EXPLANATORY NOTES FOR SCHEDULE OF RATES
TSS PARTICULARS
Schedule-1, Section 8A, 8B, 8C, 8D, 9A, 9B, 9C, 10A, 10B & 10C

Item No. 1(a) : Design and Drawings for Traction Sub-Stations

The price shall cover on a flat rate basis per substation, survey, investigation of soil bearing pressure and soil resistivity, preparation of cross section drawings, preparation of general arrangement drawings, detailed layout of equipment, bus-bar connections and insulators, layout of cable trenches outdoor and inside the control room, layout of earthing system and earth connections, layout of earth screen wire, design of supporting structures for **220kV, 132kV, 110 or 66kV/25kV** equipments, detailed drawings for steel work and structural support, suitable concrete pedestals, plinths and foundations for equipment and structural support and drawings/ designs for equipments, components, fittings and materials. The price shall include supply of requisite number of copies of all drawings, including completion drawings to the Purchaser, as specified in Part-II.

NOTE: The design for Oil Soak pit and drain water sump will also be got approved from the purchaser.

Item No. 1(b): Design and Drawings for Feeding Stations

The price shall cover on a flat rate basis per feeding station, survey, investigation of soil bearing pressure, preparation of cross section drawings, preparation of general arrangement drawings, detailed layout of equipment, bus-bar connections and insulators, layout of earthing system and earth connections, cable run layout, detailed designs and drawings for steel work and structural support, excluding the ones for which supply is made by the Purchaser, suitable concrete plinths for equipment and drawings for equipments, components, fittings and materials supplied by the Contractor. The price shall include supply of requisite number of copies of all drawings, including completion drawings as specified in Part-II.

Item No. 1(c): Design and Drawing for Shunt Capacitor Banks

The prices shall cover on a flat rate basis for preparation of all designs and drawings required in connection with supply, erection, testing and commissioning of Shunt Capacitor equipment at the traction sub-stations. The price shall also cover on a flat rate basis cost of survey, preparation of cross section drawing, general arrangement drawings, detailed layout of equipments, bus bar connections and insulators, layout of cable trenches out door and inside the control room, layout of the earthing system and earth connection layout, design of supporting structures, detailed drawings for steel work and structural support, suitable concrete pedestals and foundations for equipments components, fittings and materials. The price shall include supply of requisite number of copies of all drawings including completion drawings to the Purchaser. The price shall also include supply of the required number of copies of designs, drawings, technical booklets and completion drawings as mentioned in tender specification.

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Item No. 2(a)(i): Concrete for Foundation & Trench in Hard Soil

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Item No. 2(a)(ii): Concrete for Foundation & Trench in Rock.

The price shall cover excavation, supply and handling of all materials and accessories, temporary arrangements for excavation in hard soil and concrete/masonry drains/walls, requiring use of chisel and hammer for item 2 (a) (i) or requiring blasting for item 2 (a) (ii), shoring and shuttering where necessary, casting concrete including frame work, grouting gantry/portal columns and steel supports and finishing the top of concrete foundation with required slope/muff. The price shall include dismantling of all connected temporary arrangements, back filling required and removal of soil. The Purchaser's Engineer shall certify where use of chisel and hammer or blasting has been necessary. The Contractor shall arrange for supply of explosives and all tools and plants for blasting operations at his own cost. If half or more of the depth and width of excavation is in hard soil, concrete /masonry/drains/ walls or rock, the entire foundation shall be paid for under item 2(a), if it is less than half, payment for the entire foundation shall be made at the rate for the type of soil in which the majority of the foundation is placed. The price shall include the cost of cement also. Cement shall not be supplied by the Rlys.

NOTE: **For measurements for item 2 (a)(i) & 2(a)(ii).**

1) The payable volume of the foundations under item 2(a)(ii) shall be limited to the designed one as shown in the drawings for which the hole has been blasted, irrespective of the actual configuration assumed by the latter due to blasting.

2) The depth of excavation shall be measured from the formation level of the substation to the maximum excavated point.

Item No. 2 (b): Concrete for Foundation & Trench other than Hard Soil & Rock.

The price shall include all work mentioned in **item 2(a)** in all classes of soil, including black cotton and loose soils, except hard soil, concrete/masonry/ drains/walls and rock. The price shall include the cost of cement also. Cement shall not be supplied by the Rlys.

Item No. 2(c)(i): Reinforced Concrete for Foundation & Trench.

The price shall cover excavation and all reinforced concrete work for foundations including supply of steel for reinforcement and other materials including bending/ binding, laying of reinforcement, shoring and shuttering where necessary, casting concrete including frame work where necessary, grouting and finishing the tops of foundation blocks with the required slope/muff. The price shall include dismantling of all connected temporary arrangements, back filling as required and removal of soil. The price shall also cover all concrete work for cast-in-situ piles and pedestals/columns for mounting equipment. The volume of cast-in-situ piles and pedestals columns shall be added to the volume of foundation block for purposes of payment. Dowel bars will not be considered as reinforcement for the purpose of this item. The price shall include the cost of cement also. Cement will not be supplied by Rlys.

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Item No. 2(c)(ii): Cable Trench Covers.

The price shall cover casting of cable trench covers in reinforced concrete as per drawing in Annexure-1. The cable trench covers will be casted in an angle iron frame of angle size 40x40x5. The price shall include the supply of steel for reinforcement, angle iron for the frame work fabrication of angle iron frame etc. The price shall include positioning and dressing up of the trench covers, if required. The price shall include the cost of cement also. Cement will not be supplied by Rlys.

Item No. 2(d)(i): Reinforced Brick Work.

The price shall cover excavation and construction of reinforced brick work laid in cement mortar 1:3 mix for the baffle wall. The price shall include supply of steel for reinforcement and other materials. The price shall also include bending/binding and laying of reinforcement, shoring, shuttering and scaffolding arrangement, required for the construction of brick wall and its curing. The price shall also include dismantling of all connected temporary arrangements, back filling required and removal of spoil. The price shall include the cost of cement also. Cement will not be supplied by Rlys.

Item No. 2(d)(ii): Plastering of Brick Work.

The price shall cover supply and handling of all materials, scaffolding arrangements, raking out joints, curing and finishing of plaster (12 mm. thicknesses with cement mortar 1:4 mix.) on the Baffle wall. The price shall also include dismantling of all connected temporary arrangements and removal of spoil. The price shall include the cost of cement also. Cement will not be supplied by Rlys.

