

BIDDING DOCUMENT

FOR

CONSTRUCTION AND COMPLETION OF 132/33KV GIS SUBSTATION AT DHAMRAI, 230/132KV GIS SUBSTATION AT SHYAMPUR AND ASSOCIATED TRANSMISSION LINES ON TURNKEY BASIS.

ADB LOAN NO. 3078-BAN CONTRACT NO. PSEEIP(TRANCHE-2)/ADB/PGCB/P01

VOLUME 3 OF 3

BID PRICES AND SCHEDULES

JUNE 2014

BIDDING DOCUMENT FOR

CONSTRUCTION AND COMPLETION OF 132/33KV GIS SUBSTATION AT DHAMRAI, 230/132KV GIS SUBSTATION AT SHYAMPUR AND ASSOCIATED TRANSMISSION LINES ON TURNKEY BASIS.

INDEX TO VOLUMES

Volume 1 of 3

- Section 1 Instruction to Bidders
- Section 2 Bid Data Sheet
- Section 3 Evaluation and Qualification Criteria
- Section 4 Bid Forms (Please refer to Volume 3 of 3)
- Section 5 Eligible Countries
- Section 6 Employer's Requirements
- Section 7 General Conditions of Contract
- Section 8 Special Conditions of Contract
- Section 9 Contract Forms

Volume 2 of 3

Scope of Work Technical Specifications Drawings forming Part of Specifications

Volume 3 of 3

Bid Forms

- Schedule A Introduction & Preamble to the Price & Technical Schedules
- Schedule B Bid Prices
- Schedule C Bar Chart Programme of Key Activities
- Schedule D Manufacturers, Places of Manufacture and Testing
- Schedule E Technical Particulars and Guarantees
- Schedule F Proposed Subcontractors
- Schedule G Co-efficient and indices for Price Adjustment

BIDDING DOCUMENT

FOR

CONSTRUCTION AND COMPLETION OF 132/33KV GIS SUBSTATION AT DHAMRAI, 230/132KV GIS SUBSTATION AT SHYAMPUR AND ASSOCIATED TRANSMISSION LINES ON TURNKEY BASIS.

SCHEDULE A

INTRODUCTION & PREAMBLE TO THE PRICE & TECHNICAL SCHEDULES

BIDDING DOCUMENT

FOR

Construction and completion of 132/33kV GIS substation at Dhamrai, 230/132kV GIS substation at Shyampur and associated transmission lines on turnkey basis.

SCHEDULE A

INTRODUCTION & PREAMBLE TO THE PRICE & TECHNICAL SCHEDULES

BRIEF DESCRIPTION OF THE WORKS

The bidder shall be deemed to have visited site, inspected, gathered data and verified details of the as-built system in order to design, supply and interface their new equipment. All necessary materials, adjustments, dismantling, remedial and tiding-up work in order to complete the work specified shall be included in the contract price. The contractor is responsible for ensuring that all and/or and any item(s) of work required for the safe, efficient and satisfactory completion and functioning of the works, are included in the Bid Price whether they be described in the specification or not.

The scope of work comprises the following: -

DESCRIPTION OF WORKS

The scope of work under this turnkey bid is design, supply, delivery, installation, testing & commissioning of One new 132/33kV Gas Insulated Switchgear (GIS) substation at Dhamrai, One new 230/132kV Gas Insulated Switchgear (GIS) substation at Shyampur and 4km 230kV double circuit overhead Transmission Line in-out from Meghnaghat-Hasnabad 230kV double circuit line & 2km 132kV double Circuit overhead Transmission Line in-out from Hasnabad-Shyampur 132kV double Circuit Line at proposed Shyampur 230/132kV GIS Substation.

The scope of work also includes design, supply, delivery, installation, testing & commissioning of 132/33kV power transformer,230/132kV Auto Transformer and associated control, automation, protection, fiber optic multiplexer equipment for communication & protection, and civil works.

Scope 1: NEW 132/33KV GIS SUBSTATION AT DHAMRAI:

Design, supply, delivery, installation, testing & commissioning of a complete new outdoor type 132/33kV GIS substation at Dhamrai(which is situated at the west side and about 30km away from the Capital city Dhaka).

132kV Gas Insulated Switchgear (GIS):

Complete 132kV GIS consisting of two line bays, two transformer bays and one buscoupler bay to connect two new 132 kV overhead lines (Kaliakoir-1 & 2) & two 132/33 kV, 50/75MVA power transformers; space provision shall be kept for future extension of five 132 kV bays.The configuration of the 132 kV busbar shall be double busbar scheme. Jointing plugs shall be kept for adding future bays and jointing plugs required for connecting GIS of different makes. 33kV Air Insulated Switchgear (AIS) and Connection:

outdoor type 33 kV AIS switchyard with single busbar and two 33kV incomer bays to connect two 33kV side of 132/33 kV, 50/75MVA power transformers; two(2) 33/.415kV aux. transformer bays in order to facilitate station power supply ;space provision shall be kept for future extension of six(6) outgoing 33kV bays with busbar & skeleton

Two 50/75 MVA, 132/33 kV outdoor type three phase transformers;

Two 33/0.4 kV, 200KVA outdoor type auxiliary transformers to supply the substation auxiliary loads.

Control, Protection, Substation Automation & Metering:

Associated control, metering, protection equipment, synchronizing scheme and substation automation system for complete substation.

Fibre Optic Multiplexer Equipment for Communication and Protection: Indoor type Fibre Optic Multiplexer and communication Equipment for protection & communication and integration with existing communication network of PGCB.

DC and LVAC System:

Complete set of 110V DC & 48V DC and LVAC system with all necessary materials required for the plant being installed. The system shall be comprises with a backup/standby set.

Land Development, Civil Works, Building and Foundation:

Complete design, supply and construction of all civil items required for land development.

Complete design, supply and construction of all civil items required for the outdoor works suitable for switchyard gantry & equipment foundations, transformer foundations, blast walls, oil pit, entrance & internal roads, outdoor lighting system, cable trenches, septic tank, earth filling, surfacing, drainage, security fences, guard house, earthing & lightning protection, switchyard lighting, etc.

Complete design, supply and construction of all civil items including all necessary architecture & structural requirements; cable trays, fittings and flooring & finishes; air-conditioning and lighting for a two storied control building including cable basement.

SCADA system for Telecontrol and Telemetering:

Complete design, supply, delivery, installation, testing & commissioning of hardware and software to provide the telecontrol & telemetering facilities required at the existing National Load Despatch Center(NLDC) at Rampura for integration of complete new 132/33kV substation. All required electrical signals shall be transmitted to the NLDC through the Industrial Gateway of the substation automation system. All HV breakers, motorized disconnectors, tap changer, etc. shall be controlled form NLDC through the Gateway of the substation automation system using IEC 60870-5-104 protocol. All necessary modification works in the software of master station of NLDC are to be carried out.

Mandatory Spares, Maintenance tools & Test Equipment:

Supply of complete mandatory spare and spare parts of transformer, switchgear, control equipment, protection relays, meters, maintenance tools & test equipment. The materials shall have to be handed over to the designated store as per instruction of the Engineer.

Scope 2: NEW 230/132KV GIS SUBSTATION AT SHYAMPUR:

Design, supply, delivery, installation, testing & commissioning of a complete new indoor type 230/132kV GIS substation at Shyampur (Which is situated at the South side and about 8km away from the Capital city Dhaka).

230kV Gas Insulated Switchgear (GIS):

Complete 230kV GIS consisting of four line bays, two transformer bays and one buscoupler bay to connect four new 230 kV over head lines (Meghnaghat-1 & 2, Hasnabad-1 & 2) & two new 230/138/33kV transformers; space provision shall be kept for future extension of five 230kV bays. The configuration of the 230kV busbar shall be double busbar scheme. Jointing plugs shall be kept in GIS hall for adding future bays and jointing plugs required for connecting GIS of different makes;

132kV Gas Insulated Switchgear (GIS):

Complete 132kV GIS consisting of six line bays, two transformer bays & one bus coupler bay to connect six new 132 kV over head lines (Shyampur-1 & 2, Fatulla-1 & 2 and Matuail-1 & 2) & 132kV side of two new 230/138/33kV transformers; space provision shall be kept for future extension of four 132 kV bays. The configuration of the 132kV busbar shall be double busbar scheme. Jointing plugs shall be kept in GIS hall for adding future bays and jointing plugs required for connecting GIS of different makes;

Outdoor type 36kV VCB with CT, LA, DS for auxiliary transformer to connect with tertiary side of Auto transformer.

Two 225/300 MVA, 230/138/33 kV outdoor type three phase auto transformers; Two 33/0.4 kV, 300KVA outdoor type earthing transformers connected to each 230/138/33 kV transformer tertiary side to supply the substation auxiliary loads. 230kV, 132kV & 33kV Underground Power cables.

