

Annexure - III

SITC of 320 KVA DG Set at IUCAA, Pune

| Sr. No. | Description | Unit | Qty | Rate (Rs.) | Amount (Rs.) |
|------------|--|------|-----|------------|--------------|
| 1.0 | DIESEL GENERATING SET | | | | |
| | <p>Design, manufacture, assembly, testing at works, supply, erection, testing & commissioning at site as per specifications complete in all respect of DG Set of 320 KVA prime rating as specified below: 415 Volts, 3 phase 4 Wire, 50 Hz, 1500 RPM AC alternator coupled with Radiator Cooled Diesel Engine complete with all accessories, like self starting device, fly wheel coupling with guard, V belts, cooling system, instrument panel comprising of switch with key, starting battery & battery charging device, safety control for lub oil pressure with tripping etc. The alternator insulation shall be class 'H' with temperature rise limited to Class 'F' value suitable to withstand tropical conditions and shall generally comply with BS 5514 and IS 10002. The over load capacity shall not be less than 110% of rated capacity for 1 hour in every 12 hours. DG Set shall be enclosed in an acoustic enclosure. The enclosure shall have provision of space required for inspection and minor maintenance. 24 Volt Lead Acid rechargeable battery set of adequate AH rating complete with teak wood battery stand, suitable trickle/boost chargers, battery leads. Neutral CT of suitable ratio & Class PS accuracy mounted in the terminal box for Alternator REF protection shall be included. The governer class shall be G2/A1 as per ISO 8528 part V, Lube oil change period shall not be less than 500 Hrs. Voltage deep shall not exceed 20%. Voltage built up shall not more than 1 sec. Fuel consumption shall be linear after 50% of load.</p> | | | | |
| | <p>The DG set shall be mounted on a suitable designed fabricated rigid common base frame with antivibration pads to provide not less than 99% vibration isolation. First filling of lube oil & HSD shall be included in DG Sets cost. The DG Set shall include all standard accessories, fittings, instruments and 3 sets of operating & maintenance manuals, spare parts list etc. complete as per technical specifications. The DG set shall be inclusive of AMF controller as per specification given, Fuel day oil tank as per item no.4.1, Silencer as per item no. 3.1 etc. complete as required</p> | | | | |
| | <p>The DG Set shall be subjected to load tests at factory before despatch & IUCAA site after installation in the presence of IUCAA's representative with consultant. All consumables required during testing of DG Sets at factory & site testing shall be included in the scope of DG vendor. All consumables required during trial run of DG Sets on load for 13 hours out of which six hours for run up to full load, followed by six hours on full load and concluded by one hour 110% overload capacity to be arranged by DG Vendor. Also, vendor to arrange the 110% of rated capacity load availability for testing. The test shall be carried out as per Technical Specification & records to be submitted for approval. (The formats of all tests carried out at factory & at site with details of relevant standards as per latest standards & permissible limits should be submitted by DG vendor for reference along with tender).</p> | | | | |