Note for Item No. 2:

1. The prices under **item 2** shall be the same for any shape or size of concrete blocks, cable trenches & brick wall. In calculating the individual volume of concrete and brick wall fraction of a cubic meter beyond the third decimal shall be rounded off to the nearest third decimal.
2. The prices under item 2(a), (b) & (c) (i) shall apply for concreting of all pedestals, plinths and foundations for gantries/portals and supporting steel work and cable trenches.
3. For the purpose of computation of the volume of concrete and brick wall under **item 2**, the volume of steel work embedded in the foundation block or muff shall be ignored.
4. The cost of all concrete will be paid for only under **item 2** and the prices of other items, except **item 24(a)** shall not include cost of concrete.
5. The volume of each muff will be included in the volume of concrete for the respective foundation for purposes of computation of volume of concrete.
6. The prices shall include cost of embodiment of drain pipes, conduits for cable or earthing flats where necessary.
7. In respect of concrete for cable trenches the price shall not include the cost of cable supports and trays, which shall be supplied and erected by the Contractor and shall be paid for under **item 3.**
8. Dowel bars in special foundations and nominal reinforcement in black cotton soil foundations will be necessary. Such nominally reinforced foundations in black cotton soil will be payable under **item 2(b)** and not under **item 2(c)(i).** The steel for nominal

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reinforcement and dowel bars will be supplied by the Contractor and the concrete mixture in such a case shall be as for normal foundations (See Para 2.2.4).

9. At each Traction substation one number Oil soak pit for main transformers and one drain water sump for the cable trenches will be provided by the contractor. Payment for this work will be made under **item 2(d).**
10. The Tenderer may quote alternative rates in Form-4, for anchoring the structures with anchor bolts to hard rock, in terms of Para 2.2.3. The price shall include the supply of anchor bolts and the special high strength grouting metal.
11. The foundations for the main traction transformer shall include provision of a suitable apron under the transformer and construction of a suitable drain connecting the apron to the oil sump.

Item No. 3(a): Supply and Erection of Fabricated & Galvanised Gantries/Portal Structures for TSS.

The price shall cover supply, fabrication, galvanization and erection of steel gantries/portals, required in the traction substation. The price shall include alignment setting and grouting of steel work and supply of all necessary galvanized steel bolts, nuts, lock-nuts, washers etc. wherever required as per approved designs and drawings and assembly of the fabricated steel work at site to the extent necessary. The calculated weight to be considered for payment under this item included in relevant drawings at the time of submitting designs for approval of the Purchaser.

Item No. 3(b): Supply and Erection of Fabricated & Galvanised Steel Structures for LT Supply Transformer, Equipment Supporting Structures Etc. for TSS/Switching Stations (Special Steel Structures other than Portals and Masts).

The price shall cover supply and erection of fabricated and galvanized Steel Structures for LT Supply Transformer, Equipment Supporting Structures Etc. (Special Steel Structures other than Portals and Masts) required in the traction substation. The price shall include alignment setting and grouting of steel work and supply of all necessary galvanized steel bolts, nuts, lock-nuts, washers etc. wherever required as per approved designs and drawings and assembly of the fabricated steel work at site to the extent necessary. The calculated weight to be considered for payment under this item as included in relevant drawings at the time of submitting designs for approval of the Purchaser.

Item No. 3(c): Supply and Erection of Fabricated & Galvanised Small Parts Steel for TSS.

The price shall cover supply and erection of small parts steel work required in the traction substation. The price shall include alignment setting and grouting of steel work and supply of all necessary galvanized steel bolts, nuts, lock-nuts, washers etc. wherever required as per approved designs and drawings and assembly of the fabricated steel work at site to the extent necessary. The calculated weight to be considered for payment under this item shall be included in relevant drawings at the time of submitting designs for approval of the Purchaser.

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Note for Item No. 3(c):

For the purpose payment for 'Supply and Erection' of SPS items (steel work), the black shall be considered for weight of steel work as specified in RDSO's drawing shall be considered for payment. However, in case the unit sectional weight of any member indicated in the drawing is not in conformity with the unit sectional weight as per the latest IS Specification, the weight of the fabricated steel work shall be calculated on the basis of the latest IS Specification and the same will be considered for payment.

For the non standard fabricated steel work, the calculated weight to be considered for payment under this item, shall be included in the relevant drawing based on the latest IS sectional weight at the time of submitting the designs for approval of the purchaser.

Item No. 3(d): Supply and Erection of Fabricated & Galvanised Traction Mast

The price shall cover supply and erection of fabricated and galvanized Traction Mast required in the traction substation. The price shall include alignment setting and grouting of steel work and supply of all necessary galvanized steel bolts, nuts, lock-nuts, washers etc. wherever required as per approved designs and drawings and assembly of the fabricated steel work at site to the extent necessary. The calculated weight to be considered for payment under this item shall be included in relevant drawings at the time of submitting designs for approval of the Purchaser.

Note for Item No. 3(a), 3(b) & 3(d):

(i) For the purpose of payment for 'Supply and/or erection'', black weights of various structures and fabricated steel work as per respective RDSO's drawings (for individual tower, Beams, Tower extensions, Supporting Structures for equipments, Structures for Isolators, LT Supply Transformer, Structures for Feeding Post etc.,) shall be payable to the contractor.

(ii) No payment is permissible for increased weight of any structure or their components on account of galvanisation.

(iii) The payment shall be made on the basis of the final lengths/weight of the structures, in case the same are cut or modified as indicated above before erection.

(iv) In case of any dispute in unit weights mentioned in the drawings, the matter will be decided by the CPD of the project and the decision taken in the matter will be final and binding on to the contractor.

Item No. 4(a), 4(b), 4(c) & 4(d): Supply, Erection, testing & Commissioning of Double Pole SF6 Gas Circuit Breakers:

4(a) 66 kV Circuit Breakers
4(b) 110 kV Circuit Breakers
4(c) 132 kV Circuit Breakers
4(d) 220 kV Circuit Breakers

The price shall cover Supply of 66kV/110kV/132kV/220kV, Out-door type, double pole, SF6 Gas Circuit Breakers, complete with Poles (Interrupting Chamber & Support Insulators), operating mechanism, mounting Steel Frame, terminal Connectors, Interlocking device, Parts, fittings and

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accessories, SF6 Gas etc. as per RDSO's specification No. TI/SPC/PSI/HVCB/0121 with A&C slip No. 1 (or latest).

The price shall cover erection of the circuit Breaker including grouting the supporting frame and Mechanism box on foundations block and mounting of other accessories at their respective places. It shall also cover first gas filling, testing and commissioning of the circuit breaker. The price shall also cover the supply and erection of an enameled number plate. The Contractor shall make his own arrangement for filling of the SF6 gas and power supply required for testing purpose. All necessary tools, equipments, instruments required for carrying out necessary checks, tests and commissioning shall be arranged by the Contractor.