Control, Protection, Substation Automation & Metering:

Associated control, metering, protection equipment, synchronizing scheme and substation automation system for complete substation.

Digital Fault & Disturbance Recorder (DFDR):

Supply, installation, testing & complete commissioning of DFDR at New Shyampur 230/132kV substation , Existing Tongi 230/132kV Substation and Old Airport 230/132kV substation.

Fibre Optic Multiplexer Equipment for Communication and Protection:

Indoor type Fibre Optic Multiplexer and communication Equipment for protection & communication and integration with existing communication network of PGCB. DC and LVAC System:

Complete set of 110V DC & 48V DC and LVAC system with all necessary materials required for the plant being installed. The system shall be comprises with a backup/standby set.

Land Development, Civil Works, Building and Foundation:

Complete design, supply and construction of all civil items required for land development.

Complete design, supply and construction of all civil items required for the outdoor

works suitable for switchyard gantry & equipment foundations, transformer foundations, blast walls, oil pit, entrance & internal roads, outdoor lighting system, cable trenches, septic tank, earth filling, surfacing, drainage, security fences, guard house, earthing & lightning protection, switchyard lighting, etc.

Complete design, supply and construction of all civil items including all necessary architecture & structural requirements; cable trays, fittings and flooring & finishes; air-conditioning and lighting for a new GIS building including cable basement, control room, EOT crane etc.

SCADA system for Telecontrol and Telemetering:

Complete design, supply, delivery, installation, testing & commissioning of hardware and software to provide the telecontrol & telemetering facilities required at the existing National Load Despatch Center(NLDC) at Rampura for integration of complete new 230/132kV substation. All required electrical signals shall be transmitted to the NLDC through the Industrial Gateway of the substation automation system. All HV breakers, motorized disconnectors, tap changer, etc. shall be controlled form NLDC through the Gateway of the substation automation system using IEC 60870-5-104 protocol. All necessary modification works in the software of master station of NLDC are to be carried out.

Mandatory Spares, Maintenance tools & Test Equipment:

Supply of complete mandatory spare and spare parts of transformer, switchgear, control equipment, protection relays, meters, maintenance tools & test equipment. The materials shall have to be handed over to the designated store as per instruction of the Engineer.

Scope 3: Construction of Transmission Line:

3.1: Double circuit in-out of Meghnaghat Hasnabad 230kV line at Shyampur 230/132kV Substation.

Design, supply, delivery, installation, testing & commissioning of in-out of existing Meghnaghat–Hasnabad 230kV overhead double circuit line at Shyampur 230/132kV Substation. This 230kV overhead line in and out shall be constructed on four circuit lattice steel tower in vertical configuration with ACSR Mallard Twin conductor and two 7×4.0 steel earthwire equivalent OPGW consisting of 48 fibers approx. 4km; Insulators of 210kN & 120kN ratings, Hardware fittings.

3.2 Double circuit in-out of Shyampur – Hasnabad & Shyampur-Haripur 132kV line at Shyampur 230/132kV Substation.

Design, supply, delivery, installation, testing & commissioning of existing Shyampur– Hasnabad 132kV(Single circuit) line and existing Shyampur– Haripur 132kV(Single circuit) line at Shyampur 230/132kV Substation on same tower(approx 2km). This 132kV overhead line in and out shall be constructed on four circuit lattice steel towers in vertical configuration with ACSR Grossbeak single conductor and two 7×3.25 mm steel earthwire equivalent OPGW of 24 fibers approx 2km.

Proto load tested tower structural and shop drawings will be provided by the Employer. However, if the Contractor need to prepare any additional structural and shop drawings, that have to be prepared by the Contractor without any additional cost. Insulators of 120kN & 70kN ratings, Hardware fittings.

SCHEDULE A1

REQUIREMENTS

SCOPE-1: Dhamrai 132/33 kV GIS Substation:

The equipment to be designed, supplied, installed, tested & commissioned as per detail technical specification and as shown in bid drawings (volume 2 of 3 of this bid document):

1A 132 kV Outdoor Type Gas Insulated Switchgear (GIS)

The 132 kV outdoor type GIS shall comply with the particular requirements as detailed in the Schedule of Technical Requirements included as Appendix A1 to this section and shall comprise the following:-

- 1A1 Two(2) sets 132kV overhead line circuit bays(1250A), 40kA/1sec, 50Hz, 650kVp BIL including main connections GIS bus duct & Air Insulated Bushing(AIB), protection and control requirements.
- 1A2 Two(2) sets 132/33 kV Transformer circuit bays(1250A), 40kA/1sec, 50Hz, 650kVp BIL including main connections GIS bus duct & Air Insulated Bushing(AIB), protection and control requirements.
- 1A3 One(1) set Bus Coupler circuit bay(3000A), 50kA/1sec, 50Hz, 650kVp BIL including main connections, protection and control requirements.
- 1A4 Double Busbar (3000A), 40kA/1sec, 50Hz, 650kVp BIL with VT and ES including main connections, protection and control requirements in One(1) lot.

1B 33kV Air Insulated Switchgear(AIS) and Connection:

The 33kV AIS shall comply with the particular requirements as detailed in the Schedule of Technical Requirements included as Appendix A1 to this section and bid drawings; shall comprise the following:-

- 1B1 Two (2) sets of 36kV, 2000A, 25kA/1sec, 50Hz, 170kVp BIL, outdoor Vacuum Circuit Breakers(VCB) with spring-stored energy operating mechanism.
- 1B2 Seven(7) sets of 36kV, 2000A, 25kA/1sec, 50Hz, 170kVp BIL, single vertical break, post type, disconnectors.
- 1B3 Six(6) nos. of single-phase, 3-core, multi ratio, 36kV, 25kA/1sec, 50Hz, 170kVp BIL, post type current transformer.
- 1B4 Twelve(12) nos. of single-phase, 2-core, 36kV, 25kA/1sec, 50Hz, 170kVp BIL, voltage transformers.
- 1B5 Twelve(12) nos. of 30kV rated voltage, 10kA nominal discharge current,

50Hz, Heavy duty station class, single phase surge arresters.

- 1B6 One(1) lot of flexible conductors for busbar, jackbus, jumper, equipment connections[ACSR, Twin Mallard(795MCM)], including all necessary clamps & connectors required for completing 33kV busbar and switchgear connection.
- 1B7 One(1) lot of insulators and fittings including all necessary accessories required to complete 33kV switchyard
- 1B8 One(1) lot of steel structures for gantry and equipment supports including nuts & bolts and cable tray including all necessary fitting & fixing accessories required for completing 33kV switchyard.

1C Power Transformers & Auxiliary Transformers

- 1C1 Two (2) sets of 132/33kV, 50/75 MVA (ONAN/ONAF), three phase outdoor type power transformers with associated bushing CTs including all necessary connections, insulators & fittings.
- 1C2 Two(2) sets 33/0.415kV, 200kVA three phase outdoor type station auxiliary transformers with associated support steel structures including all necessary connections, insulators & fittings.

1D Control, Protection, Substation Automation & Metering 132 kV Circuits

The equipment to be designed, supplied, installed and commissioned shall be as shown in bid drawings and comprise of:-

- 1D1 Control, Protection, Metering & Substation Automation System including event recording function for Two(2) sets of overhead line circuits to Kaliakoir (Kaliakoir-1 & 2).
- 1D2 Control, Protection, Metering & Substation Automation System including event recording function for two(2) sets of 132/33 kV power transformer circuits including transformer tap changer control.
- 1D3 Control, Protection, Metering & Substation Automation System including event recording function for one(1) set of bus coupler circuit.
- 1D4 Busbar protection system for complete 132kV bus; one(1) lot.
- 1D5 Tariff metering panel to accommodate programmable & recordable digital 3-phase, 4-wire import and export MWh and MVArh meters (accuracy class 0.2) for Two(2) 132kV line and two(2) transformer feeder. For each feeder minimum two meters (main & check). The scope of works also includes supply of software(s) & connection cords of the above energy meters for future re-configuration.
 33 kV Circuits

The equipment to be supplied, installed and commissioned shall be as shown in bid drawings and comprise of:-

- 1D6 Control, Protection, Metering & Substation Automation System including event recording function for two sets of power transformer circuits
- 1D7 Tariff metering panel to accommodate programmable & recordable digital 3phase, 4-wire import and export MWh and MVArh meters (accuracy class 0.2) for two transformer feeder circuits (Power X-former-I & II). For each feeder minimum two meters (main & check).