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| | The design of DG Sets shall confirm to the requirement of CPCB II norms for all parameters including flue gas emission and noise level. DG set should be provided with standard accessories like anti vibration pads, AVR, electronics governor, breaker, MFM, microprocessor based controller, control cables, power cables complete as required up to AMF panel. BMS compatible ports & I/Os. | | | | |
| | | | | | |
| | BMS Requirement: | | | | |
| | DG Vendor to ensure the BMS system architecture(as indicated in Annexure - 1 for reference only) shall be able to satisfy the client's requirement. Following are some of requirement listed for guidance but not limited to: | | | | |
| | 1) RS 485 / Backnet Output from each DG set for our BMS | | | | |
| | 2)Analog input along with monitor points for fuel level, generated voltage, current, engine temperature, Battery voltage, charging current & over speed, RPM frequency etc. | | | | |
| | 3) Potential free contacts from each DG set breaker for BMS for ON/OFF/Trip status | | | | |
| | 4) BMS Controller with 5 Universal Inputs and 5 Binary Outputs in MS Enclosure with reqd power supply ,connecters,internal wiring | | | | |
| | 5) Convertor with 2 inputs and 1 RS 232/485 output, cabling etc. | | | | |
| 1.1 | 320 KVA (with acoustic enclosure & standard accessories) comprising of standard features & Accessories as follows: | Set | 1 | | |
| | GENERATOR STANDARD FEATURES: | | | | |
| | Vendor to provide one-source responsibility for the generating system and accessories. | | | | |
| | The generator set and its components are prototype-tested, factory-built, and production-tested. | | | | |
| | Two-year warranty covers all systems and components. | | | | |
| | Industrial diesel engine with 24 Volt battery charging alternator. | | | | |
| | Alternator with insulation class H & IP 23 protection. | | | | |
| | Unit-mounted radiator. | | | | |
| | Subbase fuel tank - 550 ltrs. Capacity with float type level indicator. | | | | |
| | Vibration isolators. | | | | |
| | Dry type air filter with restriction indicator. | | | | |
| | Fuel Water separator. | | | | |
| | Main line breaker. | | | | |
| | Starting battery and cables. | | | | |
| | Sound enclosure with 75dB(A). | | | | |
| | Conveniently locate fuel level indication. | | | | |
| | Operation and installation literature. | | | | |
| | Block loading capacity of engine not less than 55% | | | | |
| | ALTERNATOR STANDARD FEATURES: | | | | |
| | Alternator meets IS/IEC 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1-32, IEC600034-1, CSA C22.2-100, AS1359. | | | | |
| | Self-ventilated and dripproof of IP23 construction | | | | |
| | Superior voltage waveform form a 2/3 pitch wound stator. | | | | |
| | ADVANCED DIGITAL CONTROL : | | | | |
| | Compact Controller comprising of : | | | | |

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| | LED display for measurement & display of : | | | | |
| | RPM & Runtime hours | | | | |
| | Current | | | | |
| | Voltage | | | | |
| | Frequency | | | | |
| | Engine temperature | | | | |
| | Engine Oil Pressure | | | | |
| | Battery Voltage | | | | |
| | LED display faults: | | | | |
| | High engine temperature | | | | |
| | Low oil pressure | | | | |
| | Over crank | | | | |
| | Overspeed | | | | |
| | Over & under voltage | | | | |
| | Over & under frequency | | | | |
| | E-stop | | | | |
| | Auxiliary fault | | | | |
| | Display warning: | | | | |
| | Low battery voltage | | | | |
| | High battery voltage | | | | |
| | Low fuel level | | | | |
| | STANDARD FEATURES & ACCESSORIES: | | | | |
| | Standard Features: | | | | |
| | Master switch: Run/Off-Reset/Auto | | | | |
| | Current selector switch | | | | |
| | Remote two-wire start/stop capability | | | | |
| | Event log | | | | |
| | Superior electronics | | | | |
| | Factory-built and production-tested | | | | |
| | Automatic start with programmed cranking cycle | | | | |
| | Field software upgrade possibility | | | | |
| | Environmental specifications : | | | | |
| | Operating temperature : - 10°C to 55°C | | | | |
| | Humidity: 0--95% condensing | | | | |
| | Power Requirements : | | | | |
| | 24 VDC with fuse protection | | | | |
| | 250 mA @ 12 VDC | | | | |
| | 125 mA @ 24 VDC | | | | |
| | Accessories: | | | | |
| | Battery charger 24V | | | | |
| | Mains sensing relay | | | | |
| | Earth leakage protection | | | | |
| | Notes: | | | | |
| a | DG Set should accept at least 55% load of rated capacity of DG Set in one step at the time of starting. | | | | |
| b | DG Sets panel shall be suitable for Auto operation controlled through AMF Relay as well as manual operation. | | | | |
| c | DG Set supplier shall provide microprocessor based DG Local Control panel mounted on the engine having all electrical parameters, and fault indication with provision for its remote control. | | | | |