Item No. 5(a)(i), 5(a)(ii), 5(a)(iii) & 5(a)(iv): Supply (without Insulators) & erection of manually operated Double Pole Isolators:

5(a)(i) 66 kV Double Pole Isolators
5(a)(ii) 110 kV Double Pole Isolators
5(a)(iii) 132 kV Double Pole Isolators
5(a)(iv) 220 kV Double Pole Isolators

The price shall cover Supply of 1250 A, 66kV/110kV/132kV/220kV, manually operated, Out-door type, double pole Isolators, without insulators. The isolator shall be complete with all parts, fittings and accessories including mounting frame work, operating rod, operating mechanism along with OPEN/CLOSE indication necessary for its efficient operation. All such parts, fittings and accessories shall be deemed to be within the scope of this specification, whether specifically mentioned or not. The Isolator shall be conforming to RDSO's specification No. TI/SPC/PSI/ISOLTR/0210 with A&C slip No. 1 and 2 (10/25) (or latest). Insulators for the isolators shall be supplied and paid under **Item 5(ax)(i)** covered in **Section - 8(D).**

The price shall cover erection and connecting up of the isolators supplied under **item No. 5(a)(i), 5(b)(i), 5(c)(i) & 5(d)(i)** complete with manually operated mechanism, mounting base, Insulators and all accessories/required for its operation including terminal connectors. The price shall include supply and erection of an enameled number plate and padlock. The price shall include mounting of the Isolator and the operating rod in position and their alignment for smooth and trouble free operation.

Item No.5(a)(i)(x), 5(a)(ii)(x), 5(a)(iii)(x) & 5(a)(iv)(x): Supply of Solid Core Post Insulator Assembly for manually operated Double Pole Isolators to be supplied under Items 5(a)(i), 5(a)(ii), 5(a)(iii) & 5(a)(iv).

5(a)(i)(x) for 66 kV Isolators
5(a)(ii)(x) for 110 kV Isolators
5(a)(iii)(x) for 132 kV Isolators
5(a)(iv)(x) for 220 kV Isolators

The price shall cover only supply of Solid Core Post Insulators for **66 kV/ 110kV/ 132kV/220kV** Double Pole Isolators as per RDSO's specification No. TI/SPC/OHE/ POST/0101 with A&C slip No. 1 (06/22) (or latest).

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Item No. 5(b)(i), 5(b)(ii), 5(b)(iii) & 5(b)(iv): Extra for Supply and erection of Earthing Blade Assembly for 66kV, 110kV, 132kV & 220kV DP Isolators (Manually operated)

5(b)(i) for 66kV Isolators
5(b)(ii) for 110kV Isolators
5(b)(iii) for 132kV Isolators
5(b)(iv) for 220kV Isolators

The price shall cover supply and erection of earthing blade assembly for **66kV, 110kV, 132kV & 220kV** DP Isolators as required. The price shall be extra on **item 5(a)(i), 5(a)(ii), 5(a)(iii) & 5(a)(iv)** and applicable individually for each Isolator. The earthing switch shall be manually operated. The earthing blade assembly shall be conforming to RDSO's specification No. TI/SPC/PSI/ISOLTR/0210 with A&C slip No. 1 and 2 (10/25) (or latest).

Item No.6: Supply and erection of Current Transformers

6(a) 66 kV Current Transformer
6(b) 110 kV Current Transformer
6(c) 132 kV Current Transformer
6(d) 220 kV Current Transformer

The price shall cover supply of Current Transformer (CT) for a nominal System voltage of **220/132/110/66kV.** The CT shall be outdoor type and complete with all parts, fittings and accessories necessary for its efficient operation. All such parts, fittings and accessories shall be deemed to be within the scope of supply, whether specifically mentioned or not.

The price shall cover erection and connecting up of Current Transformers **(66kV/110kV/132kV/220kV)** complete with all fittings and accessories including terminal connectors. It shall also include mounting of the transformer in position, and supply and erection of an enameled number plate.

Item No. : 7

Supply and Erection of Lightening Arresters

7(a) 66 kV Lightening Arresters (60kV)
7(b) 110 kV Lightening Arresters (98kV)
7(c) 132 kV Lightening Arresters (120kV)
7(d) 220 kV Lightening Arresters (198kV)

The price shall cover supply of outdoor type Metal Oxide Gapless Type Lightening Arresters for nominal system Voltage **66kV/110kV/132kV/220kV** complete with terminal connector, an earthing pad, hardwares required for mounting the Lightning Arrester, insulating base and surge monitor as per RDSO's specification No. ETI/ PSI/ 137 (8/89) with A&C slip No.1 to 7 (or latest).

The price shall cover erection and connecting up of Lightning arresters with surge counters complete with all fittings and accessories including terminal connector. It shall also include mounting of the Lightning arrestor in position and supply and erection of and enameled number plate.

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Item No.8: Supply and erection of 25kV, Single Pole Vacuum Circuit Breaker.

The price shall cover supply of 25kV Vacuum Circuit breaker complete with operating mechanism, Contact wear indication, supporting frames, foundation bolts, all fittings, and accessories including terminal connectors. The circuit Breaker shall be conforming to RDSO's specification No. TI/SPC/PSI/LVCBIN/ 0121 with A&C slip No. 1 (01/25) (or latest).

The price shall cover erection of Circuit Breaker including fixing of foundation bolts, grouting the supporting frame and mechanism box on foundation block and mounting of other accessories in their respective places. It shall also cover testing and commissioning of the circuit breaker. The price shall also cover the supply and erection of an enameled number plate. All necessary tools, equipments, instruments required for carrying out necessary checks and tests and commissioning shall be arranged by the Contractor.

Item No.9: Supply, Erection, Testing & Commissioning of 25 kV Single Pole Vacuum Type Interrupters.

The price shall cover supply of 25kV Vacuum type Interrupter complete with operating mechanism, Contact wear indication, supporting frames, foundation bolts, all fittings, and accessories including terminal connectors. The Interrupter shall be conforming to RDSO's specification No. TI/SPC/PSI/LVCBIN/ 0121 with A&C slip No. 1 (01/25) (or latest).

The price shall cover erection of Interrupter including fixing of foundation bolts, grouting the supporting frame and mechanism box on foundation block and mounting of other accessories in their respective places. It shall also cover testing and commissioning of the Interrupter. The price shall also cover the supply and erection of an enameled number plate. All necessary tools, equipment instruments required for carrying out necessary checks and tests and commissioning shall be arranged by the Contractor.

Item No.10(a): Supply (without Insulator) and Erection of 25kV Single Pole Isolators (1600A).

The price shall cover the supply of 25kV Single Pole Isolator complete with all parts, fittings and accessories including mounting frame work, operating rod, operating mechanism box and all accessories required for its smooth and trouble free operation. All such parts, fittings and accessories shall be deemed to be in the scope of supply, whether specifically mentioned or not. The price shall be exclusive of the cost of required 25 kV Solid Core Post and operating rod insulators. The cost of insulators shall be paid under **item No. 10(ax) of Section-8(D)**. The Isolators shall be conforming to RDSO's specification no. TI/SPC/PSI/ISOLTR/0210 with A&C slip No. 1 & 2 (or latest).

The price shall include cost erection of the Isolators including Post and Operating rod insulators alongwith mounting frame work, operating rod, operating mechanism box and all accessories, supply and erection of an enameled number plate and a pad lock for each Isolator. Bus bar connectors provided for making connections to the Isolator terminal pad shall be paid under **item 17(c).**

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Item No. 10(ax): Supply of 25 kV Post & Operating Rod Insulators for item No. 10(a).

