger signboard/electric shock prevention chart.

18. Check availability of rubber mats, rubber gloves, etc.

19. Provision of identification tag of cables, cable glands, sealing of cable entry and unused holes.

20. Provision of inspection of indicating lamps, meters, etc. on the control panels.

21. Use of 3-pin plug and socket & proper arrangement of L & N inside them.

22. Checking of the provision of electrical shock treatment chart in Hindi and local language near electrical equipment and substation. Checking the record of the training provided to the electrical staff on electrical safety, shock treatment and to handle emergencies and artificial respiration.

23. To check the provision and use of proper height, strong and properly insulated ladders for the maintenance work.
 24. To check the provision of proper ventilation of substation, transformer rooms, electrical panel rooms and battery rooms etc.
 25. Arrangement for repair and maintenance of electrical installations, equipment and appliances including qualified maintenance personnel, accessibility, and maintenance practices, etc.
 26. Adequacy of rating of electrical equipment and installation.
 27. Adequacy of isolation of current carrying parts.
 28. Lightning protection in building/campus.
 29. Weather protection of outdoor electrical equipment and fittings.
 30. Cables – dressing, routing, identification tags, glands, lugs, armoured earthing, sealing of cable entry and used holes, adequacy for current carrying capacity, colour coding
 31. UPS and battery room.
 32. Review of the following test records, (if any) evaluating the test results and to suggest recommendations as per applicable standards.
 33. Insulation resistance tests
 34. Earth resistance tests.
- In addition to above, checking for any shortfalls in the existing electrical systems which impact on human and fire safety.

Quoted Offered Amount

Rs.

(in words):

Authorized signatory

with stamp