1E Surge Arrester, Conductor, Steel Structure, Insulator & Hardware & Fittings

132 kV Circuit

- 1E1 Twelve(12) nos. of 120kV rated voltage, 102kV(rms) continuous operating vo ltage at 500c, 10kA nominal discharge current, 50Hz, Heavy duty station class , gapless metal oxide type, single phase surge arresters.
- 1E2 One(1) lot of flexible conductors for jackbus, jumper, equipment connection [ACSR, Single Grosbeak(636 MCM)], including all necessary clamps & connectors required for completing termination of 132kV overhead incoming line and Transformer HV side.
- 1E3 One(1) lot of insulators & fittings including all necessary accessories required to complete 132kV interfacing.
- 1E4 One(1) lot of steel structures for gantry and outdoor equipment supports includ ing nuts & bolts and cable tray including all necessary fitting & fixing accesso ries required to complete 132kV interfacing.
- 1F Multicore Cables
- 1F1 One(1) lot complete set of multicore low voltage 0.6/1.1kV, XLPE insulated power and control cables (IEC 60502) shall be supplied, installed, glanded, terminated and have individual cores identified to be used for connection of all equipment supplied under this Contract. The overall substation cable routing and core schedules shall also be provided.

1G Earthing and Lightning Protection

1G1 One(1) lot of design, supply and installation of earthing system and lightning protection screen including connections, connectors and clamps, to suit the substation overall arrangement and provide supporting design calculations.

1H Batteries, Chargers and DC Distribution

1H1 110V substation NiCad batteries complete with chargers and distribution switchboard to be supplied, installed and commissioned to provide all DC supplies to equipment being supplied.

The system shall generally be as shown in bid drawing and shall include:

- (a) Two (2) sets of 100% batteries complete, each capacity shall not be less than 250Ah at the 5-hour rate of discharge.
- (b) Two (2) sets of battery chargers complete, each charger shall not be less than 75A rating.
- (c) One (1) set of DC distribution board. The DC distribution board shall be with 50% spare MCBs for future use.
- (d) Two(2) sets of online UPS, 3kVA for Substation Automation system panels.
- (e) Two(2) sets of DC/DC Converter 110/48V, 1kVA for communication panels and one(1) set 48V DC distribution board. The DC distribution board shall be with 50% spare MCBs for future use.
- 1I LVAC Distribution
- 111 One (1) lot of LVAC switchboard for substation services to be supplied, installed and commissioned, to provide the 415/240V supplies to all equipment being supplied under this turnkey Bid.
- 112 One (1) lot of Tariff metering panel to accommodate programmable & recordable digital 3-phase, 4-wire import and export MWh and MVArh meters (accuracy class 0.2) for two 33/0.415 kV station auxiliary transformer feeder circuits. For each feeder minimum two meters (main & check).
- 113 One(1) set 125A outdoor weatherproof 3-phase with neutral and earth switched socket outlet and plug as per IEC 309; to be installed, cabled and connected adjacent to the power transformers.
- 1J Civil Works, Building and Foundation
- 1J1 Complete earth filling by imported carried earth free from foreign solid particles and organic materials in addition to the earth recovered from digging of foundation, to make the top of the final ground level of substation 4.0m high from highest flood level and final compaction to be achieved 95% for total volume 40,500 cubic meter. The volume of earth filling may be varied but the payment shall be as per actual measurement of work done.
- 1J2 One(1) lot of complete design, supply and construction of all civil items required for the outdoor works suitable for switchyard gantry & equipment foundations, transformer foundations, blast walls, oil pit, entrance & internal roads, cable trenches, septic tank, soak way, surfacing, gravel laying, drainage, security fences, boundary wall, sentry post, guard house, car port, etc.

- 1J3 One (1) lot of complete design, supply and construction of all civil items and facilities required for the two storied control building including cable basement.
- 1J4 One (1) lot of complete design, supply and construction of all civil items and facilities required for the three storied dormitory building on six storied foundation with kitchen,toilet facilities for each unit.
- 1K Lighting, Small Power, Air Conditioning and Ventilation
- 1K1 One (1) lot of complete design, supply, installation and commissioning of equipment to provide lighting, LV power supply, air conditioning system, ventilation system and emergency DC lighting for the control building.
- 1K2 One (1) lot of complete set of design, supply, installation and commissioning of equipment to provide lighting (flood light LED type) for security, roadway, switchyard and emergency DC lighting at strategic locations for equipment operation and inspection.
- 1L Fibre Optic Multiplexer Equipment for Communication and Protection
- 1L1 The equipment to be supplied, installed and commissioned shall be as shown on bid drawing. One(1) lot complete set of design, supply, installation and commissioning of fibre optic multiplexer equipment including necessary works to interface with existing system is to be provided for:
 -87 or 21 relay for each transmission line protection (through fibre cores)
 -SCADA data from switchgear and control system
 -Hot-line telephone system
- 1L2 Underground optical fibre cables (24cores, single mode) from terminal box gantry structure at each 132kV double circuit transmission line termination point to MDF (Main distribution Frame) to be installed in control room. The Contract includes supply and installation of MDF and pigtail cables with adequate length.
- 1M SCADA system for Telecontrol and Telemetering
- 1M1 One (1) lot of complete design, supply, delivery, installation, testing & commissioning of hardware and software to provide the telecontrol & telemetering facilities required at the existing National Load Despatch Center (NLDC) at Rampura for integration of complete new 132/33kV substation. All required electrical signals shall be transmitted to the NLDC through the Industrial Gateway of the substation automation system. All HV breakers, motorized disconnectors, tap changer, etc. shall be controlled form NLDC through the Gateway of the substation automation system using IEC 60870-5-104 protocol. All necessary modification works in the software of master station of NLDC are to be carried out.
- 1N Mandatory Spares, Erection & Test Equipment

Supply of complete spares and spare parts of transformer, switchgear, control equipment, protection relays, meters, erection & test equipment as per quantity mentioned in Schedule B. Test equipment are to be supplied from Europe, USA or Japan origin. Printed catalogue, operation and service manual are to be provided. The materials shall have to be handed over to the designated store as per instruction of the Employer's Engineer.

SCOPE-2: Shyampur 230/132kV GIS Substation:

The equipment to be designed, supplied, installed, tested & commissioned as per detail technical specification and as shown in bid drawings (volume 2 of 3 of this bid document):

Item Description

2A 230 kV Indoor Type Gas Insulated Switchgear (GIS)

The 230kV GIS shall comply with the particular requirements as detailed in the Schedule of Technical Requirements included as Appendix A1 to this section and shall comprise the following:-

- 2A1 Four(4) sets 230 kV Overhead Line circuit bays(1600A), 50kA/1sec, 50Hz, 1050kVp BIL including main connections (termination of underground XLPE cable, 2000sqmm, cu at GIS bay end), protection and control requirements.
- 2A2 Two(2) sets 230/138/33kV Transformer circuit bays(1600A), 50kA/1sec, 50Hz, 1050kVp BIL including main connections GIS bus duct & Air Insulated Bushing(AIB), protection and control requirements.
- 2A3 One Bus Coupler circuit bay(2000A), 50kA/1sec, 50Hz, 1050kVp BIL including main connections, protection and control requirements.
- 2A4 Double Busbar 2000A, 50kA/1sec, 50Hz, 1050kVp BIL with VT and ES including main connections, protection and control requirements one(1) lot.

2B 132 kV Indoor Type Gas Insulated Switchgear (GIS)

The 132kV GIS shall comply with the particular requirements as detailed in the Schedule of Technical Requirements included as Appendix A1 to this section and shall comprise the following:-

- 2B1 Six (6) sets 132 kV Overhead Line circuit bays(1250A), 40kA/1sec, 50Hz, 650kVp BIL including main connections GIS (termination of underground XLPE cable, 1000sqmm, cu at GIS bay end), protection and control requirements.
- 2B2 Two(2) sets 230/138/33kV Transformer circuit bays(2000A), 40kA/1sec,

50Hz, 650kVp BIL including main connections GIS (termination of underground XLPE cable, 1000sqmm, cu, 2 run per phase at GIS bay end).

- 2B3 One Bus Coupler circuit bay(3000A), 40kA/1sec, 50Hz, 650kVp BIL including main connections, protection and control requirements.
- 2B4 Double Busbar 3000A, 40kA/1sec, 50Hz, 650kVp BIL with VT and ES including main connections, protection and control requirements one(1) lot.