The price shall cover only supply of a set of 25 kV solid core Post insulators (two nos.) and Operating Rod Insulator (one no.) respectively for execution of work covered under **item 10(a).** Erection cost of Insulators are inclusive **in item 10(a)**.

Item No. 10(b): Supply (without Insulator) and Erection of 25kV Double Pole Isolators (1600A).

The price shall cover the supply of 25kV Single Pole Isolator complete with all parts, fittings and accessories including mounting frame work, operating rod, operating mechanism box and all accessories required for its smooth and trouble free operation. All such parts, fittings and accessories shall be deemed to be in the scope of supply, whether specifically mentioned or not. The price shall be exclusive of the cost of required 25 kV Solid Core Post and operating rod insulators. The cost of insulators shall be paid under **item No. 10(bx).** The Isolators shall be conforming to RDSO's specification no. TI/SPC/PSI/ISOLTR/0210 with A&C slip No. 1& 2 (or latest).

The price shall include cost erection of the Isolators including Post and Operating rod insulators alongwith mounting frame work, operating rod, operating mechanism box and all accessories, supply and erection of an enameled number plate and a pad lock for each Isolator. Bus bar connectors provided for making connections to the Isolator terminal pad shall be paid under **item 17(c)**.

Item No. 10(bx): Supply of 25 kV Post & Operating Rod Insulators for item No. 10(b).

The price shall cover only supply of a set of 25 kV solid core Post insulators (four nos.) and Operating Rod Insulator (two nos.) respectively for execution of work covered under **item 10(b).** Erection cost of Insulators are inclusive in **item 10(b)**.

Item No. 10(c): Extra for Erection of interlocking Mechanism

The price shall cover erection of an Interlocking Mechanism on an Isolator to permit working of an Isolator and or earthing blade assembly in a desired sequence. The price shall be extra on **items 4, 5(a), 5(b), 8, 9, 10(a) and 10(b)** and shall be applicable individually for each Isolator, Circuit Breaker and Interrupters.

Item No. 11(a): Supply & Erection of 25kV P.T (Type-II)

The price shall cover supply & erection and connecting up of a 25kV Potential Transformer complete with all fittings and accessories including terminal connectors. It shall also include mounting of the transformer in position and supply and erection of the enameled number plate. Bus-bar connectors provided with jumper connections shall be paid under item 17(c). 25kV Potential Transformers (Type-II) shall conform to RDSO specification No. TI/SPC/PSI/PT/0210 (07/21) or latest amendments.

Item No. 11(b): Supply & Erection of 25kV PT (Type-I)

The price shall cover supply & erection and connecting up of a 25kV Potential Transformer complete with all fittings and accessories including terminal connectors. It shall also include mounting of the transformer in position and supply and erection of the enameled number plate.

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Bus-bar connectors provided with jumper connections shall be paid under item 17(c). 25kV Potential Transformers (Type-I) shall conform to RDSO specification No. TI/SPC/PSI/PT/0210 (07/21) or latest amendments.

Item No. 12: Supply & Erection of 25kV C.T. (1500/750/5A).

The price shall cover supply & erection and connecting up of a 25kV Current Transformer complete with all fittings and accessories including terminal connectors. It shall include mounting of the transformer in position and supply and erection of an enameled number plate. 25kV Current Transformers (1500-750/5) shall conform to RDSO specification No. TI/SPC/PSI/CT/0210 (7/21) or with A&C slip No. 1 (12/24) or latest amendments.

Item No. 13(a), 13(b) and 13(c): Supply, Erection, Testing & Commissioning of Control & Relay Panel (Board) for 25kV TSS.

The price shall cover supply, erection and connecting up of Control Boards with Numerical type relays as per latest RDSO's Specification (Comprising of distance, wrong phase and instantaneous over current protection with PT fuse failure) for OHE protection, transformer protection, OHE protection, auto reclosing scheme and Shunt capacitor banks manufactured by any RDSO approved firms, for all the 220/132/110/66kV and 25kV Circuit -Breakers, Interrupters, Isolators and Transformers at the traction substations complete with all wiring, control switches, meters, protective and auxiliary relays etc. including mimic panel.

The price for erection shall also include alignment and grouting of the panels in position and all necessary connections to bring the control board to operation. It shall also include the cost of connecting the frame of each control panel to the earth bus inside the control room.

Item No. 14: Supply & Erection of 25 kV Lightening Arrestors (42 kV LA)

The price shall cover supply & erection of a 25KV (42kV LA) Lightning Arrestor complete with all fittings and accessories including terminal connector. It shall also include mounting and connecting up of the Lightning Arrestor in position and supply and erection of an enameled number plate. 25kV Lightning Arrestors shall conform to RDSO specification No. TI/SPC/PSI/MOGTLA/0101 (02/2015) or latest amendments.

Item No. 15(a) & 15(b): Supply, Erection, Testing & Commissioning of 25 kV/240 V Auxiliary Supply Transformer (10 kVA/25kVA Capacity)

The price shall cover supply & erection and connecting up a 25 kV/240V, 10 kVA /25 kVA LT Supply Transformer (oil type) complete, with all fittings and accessories including terminal connectors. The price shall include mounting of the transformer on its supporting structure and supply and erection of an enameled number plate. The price shall also cover oil filtration, testing and commissioning of the transformer. The Contractor shall make his own arrangement for oil filtration plant as well as power supply for the same. 25kV/240V Auxiliary Supply Transformer (10/ 25 kVA capacity) Oil type shall conform to RDSO specification no. ETI/ PSI/15 with A&C slip No. 1 (12/24) or latest amendments.

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Item No. 16: Supply (without Insulator) and Erection of 25 kV Drop-Out Fuse Switch for Auxiliary Supply Transformers.

The price shall cover supply & erection, and connecting up of 25kV drop out fuse switches for 10/25 kVA capacity LT Supply Transformers complete with all mounting accessories including terminal connectors. It shall also include the erection of insulators, operating pole and fuse links. 25V Drop out fuse switches for 10/25 KVA Auxiliary Supply Transformer shall conform to RDSO specification No. ETI/ PSI/14 (1/86) with A&C Slip 1 or latest amendments.

Item No. 16(x): Supply of 25 kV Post Insulator for Item 16

The price shall cover only supply of 25 kV solid core post insulators for execution of work covered under item 16. Erection cost of insulators are inclusive in item 16.

Item No. 17(a): Supply & Erection of Tubular Aluminium Busbars 50x39mm dia.

The price shall cover supply and erection per meter length of 50x39 mm dia. Aluminum tube to serve as bus bar or equipment to equipment bus-bar connection in the traction sub-station, wherever required. The price shall include bending, shaping and connecting/ clamping of the Aluminum tube to the equipment terminals/bus-bar supports as required.

Item No. 17(b): Supply & Erection of ZEBRA ACSR Conductor.

The price shall cover supply and erection per meter length of 54/7/3.18 mm (ZEBRA ACSR) conductor to serve as bus-bar or equipment to equipment/bus-bar connection in the traction sub-station, wherever required. The price shall include straightening, shaping and connecting/clamping of the conductor to the equipment terminals/bus-bar supports as required.

