Schedule of work

Name of Work:- Supplying, Installation, Testing & Commissioning of 160 KVA DG Set at AG (Audit-II),Civil Lines, Nagpur.

SN	Description of Item	Qty.	Unit	Rate	Amount	Remarks
1	Supplying, Installation, Testing & Commissioning of 'Silent Type Diesel Generating set as per CPCB IV + or better norms along with having Prime Power Rating of KVA as below, 415 volts at 1500 RPM, 0.8 lagging power factor at 415 V suitable for 50 Hz, 3 phase system & for 0.85 Load Factor, including testing at factory and site with fuel, load for test and other necessary arrangements Complete as per CPWD specifications, should have QR code which should contain drawing, test report OEM manual,Geo- Tag of manufacturing location, rating plate as per relevant IS Code etc. and consisting of the followings:(A) Diesel Engine:Turbocharged Diesel engine 4 stroke water cooled,multi cylinder, dynamically balanced fly wheel, electric start of suitable BHP at 1500 RPM suitable for above output of alternator at 40 0C, 50% RH & at 1000 Meter MSL , capable of taking 10% over loading for one hour after 12 hours of continuous operation. The engine will be with Electronic governor, Dry type Air filter with service indicator, first filling of engine fuel (after commissioning) lubricating Oil, Coolant and other consumables complete with all the required accessories, the Electronic governor shall be as per ISO 8528.The engine shall comply to the latest CPCB norms (CPCB IV + or better) and Conforming to BS 5514, BS 649, IS 10000, IS 10002, IS 13018 and as per CPWD specifications					
	(B) Engine mounted Instrument Panel fitted with and having digital dis Plate for following: (i) Start-stop switch with key (ii) Water temperature indication (iii) Lubrication oil pressure indication (iv) Lubrication oil temperature indication (v) Battery charging indication and Voltage indication (vi) RPM indication (vii) Over speed indication (viii) Low lubricantion Oil trip indication (ix) Engine Running Hours indication (x) Fuel Level					
	(C) Alternator:Synchronous alternator rated of appropriate KVA, 415 volts at 1500 RPM, 3 phase 50 Hz, AC supply with 0.8 lagging power factor at 40 0C, 50% RH & at 1000 Meter MSL. The alternator shall be having Screen Protected Drip Proof (SPDP) enclosure IP23, brushless, continuous duty, dynamically balanced rotor, capable of taking 10% over loading for one hour after 12 hours of continuous operation, self cooled,self-excited and self-regulated through AVR conforming to IS13364(Part 2)/IS: 4722/BS 2613 suitable for tropical conditions and with class- H insulation.(D) Base Frame & Foundation: Both the engine and alternator shall be mounted on suitable base frame made of MS channel with necessary reinforcement which shall be installed on suitable cement concrete foundation and vibration isolation arrangement as per recommendations of manufacturer. (E) FUEL TANK:Daily service fuel tank of suitable liters capacity as per CPWD Specifications, fabricated out of 3 mm thick M.S. sheet complete with all standard accessories and fuel piping between fuel tank and diesel engine with MS class 'C' pipes of suitable dia. Complete with valves, level indications & accessories as required as per specifications.					

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	(F) Exhaust System: Dry exhaust manifold with hospital type exhaust silencer and catalytic convertor. (G) Starting System: 12V/24V DC starting system comprising of starter motors: voltage regulator and arrangement for initial excitation complete with suitable numbers of batteries (180 AH capacity lead acid SMF type) as required as per specifications. The battery shall be housed inside the acoustic enclosure of DG Set. (H) Acoustic and weather proof enclosure with arrangement for fresh air intake for cooling of the engine & alternator, extraction, discharging hot air in to the atmosphere and the temperature rise inside the enclosure, noise level outside enclosure. The acoustic enclosure should be suitable for cable connection/connection through bus-trunking. Such arrangements on acoustic enclosure should be water proof & dust-proof conforming to IP-65 protection. The enclosure shall be as per CPCB IV + or better norms etc. and as per CPWD specifications.					
	(I) AMF Panel: Free standing floor mounted IP 42 automatic mains failure control panel including auto by-pass, suitable for KVA as below for silent type DG set complete with relays, timers, set of CTs for metering & protection and energy analyser to indicate currents, phase and line voltages, frequency, power factor, KWH, Kilo Volt Ampere Reative Hour (KVARH), KVA (Phase & Total), KW & provision for overload, short circuit, restricted earth fault, under frequency, power (aluminium) and control (copper) cabling of suitable size upto 15 meter between AMF panel, LT Panel and DG Set including connection interconnection etc. as required, all complete and inter locking and communication/ Ethernet /RS485/SNMP port open protocol for BMS integration including suitable software, the panel shall be of DG Set OEM make etc. as per approved by Engineering in charge and including the following: 1. Suitable numbers and appropriate capacity 4 pole motorised electrically operated draw out with cradle type 3 position ACB/ MCCB with electronic release for O/C & E/F and shunt trip.2. Auto/Manual/Test/Off selector switch 3. Protection for under and over voltage phase reversal (2 nos Over voltage relay, 2 Nos. reverse power relay and 2 Nos. under voltage relay).					
	4. 3 Sets of current transformers 15 P 10 accuracy for protection and 15 VA class-I for metering 5. Energy analyser unit to indicate current, Voltage(L N & L_L), kW, kVA (Phase & Total), Frequency, KWH, PF. 6. LED Indicating lamps for load on mains and load on set 7. Fuse/ MCB for instruments 8. Battery charger, complete with transformer/ rectifier,D.C. voltmeter and ammeter, selector switch for trickle, off and boost and current adjustment. 9.Main supply failure monitor 10.Supply failure timer 11.Restoration timer 12.Control unit with three impulse automatic engine start/stop and failure to start lockout. 13. Impulse counter with locking and reset facility. 14.ON/OFF/Control circuit switch with indicator					