2C 33kV Air Insulated Switches(AIS) and Connection For Auxiliary Transformer:

The 33kV AIS shall comply with the particular requirements as detailed in the Schedule of Technical Requirements included as Appendix A1 to this section and bid drawings; shall comprise the following:-

- 2C1 Two (2) sets of 36kV, 630A, 25kA/1sec, 50Hz, 170kVp BIL, outdoor Vacuum Circuit Breakers(VCB) with spring-stored energy operating mechanism.
- 2C2 Two(2) sets of 36kV, 630A, 25kA/1sec, 50Hz, 170kVp BIL, single vertical break, post type, disconnectors.
- 2C3 Six(6) nos. of single-phase, 3-core, multi ratio, 36kV, 25kA/1sec, 50Hz, 170kVp BIL, post type current transformer.
- 2C4 Six(6) nos. of 30kV rated voltage, 10kA nominal discharge current, 50Hz, Heavy duty station class, single phase surge arresters.
- 2C5 One(1) lot of flexible conductors for jumper, equipment connections[ACSR, Grosbeak(636MCM)], including all necessary clamps & connectors required for completing 33kV switchgear connection for Auxiliary/Earthing Transformer connection from auto transformer tertiary terminal.
- 2C6 Six(6) nos. of single-phase, 36kV, 25kA/1sec, 50Hz, 170kVp BIL, post insulators and fittings including all necessary accessories required to complete 33kV switchyard.
- 2C7 One(1) lot of steel structures for equipment supports including nuts & bolts and cable tray including all necessary fitting & fixing accessories required for completing 33kV switchyard.

2D **Power Transformers & Earthing/Auxiliary Transformers**

- 2D1 Two (2) sets of 230/138/33KV, 225/300 MVA (ONAN/ONAF), three phase outdoor type Auto transformers with associated bushing CTs including all necessary connections, insulators & fittings.
- 2D2 Two(2) sets 33/0.415kV, 300kVA three phase outdoor type earthing

transformers and associated steel support structures including all necessary connections, insulators & fittings.

- 2E Control, Protection, Substation Automation & Metering 230 kV Circuits
 - The equipment to be designed, supplied, installed and commissioned is shown in bid drawings are comprising of:-
- 2E1 Control, Protection, Metering & Substation Automation System including event recording function for Four(4) sets of overhead line circuits to Meghnaghat-1 & 2 and Hasnabad-1 & 2.
- 2E2 Control, Protection, Metering & Substation Automation System including event recording function for two(2) sets of 230/138/33 kV power transformer circuits including transformer tap changer control.
- 2E3 Control, Protection, metering & Substation Automation System including event recording function for one(1) set of bus coupler circuit.
- 2E4 Busbar protection system for complete 230kV bus; one(1) lot.
- 2E6 Tariff metering panel to accommodate programmable & recordable digital 3phase, 4-wire import and export MWh and MVArh meters (accuracy class 0.2) for Four(4) 230kV line and two(2) transformer feeder. For each feeder minimum two meters (main & check). The scope of works also includes supply of software(s) & connection cords of the above energy meters for future re-configuration.

2F Control, Protection, Substation Automation & Metering 132kV Circuits

The equipment to be designed, supplied, installed and commissioned is shown in bid drawings are comprising of:-

- 2F1 Control, Protection, Metering & Substation Automation System including event recording function for Six(6) sets of overhead line circuits to Shyampur-1 & 2, Fatulla-1 & 2 and Matuail-1 & 2.
- 2F2 Control, Protection, Metering & Substation Automation System including event recording function for two(2) sets of 230/138/33kV power transformer circuits.
- 2F3 Control, Protection, metering & Substation Automation System including event recording function for one(1) set of bus coupler circuit.
- 2F4 Busbar protection system for complete 132kV bus; one(1) lot.
- 2F5 Tariff metering panel to accommodate programmable & recordable digital 3phase, 4-wire import and export MWh and MVArh meters (accuracy class 0.2) for Six(6) 132kV line and two(2) transformer feeder. For each feeder

minimum two meters (main & check).

33 kV Circuits

The equipment to be supplied, installed and commissioned is shown in bid drawings are comprising of:-

- 2G1 Control, Protection & Metering for two sets of Auxiliary/earthing transformer circuits.
- 2H Power Cables & Cable Termination, Surge Arrester, Conductor, Steel Structure, Insulator & Hardware fittings

230 kV Circuit

- 2H1
 230kV XLPE, 2000sqmm cu cables & cable termination for connecting four(4)
 230kV overhead line to GIS bay. The cable sealing ends at overhead line ter mination side shall be outdoor type and at GIS bay end shall be indoor type.
- 2H2 Eighteen (18) nos. of 186kV rated voltage, 160kV(rms) continuous operating voltage at 50°C, 10kA nominal discharge current, 50Hz, Heavy duty station class, gapless metal oxide type, single phase surge arresters.
- 2H3 One(1) lot of flexible conductors for jack bus, jumper, equipment connection [ACSR, Twin Mallard(795 MCM)], including all necessary clamps & connec tors required for completing 230kV overhead incoming line and Transforme r HV side interfacing.
- 2H4 One(1) lot of insulators and fittings including all necessary accessories require d to complete 230kV interfacing.
- 2H5 One (1) lot of steel structures for gantry and outdoor equipment supports inclu ding nuts & bolts and cable tray including all necessary fitting & fixing access ories required to complete 230kV interfacing.

132 kV Circuit

- 2H6 132 kV XLPE, 1000sqmm cu cables & cable termination for connecting four(4) 132kV overhead line to GIS bay. The cable sealing ends at overhead line termi nation side shall be outdoor type and at GIS bay end shall be indoor type.
- 2H7 Eighteen (18) nos. of 120kV rated voltage, 102kV(rms) continuous operating v oltage at 500c, 10kA nominal discharge current, 50Hz, Heavy duty station class , gapless metal oxide type, single phase surge arresters.
- 2H8 One(1) lot of flexible conductors for jackbus, jumper, equipment connection [ACSR, Grossbeak(636 MCM)], including all necessary clamps & connectors required for completing 132kV overhead outgoing line and Transformer LV side interfacing.

- 2H9 One (1) lot of insulators and fittings including all necessary accessories requird to complete 132kV interfacing.
- 2H10 One (1) lot of steel structures for gantry and outdoor equipment supports inclu ding nuts & bolts and cable tray including all necessary fitting & fixing access ories required to complete 132kV interfacing.

33 kV Circuit

- 2H11 33 kV 185sqmm XLPE cable & cable termination at transformer & switchgear ends for connecting the tertiary side of 230/138/34.5kV transformers with 33 kV switchgear with one spare cable & cable sealing ends as shown in drawing no.
- 2I Multicore Cables
- 211 One (1) lot complete set of multicore low voltage 0.6/1.1kV, XLPE insulated power and control cables (IEC 60502) shall be supplied, installed, glanded, terminated and have individual cores identified to be used for connection of all equipment supplied under the Contract. The overall substation cable routing and core schedules shall also be provided.

2J Earthing and Lightning Protection

- 2J1 One (1) lot of design, supply and installation of earthing system and lightning protection screen including connections, connectors and clamps, to suit the substation overall arrangement and provide supporting design calculations.
- 2J2 One (1) set of 3-phase portable (maintenance) earthing equipment devices with connectors and telescopic glass fibre operating pole suitable for plant supplied.
- 2K Batteries, Chargers and DC Distribution
- 2K1 110V substation NiCad batteries complete with chargers and distribution switchboard to be supplied, installed and commissioned to provide all DC supplies to equipment being supplied.

The system shall generally be as shown in bid drawing and shall include:

- (a) Two (2) sets of 100% batteries complete, each capacity shall not be less than 460Ah at the 5-hour rate of discharge.
- (b) Two (2) sets of battery chargers complete, each charger shall not be less than 120A rating.
- (c) One (1) set of DC distribution board. The DC distribution board shall be with 50% overall spare MCB's for future use.
- (d) Two(2) sets of online UPS, 3kVA for Substation Automation system panels.
- (e) Two(2) sets of DC/DC Converter 110/48V, 1kVA for communication panels

and one(1) set 48V DC distribution board. The DC distribution board shall be with 50% spare MCBs for future use.

- 2L LVAC Distribution
- 2L1 One (1) lot of LVAC switchboard for substation services to be supplied, installed and commissioned, to provide the 415/240V supplies to all equipment being supplied under this turnkey Bid.
- 2L2 One (1) lot of Tariff metering panel to accommodate programmable & recordable digital 3-phase, 4-wire import and export MWh and MVArh meters (accuracy class 0.2) for two 33/0.415 kV station auxiliary transformer feeder circuits. For each feeder minimum two meters (main & check). The system and requirements shall generally be as shown in Bid drawing and technical specification of Volume 2 and shall include
- 2L3 One 125A outdoor weatherproof 3-phase with neutral and earth switched socket outlet and plug as per IEC 309; to be installed, cabled and connected adjacent to the Power Transformer.
- 2M Civil Works, Building and Foundation
- 2M1 Complete earth filling by imported carried earth free from foreign solid particles and organic materials in addition to the earth recovered from digging of foundation, to make the top of the final ground level of substation 3.0m high from highest flood level and final compaction to be achieved 95% for total volume 24300 cubic meter. The volume of earth filling may be varied but the payment shall be as per actual measurement of work done.
- 2M2 One (1) lot of complete design, supply and construction of all civil items required for the outdoor works suitable for switchyard gantry & equipment foundations, transformer foundations, blast walls, oil pit, entrance & internal roads, cable trenches, septic tank, soak way, surfacing, gravel laying, drainage, security fences, boundary wall, sentry post, guard house, car port, etc.
- 2M3 One (1) lot of Complete design, supply and construction of all civil items including all necessary architecture & structural requirements; cable trays, fittings and flooring & finishes; for a new GIS building including cable basement, control room and EOT crane etc.
- 2N Lighting, Small Power, Air Conditioning and Ventilation & DFDR.
- 2N1 One (1) lot of complete design, supply, installation and commissioning of equipment to provide lighting, LV power supply, air conditioning system, ventilation system and emergency DC lighting for the GIS building.
- 2N2 One (1) lot of complete set of design, supply, installation and commissioning of equipment to provide lighting (flood light LED type) for security, roadway, switchyard and emergency DC lighting at strategic locations for equipment

operation and inspection.