Item No. 17(c)(i) to 17(c)(xiii);

The price shall cover supply and erection of a bus-bar junction and connector of the type specified, including bolts, nuts, lock nuts, washers etc. required at the junction of bus-bars. The price shall also include supply and erection of `Al-Cu' Bimetallic- strip if required, to be provided at the junction.

NOTE: 1) For the purpose of payment, for items 17(a) and 17(b), fraction of a meter in the total length used at a sub-station shall be rounded off to the nearest meter (0.5m and below being ignored).

2) For the purpose of payment, the length of aluminum conductor strung as busbar between gantries shall be taken as horizontal distance between the interfaces of the gantries. The total length used at a sub-station shall be rounded off to the nearest meter (0.5 m and below being ignored).

Item No. 17(c)(xiv) to 17(c)(xx):

The price shall cover supply and erection of Busbar junctions and connectors of various types specified including bolts, Nuts etc. Required at junctions or terminations of busbars.

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Item No. 17(d): Supply & Erection of Tubular Aluminium Busbar 36 Mm X 28 Mm

The price shall cover supply and erection of Aluminum bus-bars 36mm x 28 mm including bending, shaping and clamping on to insulators, connectors or equipment terminals.

NOTE: The price under item 17 (d) does not cover the cost of terminal connectors which will be paid for under item 17(a) to 17 (c) as applicable.

Item No. 17(e): Supply & Erection of Copper Jumper

The price shall cover the supply of 50 sq mm Small Jumper excluding Catenary wire on a flat rate basis, the supply of all components and fittings required for providing a flexible copper jumper connection, including supply of parallel clamps, bi-metallic Aluminium Copper Al-Cu strips, wherever required and bolted type terminal connector where ever required. The price shall also cover the erection of the complete jumper assembly including jumper wire. The price shall be applicable for jumper connections using 65-sq.mm catenary wire (to be supplied by the purchaser) in any combination required for lightning arresters and isolators etc.

Item No. 17(f): Supply & Erection of Aluminium Jumper

The price shall cover on a flat rate basis the erection of an Aluminum jumper complete with all components and fittings required for providing jumper connection, including parallel clamps, bimetallic AL-Cu strips wherever required, and terminal or tee clamps at either end. The price shall be applicable for any aluminum jumper/connections in any combination between feeders, return conductors, overhead equipment, isolators and outgoing bus-bars or switching stations and booster stations. Jumper connections for 25 KV feeders at angle tower traction sub-station or at feeding stations will also be paid under this item.

Item No. 17(g): Supply & Erection of All Aluminium 25 kV Feeder / Return Conductor (Single Spider)

The price shall cover erection of a 25 KV feeder/return conductor (along or across tracks) made of a single all aluminum bare, hard drawn conductor 19/3.99 mm (SPIDER). The price shall not include the cost of suspension assembly (which will be paid for under item 18 (e)) and termination (which will be paid for under item 18 (d)) and small part steel work, complete with bolts and nuts etc, if any. The price shall also cover on a flat rate basis, the cost of supply of splices to the extent required. The price shall exclude the cost of 19/3.99 mm (SPIDER) conductor.

Item No. 18: Supply & Erection of Support Insulators.

18(a)(i): 220kV Support Insulator
18(a)(ii): 132/110kV Support Insulator
18(a)(iii): 66kV Support Insulator

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The price shall cover supply and erection of support insulators 220kV/132kV/110kV/66kV complete with fixing bolts, nuts and studs. Bus-bar/ jumper clamps for clamping the bus-bar shall be paid under item 17(c).

Item No. 18(b):Supply & Erection of 25kV Support Insulator.

The price shall cover the supply and erection of a 25kV solid core post insulator to support Aluminum bus-bars. It shall include supply of fixing bolts, nuts, locknuts, washers and studs etc. It shall also cover-erection of all components required for the assembly including post insulator. Bus-bar clamps/jumper clamps for clamping the bus-bars/jumpers shall be paid under item 17(c).

Item No. 18(c): Supply and Erection of 110 kV and/or 132 kV Termination arrangements with Disc Insulator with Adjuster for -

18(c)(i) : 110 and/or 132 kV
18(c)(iii) : 66 kV
18(c)(v) : 220 kV

The price shall cover supply and erection of all materials for the termination of a single ACSR conductor (61/3.18 mm ZEBRA) strung between gantries/portals, including anchor fittings, single clevis assembly, anchor double straps, string of appropriate numbers of Disc Insulators required as per system voltage, strain clamps and arcing ring, adjusters and other fittings to complete the assembly. The assembly shall be of breaking strength of not less than 11500 kgf.

Item No. 18(c): Supply and Erection of 110 kV and/or 132 kV Termination arrangements with Disc Insulator without Adjuster for

18(c)(ii) : 110 and/or 132 kV
18(c)(iv) : 66 kV
18(c)(vi) : 220 kV

The price shall cover supply and erection of all materials for the termination of a single ACSR conductor (61/3.18 mm ZEBRA) strung between gantries/portals, including anchor fittings, single clevis assembly, anchor double straps, string of appropriate numbers of Disc Insulators required as per system voltage, strain clamps and arcing ring, without adjusters and other fittings to complete the assembly. The assembly shall be of breaking strength of not less than 11500 kgf.

Item No. 18(d): Supply (without Insulator) & Erection of Materials for Termination of All Aluminium 25kV Feeder/ Return Conductor (Single SPIDER).

The price shall not cover supply of materials required for the termination of an all aluminum 25 kV feeder/return conductor (SPIDER), including appropriate mast anchor fittings adjuster, strain clamp end fitting. The price shall cover erection of all materials including the 9-tone insulator assembly and 3 kV cut-in-insulators.

Item No. 18(dx) and 18(ex) : Supply of 9 Tonne Insulator

18(dx)(i) & 18(ex)(i): Porecelain CD-1050 mm

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18(dx)(ii) & 18(ex)(ii): CompositeCD-1050 mm
18(dx)(iii) & 18(ex)(iii): Composite CD-1600 mm

The price shall cover only supply of 9 tonne insulator assembly (Porcelain CD-1050 mm/CompositeCD-1050 mm/Composite CD-1600 mm)for execution of work under item 18(d) & 18(e). Erection cost of insulators are inclusive in item 18(d) & 18(e).

Item No. 18(e): Supply (without Insulator) and Erection of a Solid Core Suspension (9 Tonne) Insulator.

The price is applicable to the provision of a 9 tonne suspension insulator assembly for suspension of an all Aluminum 25 kV feeder (Single or Double SPIDER), 130 sq. mm or 65 sq. mm overhead equipment conductor or 19/2.79 mm all Aluminum catenary or any other similar type of suspension. The price shall cover supply of all components required for the suspension assembly including the appropriate suspension clamps and the 9 tonne insulator assembly but excluding small parts steel work with bolts and nuts etc., if any. The price shall cover erection of all components, including the 9 tone insulator assembly but excluding small parts steel work with bolts and nuts etc., if any.