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	15.Audio/Video annunciation for (i)High water temperature (ii)Low lubricating oil pressure (iii)Engine over speed (iv)Engine fails to start (v)Full load/maximum load warning 16.Protection for over/under Frequency, Loss of AC sensing, Over Current, Unbalancing load with suitable number of relays and accessories 17. Maintenance notification based on Engine Run Hour & due date. 18. Load Management through PLC to achieve auto opening and closing of incomer breakers, bus coupler switching of essential panel , interlocking providing signal to AMF Panel for load status and AMF shall give command to DG Set to auto start / auto stop depending upon load status and requirement etc. and necessary hardware and software required to perform the operation shall be provided by the contractor including all control wiring.					
1	160KVA	1	Each	1249613.00	1249613.00	29.1.9
2	Supplying of PVC insulated and PVC sheathed / XLPE insulated armoured power cable of 1.1 KV grade, and confirming to IS : 7098 (part-I) 1988, amended upto date of following size.					
2	3.5 x 120 sq mm. Aluminium armoured cable	70.00	Meter	1668.00	116760.00	MR
3	Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size in the existing RCC/ HUME/ METAL pipe as required.					
3	Above 95 sq. mm and upto 185 sq. mm	50.00	Meter	97.00	4850.00	10.5.3
4	Laying and fixing of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size on wall surface as required.					
4	Above 95 sq. mm and upto 185 sq. mm (clamped with 25/40x3mm MS flat clamp)	20.00	Meter	180.00	3600.00	10.7.3
5	Supplying and laying of following size DWC HDPE pipe ISI marked along with all accessories like socket, bend, couplers etc. conforming to IS 14930, Part II complete with fitting and cutting, jointing etc.direct in ground (75 cm below ground level) including excavation and refilling the trench but excluding sand cushioning and protective covering etc., complete as required.					
5	90 mm dia (OD-90 mm & ID-76 mm nominal)	70.00	Meter	336.00	23520.00	15.16.2
6	Supplying and installaton following size of perforated painted with powder coating M.S. cable trays with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with two numbers MS/GI Suspenders i/c base of suitable size MS/GI angle, bolts & nuts, painting suspenders, fastener etc as required.					
6	100 mm width X 50 mm depth X 1.6 mm thickness	15.00	Meter	623.00	9345.00	4.1.1
7	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.	2.00	Set	8351.00	16702.00	5.4
8	Earthing with copper earth plate 600 mm X 600 mm X 3 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.	2.00	Set	15004.00	30008.00	5.6

SN	Description of Item	Qty.	Unit	Rate	Amount	Remarks
9	Providing and fixing 25 mm X 5 mm copper strip in 40 mm dia G.I. pipe from earth electrode including connection with brass nut, bolt, spring, washer excavation and re-filling etc. as required.	10.00	Meter	1638.00	16380.00	5.10
10	Providing and fixing 25 mm X 5 mm G.I. strip in 40 mm dia G.I. pipe from earth electrode including connection with G.I. nut, bolt, spring, washer excavation and re-filling etc. as required.	10.00	Meter	755.00	7550.00	5.11
11	Providing and fixing 25 mm X 5 mm copper strip on surface or in recess for connections etc. as required.	10.00	Meter	1246.00	12460.00	5.14
12	Providing and fixing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required.	10.00	Meter	287.00	2870.00	5.15
			Total	**Rs.**	**1493658.00**	
			Say	**Rs.**	**1493658.00**	

Executive Engineer (E),
NED, CPWD, Nagpur