- 2N3.1 Digital Fault & Disturbance Recorder (DFDR), complete for all 230kV & 132kV bays for new Shyampur 230/132kV Substation; one(1) lot.
- 2N3.2 Digital Fault & Disturbance Recorder (DFDR), complete for all 230kV & 132kV bays for existing Old Airport Substation; one(1) lot.
- 2N3.3 Digital Fault & Disturbance Recorder (DFDR), complete for all 230kV & 132kV bays for existing Tongi Substation; one(1) lot.
- 20 Fibre Optic Multiplexer Equipment for Communication and Protection
- The equipment to be supplied, installed and commissioned shall be as shown on bid drawing. One(1) lot complete set of design, supply, installation and commissioning of fibre optic multiplexer equipment including necessary works to interface with existing system is to be provided for:
 -87 or 21 relay for each transmission line protection (through fibre cores)
 -SCADA data from switchgear and control system
 -Digital Telephone exchange including hot-line telephone system
- 2O2 Underground optical fibre cables (24cores for 132kV switchyard and 48cores for 230kV switchyard) from terminal box gantry structure at each 230kV and 132kV circuit transmission line termination point to MDF (Main distribution Frame) to be installed in control room. The Contract includes supply and installation of MDF and pigtail cables with adequate length.
- 2P SCADA system for Telecontrol and Telemetering
- 2P1 One (1) lot of complete design, supply, delivery, installation, testing & commissioning of hardware and software to provide the telecontrol & telemetering facilities required at the existing National Load Despatch Center (NLDC) at Rampura for integration of complete new 230/132kV substation. All required electrical signals shall be transmitted to the NLDC through the Industrial Gateway of the substation automation system. All HV breakers, motorized disconnectors, tap changer, etc. shall be controlled form NLDC through the Gateway of the substation automation system using IEC 60870-5-104 protocol. All necessary modification works in the software of master station of NLDC are to be carried out.
- 2Q Mandatory Spares, Erection & Test Equipment

Supply of complete spares and spare parts of transformer, switchgear, control equipment, protection relays, meters, erection & test equipment as per quantity mentioned in Schedule B. Test equipment are to be supplied from Europe, USA or Japan origin. Printed catalogue, operation and service manual are to be

provided. The materials shall have to be handed over to the designated store as per instruction of the Engineer.

APPENDIX A1.1

SCHEDULE OF TECHNICAL REQUIREMENTS OF 230 kV and 132 kV INDOOR/OUTDOOR TYPE GAS INSULATED SWITCHGEAR (GIS)

SL.	No. Description	Unit	230 kV	132 kV
1.	Site Condition			
	Max. Altitude above sea level	m	not more than 1000	not more than 1000
	Max. Ambient temperature outdoor	°C	+45	+45
	Min. Ambient temperature outdoor	°C	+4	+4
	Max. Ambient relative humidity	%	100	100
	Max. Seismic acceleration at floor level			
	- horizontal	g	0.1	0.1
	- vertical	g	0.1	0.1
2.	Type Designation	0		
	Enclosure			
	- busbar		three phase	three phase
	- bay		single phase	three phase
	Enclosure Material		Al	Al
	Standards		IEC	IEC
3.	Electrical Data			
	Rated Voltage	kV	245	145
	Rated Frequency	Hz	50	50
	Insulation Level			
	- lightning impulse withstand	kV	1050	650
	- 50 Hz withstand 1 minute	kV	460	275
	Rated continuous current at $40^\circ C$			
	ambient temperature			
	- main busbar and bus coupler	А	3000	3000(Shyampur)
				3000(Dhamrai)
	- transformer bay	А	1600	2000 (for Auto Tr.)
				1250 (for 132kV Tr.)
	- line bay	А	1600	1250
	Rated short time withstand			
	- current	kA	50	40(Shyampur)
				40(Dhamrai)
	- duration	sec	1	1
	Rated peak withstand current	kA	160	125
4.	Secondary Circuit			
	Auxiliary voltage			
	- for control and signal	V dc	110	110
	- for remote control	V dc	110	110
	- for heating	V ac	415/230	415/230
_	- tolerances	%	-15/+15	-15/+15
5	Circuit Brookar			

5. Circuit Breaker

	Enclosure		single phase	three phase
	Enclosure material		Al	Al
	Rated short time breaking current	kA	50	40(Shyampur) 40(Dhamrai)
	Rated peak withstand current	kA	160	125
	Percentage D.C component	%	40	40
	First-pole-to-clear-factor		1.3	1.3
	Rated breaking current			
	- cable charging	А	250	160
	Switching overvoltage	p.u.	2.5	2.5
	Operating mechanism		single/three phase	three phase
	Operating mechanism(for closing/op	pening)	spring	spring
	Number of making coil per operating mechanism	pcs	1	1
	Number of tripping coil per operating mechanism	pcs	2	2
	Rated motor voltage	V dc	110	110
	Rated operating sequence		O-t-CO-t'-CO	O-t-CO-t'-CO
	- t	sec	0.3	0.3
	- t'	min	3	3
6.	Disconnector & Earthing Switch			
	Enclosure		three/single phase	three phase
	Operating mechanism(for closing/op	pening)	manual & motorised	manual & motorised
	Rated motor voltage	V dc	110	110
7.	Surge Arrester			
	Rated voltage	kV	186	120
	Nominal discharge current	kA	10	10
	Discharge class		heavy duty class 3	heavy duty class 3
8.	CT ratio, class and output			
	(a) Line bay	A	1600/1,1,1 A, 30 VA, 5P20 (2 Cores) for protection, Cl 0.2(1 Core) for measuring 1600/1 A, 30 VA (BBP)	1200/1,1,1 A , 30 VA, 5P20 (2 Cores) for protection, Cl 0.2 (1 Core) for measuring 1200/1 A, 30 VA (BBP)
	(b) 230/138/34.5 kV	А	1200/1,1,1 A, 30 VA,	1600/1,1,1 A, 30 VA,
	Transformer bay		5P20 (2 Cores) for protection, Cl 0.2 (1 Core) for measuring 1200/1 A, 30 VA (BBP)	5P20 (2 Cores) for protection, Cl 0.2 (1 Core) for measuring 1600/1 A, 30 VA (BBP)
	(c) 132/33 kV Transformer bay	А		800/1,1,1 A, 30 VA, 5P20 (2 Cores) for protection, Cl 0.2 (1 Core) for measuring, 800/1A,30VA(BBP)
	(d) Bus coupler bay	A	3000/1,1 A, 30 VA, 5P20 (1 Cores) for protection, Cl 0.5 (1 Cores) for measuring	3000/1,1, A, 30 VA, 5P20 (1 Cores) for protection, Cl 0.5 (1 Cores) for measuring

9. VT ratio, class and output

Ratio	kV	230/\dd/3/0.11/\dd/0.11/\dd/3	132/\[]3/0.11/\[]3/0.11/\[]3
Total burden	VA	10	10
Accuracy class		3P & 0.2	3P & 0.2

10. Degree of Protection

for indoor GIS	IP54
for outdoor GIS	IP55W

APPENDIX- A1.2 SCHEDULE OF TECHNICAL REQUIREMENTS OF 132kV and 33kV AIR INSULATED SWITCHGEAR (AIS)