The price shall include the cost of provision of a flat armor tape only to be used in connection with suspension of "SPIDER" conductor.

Item No. 19: Supply & Erection of 110V, 200 Ah, Low Maintenance Lead Acid Batteries.

The price shall cover supply and erection of a 110V, 200Ah low maintenance lead acid battery complete with stand and accessories as mentioned in relevant specification and a tool board. The price for erection shall include installation, connecting up, charging and commissioning of the battery. 110V Low Maintenance Lead Acid Batteries shall conform to RDSO specification no. RDSO/PE/SPEC/TL/0040(Rev-2)-2021 or latest amendments.

Item No. 20: Supply & Erection of Battery Chargers for 110V, 200 Ah Low Maintenance Batteries.

The price shall cover supply and erection, connecting up and commissioning of battery charger for charging 110V, 200Ah Low Maintenance Lead Acid battery. The price for erection shall include grouting of the charger in position or mounting it on the wall and connecting it to 240V single phase A.C. supply. Battery Chargers for 110V Low Maintenance Lead Acid Batteries shall conform to RDSO specification no. TI/SPC/PSI/200-250 CHGR/0210(07/21) or latest amendments.

Item No. 21: Supply & Erection of 240V L.T. Distribution Boards in The Control Room for 25 kVA, L.T Supply Transformer.

The price shall cover supply and erection of a 240V AC distribution board in the Control Room. It shall include the grouting of the framework of the distribution board in position or mounting it on the wall and necessary connections. 240V A.C. L.T. Distribution Boards in the Control Room for 10/25 kVA, LT Supply Transformer shall conform to RDSO specification no TI/SPC/PSI/LTDPNL/0210(10/21) or latest amendments.

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Item No. 22: Supply & Erection of 110V DC Distribution Boards.

The price shall cover supply and erection of a 110V DC distribution board in the control room. The price shall include the grouting of the frame work of the distribution board in position or mounting it on the wall and necessary connections. 110V D.C. Distribution Board shall conform to RDSO specification no TI/SPC/PSI/LTDPNL/0210(10/21) or latest amendments.

Item No. 23(a): Supply and installation of cables, for Circuit Breakers & interrupter control and indication circuits. (7x2.5 sq.mm Copper)

The price shall cover supply and installation per meter length of a PVC 1100V grade 2.5 sq.mm (copper conductor) 7 core cable from each circuit breaker and Interrupter to the Control and Relay Board.

Item No. 23(b): Supply and installation of cable for Transformer Alarm/Trip Circuits & Tap Changer Control. (10x2.5 sq.mm Copper)

The price shall cover supply and installation per meter length of a PVC 1100V grade 2.5 sq.mm(copper conductor)10 core cable from the Marshalling Box of each Traction Transformer to the Control and Relay Board.

Item No. 23(c): Supply and installation of cable for Transformer Bushing CT Circuits & 110V DC Circuits. (4x4sq.mm Copper).

The price shall cover supply and installation per meter length of PVC 1100V grade 4 sq.mm (copper conductor) 4 core cable from each Traction Transformer to the Control and Relay Board and from Battery charger and battery to DC distribution board.

Item No. 23(d): Supply and installation of cable for Current Transformer Circuits 110V DC & 240V AC Supply Circuits. (2x4sq.mm Copper)

The price shall cover supply and installation per meter length of PVC 1100V grade 4 sq.mm (copper conductor) 2 Core cable from each current transformer to the control and relay board, from 110V DC distribution board to the control and Relay Board and from 240V A.C. LT distribution board to Battery Chargers.

Item No. 23(e): Supply and installation of cable for Potential Transformer and 240V AC Supply Circuits. (2x2.5 sq.mm Copper)

The price shall cover supply and installation per meter length of PVC 1100V grade 2.5 sq.mm (copper conductor) 2 Core cable from each potential transformer to the control and Relay Board, and from 240V AC LT distribution board to control and relay board.

Item No. 23(f): Supply and installation of cable for 240V Heater Circuit (2x4 sq.mm Aluminium)

The price shall cover supply and installation per meter length of 1100V Grade PVC insulated heavy duty 2 Core 4 sq.mm aluminum conductor cable for space heater provided in control cabinets of various equipment and control panel.

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Item No. 23(g)(i): Supply and installation of cable for LT Power Supply To Control Room. (2x25 sq.mm Aluminium)

The price shall cover supply and installation per meter length of an 1100V grade 25 sq.mm aluminum conductor 2 Core PVC insulated and armoured cable from each LT supply transformer to the LT A.C. distribution boards. and from LT A.C. distribution boards.

Item No. 23(g)(ii): Supply and installation of cable for LT Power Supply To Control Room (2x150 sq.mm Aluminium)

The price shall cover supply and installation per meter length of an 1100V grade 150 sq.mm aluminum conductor 2 Core PVC insulated and armoured cable from each LT supply transformer to the LT A.C. distribution boards.

Item No. 23(h): Supply and installation of cable for L.T. Power Supply for Oil Filtration Plant (2x300 sqm.m Aluminium)

The price shall cover supply and installation per meter length of PVC insulated and armoured 300 sq.mm 2 Core Aluminum conductor cable from 10/25 kVA LT Supply Transformer to LT distribution board in the switch yard.

NOTE for items 23(a) to 23(h):

1) The price for erection of cables shall include cable boxes, metallic glands, identification labels, terminal connectors, copper lugs and leading inducts or pipes as required.

2) The price for erection shall include connecting up of the cable at either end. It shall also include clamping of the cable on steel supports fixed in the trenches, on the structures, on the frame work of the equipment or on the wall of the Control Room as required.

3) For purposes of payment, fraction of a meter in total length of cable of each type used in a substation shall be rounded off to the nearest meter (0.5m or below being ignored).

Item No. 24 : Supply and erection of earth system

24(a): Earth Electrode.

The price shall cover supply and erection of an earth electrode, a typical drawing of which is included in Annexure-I. The price shall cover the provision of a protective concrete box with removable cover as shown in the drawing. The price shall include the testing of earth value and painting the particulars on the box.

The price shall be inclusive of concrete box with cover for this item which shall not be included in Item 2.

24(b): Earth Leads 75mm X 8mm Mild Steel laid in the Ground.

The price shall cover supply and installation per meter length of 75x8mm mild steel flat, buried at a depth of 60cm below ground level. The price shall also cover connections of the steel flats to the earth electrodes to constitute the main earth ring and to the earthed terminals of the 132/25kV transformers etc. as required.

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24(c): Earth Leads 50mm X 6mm Mild Steel Laid in the Ground.

The price shall cover supply and installation per meter length of 50x6mm mild steel flat buried at a depth of 60cm below ground level. The price shall also cover connections of the steel flats to the main earth ring and to the steel structures and metallic frame work/terminals of various equipment, as required.