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| d | DG Supplier should provide for all required hardware (convertor to give bacnet compatability, control wiring, potential free NO/NC,RS ports,A/D & D/A converters etc. as required to operate the BMS system software.) arrangement for remote start/stop and DG fault (LLOP, over speed) etc along with remote adjustment of voltage & speed of the engine (Motorised/ solid state pot. may be required) & shall be included in the quoted rates as required. | | | | |
| e | The neutral CTs as per specification shall be provided on the neutral side of winding and connection brought out to a neutral CT box to be mounted on the alternators (All the six terminals are to be brought out and then shorted). | | | | |
| 2.0 | RCC FOUNDATION OF DG SET : Designing & casting of RCC foundation suitable for 320 kVA DG set considering safe soil bearing capacity at site as 10 T/sq m & as per DG manufacturars design specification including excavation, RCC foundation nut bolts etc. in an approved manner. Clearing the site by removing excavated murum/soil/bolders/debris etc. & making the site good as per site requirement. It should be as per OEM's approved drawings. | Set | 1 | | |
| 3.1 | Silencer : Supply, installation, testing & commissioning of residential type silencers as per CPCB norms with 75mm glass/ mineral wool insulation complete with wire chicken mesh and 24 guage Aluminium cladding from engine upto silencers, including supporting arrangement suitable for the following DG Set complete as required. | Set | 1 | include in the above item no 1.0 | |
| 3.2 | SUPPORTING STRUCTURE FOR EXHAUST SYSTEM : Supply, Fabrication & Erection of M.S. steel structure made of M.S. angles / Channels etc. duly painted as required at site for DG exhaust pipe support. | Kg | 100 | | |
| 4.0 | DG FUEL SYSTEM | | | | |
| 4.1 | FUEL DAY OIL TANK | | | | |
| | Supply, fabrication, installation, testing & commissioning of M.S. day fuel tank fabricated out of min. 2.5 mm thick M.S. sheet installed on steel frame or masonry pedestal with all associated accessories, filters, valves & fittings including level controller, priming motor complete as required, float switch with contacts for remote interlock should be provided. The tank shall be suitably treated with diesel resistant paint/anticorrosive treatment. The contact of level controller shall be wired up terminal block. or as per manufacturer's design included in the enclosure. The tank level remote indicator to be provided at some suitable location as advised by client in the canopy. | Set | 1 | include in the above item no 1.0 | |
| 4.2 | Fuel Oil Piping : Supply, installation, testing and commissioning of schedule- C class MS 25 mm dia piping conforming to IS-1239 for fuel piping complete with all necessary fittings and valves between day oil storage tanks and DG sets including jointing of pipes, painting with 2 coats of Zinc oxide and two coats of enamel paint. | RM | 40 | | |
| 5.0 | CABLES AND BUSDUCT : | | | | |