Sl. No.	Description	Unit	230kV	132kV	33kV
1.	Site Condition				
	Max. Altitude above sea level	meter	not more than 1	1000	
	Max. Ambient temperature outdoor	°C	+45		
	Min. Ambient temperature outdoor	°C	+4		
	Max. Ambient relative humidity	%	100		
	Max. Seismic acceleration at floor level				
	- horizontal	g	0.1		
	- vertical	g	0.1		
2.	Electrical Data				
	Nominal system Voltage	kV	230	132	33
	Rated Voltage	kV	245	145	36
	Rated Frequency	Hz	50	50	50
	Insulation Level				
	- lightning impulse withstand	kVp	1050	650	170
	- switching impulse withstand	kVp	—		—
	- 50 Hz withstand 1 minute	kV	460	275	70
	Rated continuous current at 40°C a				
	mbient temperature				
	- main busbar and bus coupler	Α			3000
	- transformer bay	Α			2000
	- line bay	Α			-
	Rated short time withstand				
	- current	kA	50	40(Shaympur) 40(Dhamrai)	25
	- duration	Sec	1	1	1
	Rated peak withstand current	kA	125	100	62.5
3.	Secondary Circuit				
	Auxiliary voltage				
	- for control and signal	V dc	110		
	- for remote control	V dc	110		
	- for heating	V ac	415/240		
	- tolerances	%	-15/+10		
4. 4.1	Circuit Breakers 36kV Class Circuit Breakers	I			
1	Туре			Outdoor typ	e VCB
2	Standard			IEC 62271-	100

1	Туре	Outdoor type VCB
2	Standard	IEC 62271-100
3	Rated voltage	36 kV
4	Rated short-duration power frequency withstand voltage (1 min.)	70 kV rms
5	Rated lightning impulse withstand voltage	170 kV peak

6	First pole to clear factor	1.3
7	Rated current	2000 A(for Dhamrai) 630 A(for Shyampur)
8	Rated short circuit breaking current	25 kA rms
9	Rated short circuit making current	65 kA peak
10	Short time withstand current for 1 sec.	25 kA rms
11	Total closing time	Not more than 150 ms
12	Total breaking time	100 ms
13	Operating mechanism	Motor spring stored energy
14	Rated duty cycle	O-0.3S-CO-3min-CO
15	Number of closing coils	1
16	Number of tripping coils	2
17	Number of auxiliary contacts for: - Making - Breaking - Middle position	Min. 8 Min. 8 0
18	Protection class	IP55

5. Disconnector Switches/Isolators

5.1 36kV Class Isolators

~ • • •		
1	Туре	Outdoor, Single vertical break
2	Standard	IEC 62271-102
3	Rated voltage	36 kV
4	Rated short- duration power frequency withstand voltage (1 min.)	70 kV rms
5	Rated lightning impulse withstand voltage	170 kV peak
6	Rated normal current	2000 A
7	Rated short circuit current (Ith), 1s	25 kA rms
8	Rated short circuit current (Idyn)	65 kA peak
9	Creepage distance of insulator	25 mm/kV
10	Operating mechanism of isolator	manual operated
11	Number of auxiliary contacts for main switch - Making / Breaking	Min. 6 / 6

6. Instrument Transformers

6.1 Instrument Transformers

	36kV	
Rated lightning impulse withstand voltage	170 kVp	
Rated switching impulse withstand voltage		
Power frequency withstand voltage (1 min.)	70 kVrms	
Corona extinction voltage		
Radio interference level for 0.5 MHz to 2 MHz	1000 micro V (at 92 kVrms)	
Partial discharge level	10 pC	
Type of insulation	Class A	
	voltageRated switching impulse withstand voltagePower frequency withstand voltage (1 min.)Corona extinction voltageRadio interference level for 0.5 MHz to 2 MHzPartial discharge level	Rated lightning impulse withstand voltage170 kVpRated switching impulse withstand voltage170 kVpPower frequency withstand voltage (1 min.)70 kVrmsCorona extinction voltage70 kVrmsRadio interference level for 0.5 MHz to 2 MHz1000 micro V (at 92 kVrms)Partial discharge level10 pC

-

6.1.1 36kV Class Current Transformers (for transformer bay)

1	No. of Cores	3 (Metering-1 plus Protection-3)
2	Ratio	1600/1/1/1[for 50/75MVA]-Dhamrai
3	Class of accuracy	Protection : 5P20Metering : Class 0.2
4	Burden (VA)	30
5	Min. knee point voltage at lowest ratio (Volts)	>1kV@ max ratio for protection core <150V@ max ratio for metering core
6	Max. magnetizing current guaranteed at knee point voltage & the lowest ratio (mA)	M.R.
7	Max. resistance of secondary winding at 75 °C and at lowest ratio (ohms)	M.R.

6.1.2 36kV Class Voltage Transformer

1	Rated voltage levels	36 kV	36 kV		
2	Rated Voltage Factor	1.2 continuou	1.2 continuous; 1.5 for 30 seconds		
3	Phase angle error (minutes)	20	20		
4	Core details		Core-I :	Core-II :	
5	Purpose		Protection	Metering	
6	Secondary Voltage		110/√3	110/√3	
7	Burden (VA)		50	25	
8	Class of accuracy		3P	0.2	
9	One minute power frequency withstand voltage between LV	4(10 if the lo	4(10 if the low voltage terminal is		

	terminal and earth(kV rms)	exposed)
10	Withstand voltage for secondary winding (kV rms)	2

7 Surge Arresters

1	Max. highest system voltage	245kV	145kV	36kV
2	Туре	Outdoor type,	ZnO, Gapless	3
3	Standard	IEC 60)099-4	
4	Rated voltage	186kV	120kV	30kV
5	Max. continuous operating voltage	160kVrms	102kVrms	
6	Nominal discharge current	10kA	10kA	10kA
7	Discharge class	Heavy duty 3	Heavy duty 3	Heavy duty 3
8	Surge counter	Yes	Yes	Yes
9	Leakage current detector	Yes	Yes	Yes

APPENDIX A2.1

SCHEDULE OF TECHNICAL REQUIREMENTS OF 230/138/33 kV POWER TRANSFORMER

Sl. No.	Description		
	RATING AND PERFORMANCE		
1	Maximum continuous rating (MCR)	MVA	300
2	Number of Phases		3
3	Number of windings		Auto plus stabilising
4	Normal ratio of transformation at no load and at principle tap - HV/LV/TV	kV	230/138/33
5.1	Corresponding highest system voltages	kV	245/145/36
5.2	Corresponding lowest system frequency	Hz	48
6	 Minimum withstand voltages: Full wave impulse withstand of windings of line terminal bushings Induced over voltage Power frequency withstand of neutral 	kVp kVp kV rms kV rms	1050/650/170 1050/650/170 460/275/70 38
7	Type of cooling		ONAN/ONAF
8	Minimum continuous rating	MVA	225/300
9	Rating of tertiary windings	MVA	75/100
10	Service conditions: - External cooling medium - Altitude not exceeding - Air temperature not exceeding Average air temperature in any one year not exceeding: - In any one day - Average in one year	- m °C °C °C	Air 150 45 35 25
11.1	Maximum temperature :Top oil rise normalAverage ONAN winding riseAverage ONAF winding rise	°C °C °C	50 55 55
11.2	Maximum hot spot temperature at maximum continuous rating at yearly average ambient temperature	°C	98
11.3	Winding hot spot temperature on emergency overload not exceeding	°C	140
12	Phase connections:		

	TTT / 1'		
	- HV winding		Star
	- LV winding		Star
	- TV winding		Delta
	- Vector group - HV/LV/TV		YNa0d1
13	Short circuit withstand fault level at terminals of:		
	- 230 kV busbars	kA	50
	- 132 kV busbars	kA	40
	- 33 kV busbars	kA	25
1.4		K7 1	20
14	Impedance voltage at 75°C and at normal tap and		
	MCR between windings (% on HV Base):	0 /	10
	- HV & LV % on HV base	%	13
15	Delta connected tertiary winding		
	- Nominal voltage	kV	33
	- External load	kVA	300 kVA
16.1	Total range of variation of on load		
10.1	transformation ratio (on HV side) as sl. no. 4:		
	- Ratio	%	±10
		% %	±10 1.25
	- Size of steps	70	
16.2	Type of control		On load local,
			remote and
			supervisory
			electrical and
			hand operation
17	Line drop compensation		Yes
18	Whether automatic control required and referenced		Yes, 110V,
-	voltage		50Hz
19	Whether separate remote control panel required		Yes
			105
20	DC supply.		110
	- Nominal	V	110
	- Maximum float voltage	V	125
21	Whether provision for supervisory control required,		Yes
	including AVR setting		
22	Whether marshalling kiosk required		Tankside
	whether marshanning klosk required		Cubicle
23	Number of transformers for which automatic control		2 (and
	is to be suitable		provision for
			future 3rd)
24	TERMINATIONS		
	Bushing insulators or cable boxes		
	on line and neutral terminals:		
	i) HV line		
	,		AIB termination
	ii) Neutral		Air Bushings
	,		
	iii) LV line		
	,		
L		1	

	iv) Tertiary winding			
25	BCT PARTICULARSi) HV (230 kV) Side:	Core 1		1200/1A, 30VA
		Core 2 & 3		Ratio & burden matched with WTI, OLTC
	ii) LV (138 kV) Side:	Core 1 Core 2		1600/1A, 30VA Ratio & burden matched with WTI
	iii) Tertiary Side :	Core 1&2		800/1/1A, 30VA
		Core 3		Ratio & burden matched with WTI
	iv) Neutral Bushing (core 1):			1600/1A, 30VA
26	Pollution category of bushing insulat	ors		25 mm/kV of system rated (highest) voltage
27	COOLING i) Number of cooler banks required per transformer			To suit transformer design
	ii) Rating of each cooler bank as p lloss at CMR	ercentage of tota	%	50
	iii) Standby cooling requirement			One fan in each group
28	GENERAL Type of oil preservation system			Air Cell
29	Maximum acceptable noise level			78 dBA