NOTE for item 24 b and c:

The price for item 24(b) and (c) shall cover supply and installation of a buried rail of approx. 13m length.

24(d): Earth Leads 75mm X 8mm Mild Steel Flat Laid Exposed.

The price shall cover supply and installation per meter length of 75x8 mm mild steel flat, painted all around with two coats of painting to colour grass green shade-218 of IS:5 passing through cable trench or exposed above ground level. The price shall also cover the connections of the steel flats to the earth electrodes, to constitute the main earth ring and to the earthed terminals of the various equipments as required.

24(e): Earth Leads 50mm X 6mm Mild Steel Flat Laid Exposed.

The price shall cover supply and installations per meter length of 50x6 mm mild steel flat painted all around with two coats of painting to colour grass green shade-218 of IS:5 passing through cable trench or exposed above ground level. The price shall also cover the connections of the steel flats to the main earth ring and to the steel structures and metallic frame work/terminals of various outdoor equipments as required.

24(f): 8 SWG G.I Wire for Earthing.

The price shall cover supply, shaping and erection of 8 SWG G.I wire per meter used for earthing of control panels, L.T. AC and DC distribution boards, battery chargers, etc. at sub-station control rooms. The requirement of fencing panel earthing to the nearest fencing upright shall also be included and paid for under this item.

24(g): 32mm Dia MS Rod for Earth Mat.

The price shall cover supply and installation per meter length of bare mild steel rod of dia 32mm to be buried at a depth of 60cm. below the ground level to form the earthing grid & connected to earth electrodes. The price shall also cover jointing of the M.S. rods to form an earthing grid and connection to M.S. flats for system earthing.

NOTE: For purposes of payment for items (b) to (g) fraction of a meter in the total length of earth lead of each type used at a substation shall be rounded off to the nearest meter (0.5m and below being ignored).

<u>Item No. 25(a):</u> Supply & Erection of Earth Screen Wires.

The price shall cover supply and stringing per meter length of 25 tone quality 19/2.5mm (70kg/sq.mm) galvanised steel stranded wire. It shall include the supply and erection of suitable terminations using strain clamps adjuster (on one side only) etc. It shall also include connecting

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by means of suitable terminal spades, the end of the earth screen wire to the main members of the columns of portals gantries across which these wires are strung or to 50x6mm M.S. flat earth leads. For purposes of payment the clear span between the structures on which earth wire is run shall be adopted. The clear span will be rounded off to the nearest meter (0.5m and below being ignored).

Item No. 25(b): Supply & Erection of Earth Screen Wire of Size 7/9 SWG.

Same as item 25(a) above except that the earth screen wire of size 7/9 SWG to be used in place of earth screen wire of size 19/2.5mm.

Item No. 26(a): Supply & Erection of Fencing Panels at Sub-Stations.

The prices shall include supply and erection of fencing panels as per relevant drawing included in Annexure-1, painted with two coats of red oxide zinc chromate primer as per particulars specified in Para 2.6.12 and finished with two coats of aluminum paint to IS:2339. The prices shall not include supply and erection of fencing uprights, anti-climbing devices but shall include the cost of fasteners and the price shall be for a meter length of the panels, measured in the plan view of the approved drawings.

Item No. 26(b): Supply & Erection of Fencing Uprights at Sub-Stations.

The price shall cover supply and erection of fabricated fencing uprights painted with two coats of red oxide zinc chromate primer as per particulars specified in para 2.6.12 and finished with two coats of Aluminum paint to IS:2339. The price shall be on the basis of black weight of the steel section of the approved drawing with no deduction for holes and skew cuts or no increase for weld materials. The cost of foundation of uprights will be paid under item 2. Provision of the earth connections connecting each upright with the main earth bus as per approved drawing shall be paid under item 24.

Item No. 26(c): Supply & Erection of Gates

The price shall cover supply and erection of gates including locking device to Drg. No. CORE/ALD/PS/01 Mod `C'. The gates will be painted with two coats of red oxide zinc chromate primer to IS:2074 and finished with two coats of aluminum paint as per particulars specified in Para 2.6.12 and IS:2339. The price shall be per meter length of the gate as measured on the plan view of the appropriate approved drawings. The price shall also include providing two bond connections made of multi-stranded flexible steel equivalent to 6 SWG in the form of helical spring for the purpose of continuity of earthing between the gate and the adjacent fencing uprights as per the appropriate approved drawings. Both fixing ends shall be provided with an "eye" and properly crimped.

NOTE: All fasteners, bolts, nuts, locknuts and washers etc. required for assembly and fixing of steel work shall be galvanized.

Item No. 26(d): Supply & Erection of Anticlimbing Device at Sub-Stations.

The price shall cover supply and erection of an anti-climbing device consisting of steel fixtures and galvanized barbed wire mounted on the fencing panels as per approved drawings. The price shall be per meter length of the panel. The price shall include painting of the fixtures with

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two coats of red oxide zinc chromate primer and two finishing coats of aluminum paint as per particulars specified in Para 2.6.12 & IS: 2339

***NOTE**:* The prices for item 26(a) to 26(d) shall also include supply of all necessary galvanized steel bolts, nuts, lock-nuts and washers etc. required for assembly and fixing of the steel work.

Item No. 27: Erection, Testing and Commissioning of 220/25kV, 132/25 kV,110/25& 66/25 kV, 21.6 MVA Single Phase Power Transformer.

27(a): 220/25 kV
27(b): 132/25 kV
27(c): 110/25 kV
27(d): 66/25 kV

The traction power transformers (220/25kV, 132/25 kV,110/25& 66/25 kV) complete with all accessories including oil (which may be in separate drums/containers) will be handed over by the Purchaser at the sub-station premises. The Contractor shall bring the transformer on to its correct position on the foundation and erect all the accessories, check up the alignment and make connections of HV and LV terminals to the 220kV/132kV/110kV/ 66 kV and 25kV bus-bars. The Contractor shall carry out oil filtration and pre-commissioning tests as approved by the Purchaser and commission the transformers strictly in accordance with the instructions of the transformer manufacturer or his commissioning Engineer at site to the complete satisfaction of the Purchaser. The Contractor shall be held responsible to ensure that the work is carried out to the highest standards, in accordance with the relevant codes of practice and any special conditions/ guidelines/ requirements as laid down by the manufacturer of the transformer are properly complied with contractor shall notify the manufacturer regarding likely date of commissioning, one month in advance, so that the manufacturer can depute his representative if so desired by him at his own cost, for warranty obligation purposes. Notwithstanding availability of manufacturer's representative or otherwise, it shall be the contractor's responsibility to ensure that the equipment is commissioned as per laid down procedure. However, in case of any extra cost being incurred in this.

Item No. 28: Supply & Spreading of Ballast/Gravel in The Switch Yard.

The price shall be per cum rate and shall cover supply and spreading of uniformly graded gravel/ballast of size 20/25mm, in the outdoor switch yard after completing all the works and leveling the switch yard area, but before commissioning of the sub-station. The gravel/ballast shall be of good quality and free from any dust and dirt. Prior approval of ballast shall be taken from the Purchaser for the gravel samples. The gravel/ballast shall be spread out uniformly to a depth of 10 cm. over the area indicated by the Purchaser's Engineer.