| Sr. No. | Description | Unit | Qty | Rate (Rs.) | Amount (Rs.) |
|------------|--|------|-----|------------|--------------|
| 5.1 | Supply and laying in existing cable Trays/ Hume Pipes/clamped to wall with suitable clamps saddles and fixing bolts including testing and commissioning of the following 1100 volts grade armoured XLPE insulated and sheathed aluminium/copper conductor cable complete as required. Identification tags shall be provided for all cables including excavation in soft/hard murum if required. | | | | |
| 5.1.1 | 3.5C x 300 Sq.mm A2XFY | RM | 100 | | |
| 5.1.2 | 1C x 120 Sq. mm Copper Flexible Cable | RM | 20 | | |
| 5.2 | Cable end termination of the following PVC copper/aluminium cables 1100 Volt grade including cost of crimping tinned copper heavy duty bimetallic lugs, double compression glands, insulation tape and all requisite material for completion of joints. | | | | |
| 5.2.1 | 3.5C x 300 Sq.mm A2XFY | No | 4 | | |
| 5.2.2 | 1C x 120 Sq. mm Copper Flexible Cable | Nos. | 8 | | |
| 6.0 | EARTHING SYSTEM | | | | |
| 6.1 | Earthing Stations: Supply, installation, testing and commissioning of eco safe electrical grounding system offering a stable grounding back fill compound for a long period of time. i.e It should be electrically conducting & not dependant on moisture & confirming to ANSI/NSF Standard 60, will not diffuse in to the ground, will not expand or experience any shrinkage but remain in constant contact with earth & should be able to reduce contact resistance to earth significantly(at least 40 %) & create a low steady state impedance for a very long period resulting in faster transient dissipation. The standard earth electrode shall be made of high tensile low carbon steel circular rods, molecularly bonded copper or clad copper on the outer surface to confirm with the requirements of UL467-2007; thus reducing earth resistance(i.e combined resistance of electrode & contact resistance between electrode & soil) as an alternating low impedance path for the dangerously high voltages in the electrical distributor system. Providing masonry enclosure with 10 mm thick C.I. cover plate having locking arrangement and disconnecting/ testing links etc as per IS 2042 | | | | |
| 6.1.1 | With Copper plated electrode of 25 mm dia rod having at least 250 micron copper plating | Set | 4 | | |
| 6.1.2 | Soil resistivity testing & report | Nos. | 2 | | |
| 6.2 | Earthing Strip/Wires : Supply, installation, testing and commissioning of following sizes of GI/ Copper strip/ wire clamped to walls, cable trays, bus ducts, cables in recess or surface etc for equipment/ System earthing complete as required including inter connection between length at joints, all fixing accessories saddles, clamps etc and other fixing hardware material as required for proper installation | | | | |
| 6.2.1 | G.I. Earthing strip/wire | | | | |
| a) | 50 x 6 mm strip | RM | 120 | | |
| b) | 32 x 6 mm strip | RM | RO | | |

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|------------|--|------|-----|-----------------------|--------------|
| 6.2.2 | Copper earthing strip/wire | | | | |
| a) | 50 x 6 mm strip | RM | 50 | | |
| b) | 32 x 6 mm strip | RM | | | |
| 8.0 | Modification, Synchronisation with existing 2 X 320 KVA KOEL make DG Sets | | | | |
| 8.1 | Vendor to note that the existing 2 X 320 KVA DG sets if requires changes at alternater & governer level so as to synchronise with the new DG Set. Necessary changes & additional material required shall be the responsibility of the DG vendor. Vendor to check the same at site before quoting. Synchronisation Panel for 4 Nos. 320 KVA DG sets is already installed and working with 2 X 320 KVA DG sets in load sharing & synchronisation mode. | Job | 1 | | |
| 9.0 | Charges for Laisoning & Sanction for the DG set | | | | |
| | Statutory approval from authorities like PWD, SEB, CPCB etc. for installation & commisioning of above DG sets complete as required. Vendor to prepare & submit required documents & drawings to authorities for sanction & approval & submit the commissining report to the client. Please note that any statutory payment to the departments shall be paid by the clients seperately on submission of the receipt by vendor. | L.S | 1 | | |
| | GRAND TOTAL (A) | | | | |
| | | | | GST - | |
| | | | | Net Total (A)- | |

Lowest Cost Criteria :

| Sr. No. | Particulars | Amount (Rs) |
|----------|--|-------------|
| A | Basic Cost of Generator Set - Supply & Installation (Net Total (A)) | |
| B | Fuel Cost : Cost of DG set working (running) at 100% Load for 200 hrs per Year for 15 Years i.e.Total - 3000 Hrs (<i>Note : Cost of Diesel shall be considered at Rs. 100.00 per Litre</i>). | |
| C | Lub Oil Cost : Oil required in Litres for one time 'B' Check Maint. X 30 X Rs. 300/- (<i>Note : Two 'B' Check Maint. Per Year and Cost of Lub Oil shall be considered at Rs. 300.00 per Litre</i>). | |
| D | Total Cost of ownership at the end of 15 years (Sr. No. A + B+ C) | |

Net Amount (D) in Words - Rs. _____