APPENDIX- A2.2 SCHEDULE OF TECHNICAL REQUIREMENTS OF 132/33 kV POWER TRANSFORMER (50/75MVA)

	132/33 KV TOWER TRANSFORMER (.	50//51 v1 v 11)	
Sl. No	D. Description		
	RATING AND PERFORMANCE		
1	Maximum continuous rating (MCR)	MVA	75
2	Number of Phases		3
3	Number of windings		2
4	Normal ratio of transformation at no load and	kV	132/33
	at principle tap - HV/LV		
5.1	Corresponding highest system voltages	kV	145/36
5.2	Corresponding lowest system frequency	Hz	48
6	Minimum withstand voltages:		
	- Full wave impulse withstand		
	of windings	kVp	650/170
	of line terminal bushings	kVp	650/170
	- Induced over voltage	kVrms	275/70
	- Power frequency withstand of neutral	kV rms	38
7	Type of cooling		ONAN/ONAF
8	Minimum continuous rating	MVA	50/75
9	Rating of tertiary windings	MVA	NA
10	Service conditions:		
	- External cooling medium	-	Air
	- Altitude not exceeding	m	150
	- Air temperature not exceeding	0C	45
	Average air temperature in any		
	one year not exceeding:		
	- In any one day	0C	45
	- Average in one year	0C	35
11.1	Maximum temperature :		
	- Top oil rise normal	0C	50
	 Average ONAN winding rise 	0C	55
	 Average ONAF winding rise 	0C	55
11.2	Maximum hot spot temperature at	0C	98
	maximum continuous rating at		
	yearly average ambient temperature		
11.3	Winding hot spot temperature on	0C	140
	emergency overload not exceeding		
12	Phase connections:		
	- HV winding		Delta
	- LV winding		Star
	- TV winding		-
	- Vector group - HV/LV/TV		DYN1

13	Short circuit withstand fault level (one sec.)at terminals of:		
	- 132 kV busbars - 33 kV busbars	kA kA	40 25
14	Impedance voltage at 75°C and MCR (75 MVA) between windings (% on HV Base)		
	at Nominal tap	%	10~14
	at maximum tap	%	10~14
	at minimum tap	%	10~14
15	Not used		
16.1	Total range of variation of on load transformation ratio (on HV side) as sl. no. 4: - Ratio	%	±10
	- Size of steps	%	1.25
16.2	Type of control		On load local, remote and supervisory electrical and hand operation
17	Line drop compensation		Yes
18	Whether automatic control required and referenced voltage		Yes, 110V, 50Hz
19	Whether separate remote control panel required		Yes
20	DC supply: - Nominal	V	110
	- Maximum float voltage	V	125
21	Whether provision for supervisory control required, including AVR setting		Yes
22	Whether marshalling kiosk required		Tank side Cubicle
23	Number of transformers for which automatic control is to be suitable		2 (and provision for future 3rd)
24	TERMINATIONS Bushing insulators or cable boxes		intuite site)
	on line and neutral terminals:		Oil/Air
	i) HV line		Bushings
	ii) Neutral		Oil/Air
	iii) LV line		Bushings
			Oil/Air Bushing
25	BCT PARTICULARS		Dushing
	i) HV (132kV) Side		400/1,
	, , , , , , , , , , , , , , , , , , , ,		Cl-5P20,
	Core 1 & 2		30VA

	Core 3		Ratio, burden and accuracy class shall be matched with WTI meter
	ii) LV (33 kV) Side (Core 1 & 2):		1600/1, Cl-5P20, 30VA
	Core 3		for WTI meter
	Core 4		for Tapchanger
	iii) Neutral Bushing (core 1 & 2):		1600/1, Cl-5P20, 30VA
26	Pollution category of bushing insulators		25 mm/kV of system rated (highest) voltage
27	 COOLING i) Number of cooler banks required per transformer ii) Rating of each cooler bank as percentage of total loss at CMR iii) Standby cooling requirement 	%	i)To suit transformer design ii)100% iii)One fan in each group
28 29	GENERAL Type of oil preservation system Maximum acceptable noise level		Air Cell 78 dBA

APPENDIX A3.1

SCHEDULE OF TECHNICAL REQUIREMENTS OF 33/0.415 kV EARTHING(STATION SERVICE) TRANSFORMER

SL. No. Description

	EARTHING TRANSFORMER		
1.	Nominal rating	kVA	300
2.	Number of phase		3
3.	Frequency	Hz	50
4.	No-load voltage ratio	kV	33/0.415
5.	Corresponding highest system voltage	kV	36/1.1
6.	Type of cooling		ONAN
7.	Coolant		Mineral Oil
8.	Туре		Core, Conservator Type
9.	Installation		Outdoor, Tropical and high rainfall and humidity
10.	Earthing		Neutral solidly earthed in interconnected star winding Neutral earthed in LT 3 phase, 4 wire system
11.	Windings		Double wound of high conductivity copper
12.	Test voltage		
	Impulse test voltage (1.2/50 μ s)	kV	170/10 (HT/LT)
	Power frequency withstand voltage	kV	70/2.5 (HT/LT)
	for 1 min		
13.	Vector group		ZNyn11
14.	Neutral to be brought out		HT: Yes, LT: Yes
15.	Neutral insulation		Full insulation and 100% loading capacity
16.	LT bushing		4 nos.
17.	Impedance voltage	%	5
18.	Tapping range		Off load tap changer
			$\pm 5\%$ in the step of 2.5
19.	Tap changer control		Manual
20.	BCT Particulars:		
	i. HV side Neutral(core-1)		100/1A
	ii. LV side (core-1)		600/1A

APPENDIX- A3.2 SCHEDULE OF TECHNICAL REQUIREMENTS OF 33/0.415 kV AUXILIARY (STATION SERVICE) TRANSFORMER

SL. No. Description

	AUXILIARY TRANSFORMER		
1.	Nominal rating	kVA	200
2.	Number of phase		3
3.	Frequency	Hz	50
4.	No-load voltage ratio	kV	33/0.415

5. 6. 7. 8. 9.	Corresponding highest system voltage Type of cooling Coolant Type Installation	kV	36/1.1 ONAN Mineral Oil Core, Conservator Type
10.	Outdoor, Tropical and high rainfall and Earthing	humidity	
10.	Neutral solidly earthed in interconnected	d star win	ding
	Neutral earthed in LT 3 phase, 4 wire sy	vstem	
11.	Windings		
12.	Double wound of high conductivity cop	per	
12.	Test voltage Impulse test voltage (1.2/50 µs)	kV	170/10 (HT/LT)
	Power frequency withstand voltage	kV kV	70/2.5 (HT/LT)
	for 1 min	IX V	10/2.5 (111/21)
13.	Vector group		dyn11
14.	Neutral to be brought out		HT: no, LT: Yes
15.	Neutral insulation		
1.6	Full insulation and 100% loading capacit	ity	
16.	LT bushing	0 (4 nos.
17.	Impedance voltage	%	4-5
18.	Tapping range		Off load tap changer $\pm 5\%$ in the step of 2.5
19.	Tap changer control		Manual
APPENDIX A4.1

SL.	Description	230kV	132 kV	33kV
No.				
1	Rated system voltage	230kV	132 kV	33kV
2	Max. permissible system voltage	245kV	145kV	36kV
3	Rated frequency	50Hz	50Hz	50Hz
4	Max. operating current			
5	No. of cable	2/Phase	1/Phase (For Line) 2/Phase(For Auto Tr)	1/phase
6	Cross sectional area	1000 mm ² Cu	1000 mm ² Cu	185 mm ² Cu
7	Impulse withstand voltage	1050kV	650 kV	170 kV
8	Power frequency withstand voltage	460kV	275 kV	70 kV
9	Shape of conductor	Segment	Segment	Compact round
10	Insulation thickness	23mm	17-18 mm	8-9 mm
11	Min. bending radius	20 D D is external diameter of cable	15 D D is external diameter of cable	15 D D is external diam eter of cable
12	DC resistance at 20 [°] C	0.009 ohm/km	0.0113 ohm/km	0.0366 ohm/km
13	Short circuit rating for 1 sec	50kA	40kA	25kA
14	Three phase symmetrical fault current f or 1 sec	280kA	90 kA	70 kA

APPENDIX A4.2

SCHEDULE OF TECHNICAL REQUIREMENTS OF OUTDOOR CABLE SEALING END

Item	Description	Unit	Requirement	
			230kV	132kV
1	Voltage rating	kV	230	132
2	Current rating	amp	As per cable	As per cable
3	Туре		Elastomeric stress cone with porcelain insulator.	Elastomeric stress cone with porcelain insulator.
4	Insulator material		Porcelain	Porcelain
5	Total creepage distance of shedding	mm	6250mm (approx)	3625mm (approx)
6	Impulse withstand voltage (External)			
	(a) Positive	kV	1050	650
	(b) negative	kV	1050	650
7	Standards		IEC 62067	IEC 62067
8	Height of steel mounting Structure over the finished switchyard level	mm	2500 (min.)	2500 (min.)