Item No. 29: Supply & Erection of 110 V Maintenance Free Type Lead Acid Batteries (200Ah)

The price shall cover supply and erection of pre-charged 110V, 200Ah Maintenance free type lead acid battery complete with stand and accessories and tool board as mentioned in relevant specification. The price for erection shall include installation, connecting up, charging at site if required and commissioning of the battery.

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Item No. 30: Supply & Erection of Battery Charger for 110 V, 200Ah, Maintenance Free Lead Acid Battery.

The price shall cover supply and erection of connecting up and commissioning of battery charger for charging 110V, 200Ah Maintenance free Lead acid Battery. The price for erection shall include grouting of the charger in position or mounting it on the wall and connecting it to 240V single phase A.C. supply.

Item No. 31: Supply & Erection of Copper Feeder Wire (37/2.25mm HDBC)

The price shall cover supply and erection of 25KV feeder wire across/ along the track at the location of SP /SSP/FP/BT/ Gantries stations. Feeder wire shall be made of hard drawn bare copper conductor of 37/2.5 mm. The price shall be inclusive of cost of feeder wire but exclusive of termination (which will be paid under item 32) and small parts steel work complete with bolts, nuts etc if any.

Item No. 32: Supply (other than insulators) and Erection of Materials (including insulator) for Termination of Copper Cross Feeder Wire.

The price shall cover the supply of all materials required for termination of copper cross feeder wire (37/2.25 mm HDBC) including appropriate mast anchor fitting (3231), 18 mm Single clevis (5040), 9 Tone adjuster (5020-2), Feeder ending clamp (1130), double clevis (3010) and other components as necessary but excluding 9-Ton insulator assembly. The price shall also cover the erection of all materials including 9-Ton insulator assembly and termination of cross feeder at either ends. Fittings/ components required for termination of one cross feeder at both ends constitute one set.

Item No. 33: Supply & Erection of Large Copper Jumper 160 Sq. mm Between Aluminium Bus and Cross Feeders.

This jumper shall be provided between 36 mm Aluminum bus and the copper cross feeder at SP/SSP/FP/BT locations. The price shall cover the supply of all components and fittings including 160 sq.mm jumper wire required for providing a flexible copper jumper (160 Sq.mm) and connection between 36 mm Aluminum bus and cross feeder. including Terminal connector 19 mm multiple hole bolted type (1009), parallel clamps (1050-3), Al-Cu bimetallic strips, fasteners.The price shall also cover the erection of the complete jumper assembly including jumper wire.

Item No. 34: Supply & Erection of Large Copper Jumper 160 Sq. mm Between Cross Feeder and OHE

This jumper shall be provided between copper cross feeders and OHE. The price shall cover the supply of all components and fittings including 160 sq.mm jumper wire required for providing a flexible copper jumper (160 Sq.mm) between copper cross feeder and existing OHE, including Parallel clamps (1030-3 & 1050-3) complete with fasteners etc as required .The price shall also cover the erection of the complete jumper assembly including jumper wire.

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Item No. 35: Supply of 9 Tonne Insulator (for item No. 32)

35 (i) : Porcelain CD-1050 mm

35 (ii): Composite CD-1050 mm

35 (iii): Composite CD-1600 mm

The price shall cover only supply of 9 tonne insulator assembly (Porcelain CD-1050 mm/CompositeCD-1050 mm/Composite CD-1600 mm) for execution of work under item 32. Erection cost of insulators are inclusive in item 32.

Item No. 41: Supply, Erection, Testing & Commissioning of Shunt Capacitor Banks of 5500/2200/3300 kVAR

Item no 41(a): 5500 kVAR
Item no 41(b): 2200 kVAR
Item no 41(c): 3300 kVAR

The lump sum price shall cover supply, erection testing and commissioning of 5500/2200/3300 kVAR at 40 kV shunt capacitor bank at Traction sub-stations, complete with capacitor unit, internal fuses, discharge devices, rack insulator assembly, inter-connector between units, insulators, suitable earthing lugs including terminal connectors and other material and hardware required for satisfactory operation of the unit. It shall also include mounting of the capacitor bank on the supporting structures and its connecting upto other equipment. Price is inclusive of erection & grouting of supporting structure.

The contractor shall carryout pre-commissioning tests as approved by the purchaser and commission the shunt capacitor bank strictly in accordance with the instructions of the shunt capacitor bank manufacturer or his commissioning engineer at site to the complete satisfaction of the purchaser. The contractor shall be held responsible to ensure that the work is carried out to the highest standards, in accordance with relevant codes of practice and any special conditions/ guidelines/requirements as laid down by the manufacturer of the shunt capacitor bank are properly complied with. The contractor shall notify the manufacturer regarding the likely date of commissioning, one month in advance so that the manufacturer can depute his representative, if so desired by him, at his own cost, for warranty obligation purposes. Notwithstanding availability of manufacturer's representative or otherwise, it shall be the contractor's responsibility to ensure that the equipment is commissioned as per laid down procedure. All necessary tools, equipments, instruments required for carrying out necessary checks and commissioning of the shunt capacitor bank shall be arranged by the contractor. 25kV Shunt Capacitor bank shall conform to RDSO specification No. TI/SPC/PSI/FC & SR/0100(01/10) with A&C slip no 1 or latest amendments.

Item No. 42: Supply, Erection, Testing & Commissioning of Low Loss Series Reactor Suitable for 25 kV Shunt Capacitor Banks of 5500 /2200/3300 kVAR at 40 kV

Item no 42(a): For 5500 kVAR
Item no 42(b): For 2200 kVAR
Item no 42(c): For 3300 kVAR

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The price shall cover supply, erection and connecting up of series reactor suitable for 5500/2200/3300 kVAR at 40 kV shunt capacitor bank complete with all fittings and accessories including connectors. It shall include mounting of the series reactor in position. Series reactor for Shunt Capacitor bank equipment shall conform to RDSO specification No. TI/SPC/PSI/FC & SR/0100(01/10) with A&C slip no 1 or latest amendments.

Item No. 43: Supply & Erection of 25kV Current Transformers (200-100/5A)

The prices shall cover supply, erection and connecting up of a 25kV Current transformer with ratio 200-100/5A complete with all fittings and accessories including terminal connectors. Current transformer shall conform to RDSO specification no TI/SPC/PSI/CT/0210 with A&C slip no 1(12/24) or latest .The price shall include mounting of the current transformer in position and supply and erection of an enameled number plate.

Item No. 44: Supply & Erection of 25kV Neutral Current Transformers.

The prices shall cover supply, erection of 25KV neutral current transformer for protection of the capacitor bank. The price shall also cover connecting of the neutral current transformer with capacitor bank and control and relay panel. It shall also cover mounting of the neutral current transformer on the supporting frame.

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