APPENDIX- A5 SCHEDULE OF TECHNICAL REQUIREMENTS OF NI-CAD BATTERY

- SL. No. Description
- 1. Installation
- 2. Cell type
- 3. Voltage (Normal)
- 4. Float voltage
- 5. Equalizing voltage
- 6. Capacity in AH at 20°C
- 7. Ambient temperature
- 8. Positive plate
- 9. Negative plate
- 10. Type of container
- 11. Discharge voltage
- 12. Sp. gravity of electrolyte
- 13. Sp. gravity of electrolyte (Charged)
- 14. Vent plug
- 15. Cell condition
- 16. Battery stand
- 17. Standard

- : Indoor
- : Ni-cd
- : 1.2 volts per cell
- : 1.40-1.42 volt/cell
- : 1.55 1.65 volt/cell
- : 460 AH @ 5 Hr (for 110 V DC) at Shyampur SS 250 AH @ 5 Hr (for 110 V DC) at Dhamrai SS : 45°C
- : Tubular
- : Pasted
- Dlastia m
- : Plastic polymer
- : 1.0 V/Cell
- : 1.19 ± 1%
- : $1.23 \pm .010$ at 20° C
- : Anti-corrosive & fire proof
- : Pre-charged.
- : Steel frame of step type
- : IEC or equivalent

APPENDIX- A6 SCHEDULE OF TECHNICAL REQUIREMENTS OF 110 V BATERY CHARGER

SL. No. Description

A) GENERAL

1.	Installation	: Indoor
2.	Rectifier type	: Thyristor controlled.
3.	Rated D.C. voltage	: 110V ±5%
4.	Rated output current	: 75 Amps(For Dhamrai) 120 Amps(For Shyampur)
5.	Charging mode	:Both constant current & constant voltage
6.	High Voltage Insulation	: 1000 V AC for 1 minute between input to output and input to ground
7.	Insulation resistance	: 10 M Ω with 500 V DC for 1 minute
8.	Cooling system	: Self & natural air cooled.
9.	Relative humidity	: Up to 98%
10.	Ambient temperature	: 45°C (max.)
11.	Noise level	: 65 dB (max)
12.	Altitude	: 1000 m
13.	Applicable Standard	: IEC or equivalent.

B) TECHNICAL DATA

A.C. INPUT

1.	Voltage	: 415 Volts
2.	Phase	: 3 Phase
3.	Frequency	$50 \pm 5\%$ Hz
4.	Input AC voltage variation	: ± 5%
5.	Power factor (Full range)	: 0.8
6.	Efficiency (Full load)	: 85%
7.	Charge Characteristics	: Constant current /Constant voltage
	(During float charge)	
8.	Current limitation	: 110%
D.C. OUTPU	JT	
1	Voltage	110 + 5% yolt

- 1. Voltage
- 2. Ripple Voltage (Full load)
- 3. Charge modes (3 level)
- 4. Float Voltage (adjustable)
- 5. Boost Voltage (adjustable)

 $: 110 \pm 5\%$ volt

- : ± 3%
- : Charge, Float charge & Boost charge
- : 1.42 volt/cell
- : 1.53 volt/cell

APPENDIX A7

SCHEDULE OF TECHNICAL REQUIREMENTS OF SUBSTATION AUTOMATION SYSTEM

71

1. General Requirement:			
Standards to be complied with Substation Automation	system		
Test Ca. Damp heat steady state	IEC 60068-2-3		
Test Db and guidance; Damp heat cyclic	IEC 60068-2-30		
Digital I/O, Analogue I/O dielectric Tests	IEC 60870-3 class 2		
Digital I/O, Surge withstand test	IEC 60801-5/Class 2		
Radio interference test	IEC 60870-3/Calss 2		
Transient fast burst test	IEC 60801-4/4		
Static Discharge	IEC 60801-2/4		
Electromagnetic fields	IEC 60801-3-3		
Temperature range (min/max)	°C 0/50		
Relative humidity	% 93		
Intelligent Electronic Devices (IED's)	Yes		
- serial communication interface included?	Yes		
- Protection & Control IED's connected same bus?	Yes		
- self monitoring	Yes		
- display of measured values	Yes		
- remote parameterization	Yes		
- disturbance record upload and analysis	Yes		
Availability Calculation shall be furnished for each	Yes		
equipments as well as for the entire system			
2. Detailed Requirements:			
Number of years of proven field experience of offere d system.	5 Yrs.		
(Note: proof of experience should be furnished. The			
components used in the offered system and those wit			
h			
field experience should be the same)	20 Yrs		
Design life of substation Automation System	ISO 9001/9002 or equivalent		
Manufacturers quality assurance system	130 9001/9002 of equivalent		
Dimensions of cubicle	mm		
- Width	mm		
- Depth	mm		
- Height	mm N/m^2 may 600		
- Floor load	N/m ² max.600		
3. Station Level Equipment:			
Station Controller	Industrial PC		
MTBF (Mean time between Failures)	Hrs		
MTTR (Mean time to repair)	Hrs		

Dual Station Computers Provided in redundant hot			
	Yes		
standby Hot standby take over time			
Hot standby take over time	Seconds		
Annunciator for Station PC system software	16 Windows		
Number of years of proven field experience of offere d	5 Yrs		
software			
Operating System	Windows		
All standard picture as per spec included in HMI	Yes		
· · · ·	Yes		
Process Status Display & Command Procedures	Yes		
Event processing as per spec	Yes		
Alarm processing as per spec	Yes		
Reports as per spec	Yes		
Trend Display as per spec	Yes		
User Authority levels as per spec	Yes		
System supervision & monitoring as per spec	Yes		
Automatic sequence control as per spec			
4. Gateway to National Load dispatch Center			
Number of years of proven filed experience of offere d	5Yrs		
unit			
Insulation tests	IEC 60255-5		
Fast disturbance tests	IEC 61000-4-4,Calss 4		
Industrial environment	EN 50081-2 Class A		
	Yes		
Industrial grade hardware with no moving parts			
(PC based gateway is not accepted)	20 Yrs		
Design life of offered equipment Redundant communication channel	Yes		
	Yes		
Redundant CPU	Yes		
Redundant DC/DC Supply	Hrs		
MTBF (Mean time between Failures)	Hrs		
MTTR (Mean time to repair)			
5. Station Bus:			
Physical Meduim	Glass fibre optic		
6. Interbay Bus			
Physical Meduim	Glass fibre optic		
7. Printer server			
MTBF	Hrs		
8. Event Printer			
MTBF	Hrs		
9. Hard Copy colour Printer			
MTBF	Hrs		
10. Master Clock – GPS (Global Positioning System) Receiver:			

MTBF	Hrs	
11. Bay control Unit - HV		
Number of years of proven field experience of offere d	5 Yrs	
unit Separate Bay controller unit provided for each bay &	Yes	
feeder Type of bay controller offered HV/MV	HV	
Select Before Operate with Open Execute & Close	Yes	
Execute Single bit dependence	No	
Interlocking, bay & Station wide Synchrocheck function	Yes	
- Maximum Voltage difference	Specify	-
Maximum Frequency differenceMaximum Phase difference	Specify Specify	-
Double command blocking Independent settable parameter groups	Yes 4	
Local Display Unit	Yes	
Sequence of event recorder - Events	256	
- Time resolution	1 ms Yes	
Disturbance recorder function Comprehensive self-supervision	Yes	
Battery free backup of events and disturbance record s	Yes IEC 60	255-5
Insulation tests		000-4-4, Class 4
Fast disturbance tests MTBF	Hrs Hrs	
MTTR Temperature range: IED's	°C	-10 to +50
- Operation	$^{\circ}$	-10 to +50
- Transport and storage Relative humidity:	%	93
Operating max./minTransport and storage	%	93
12. Back up control mimic -HV		

Control functionality:		
Control of breaker as well as all isolators/earthing		
switch		
(Control functionality should not be affected if bay		
controller fails)	Yes	
Key-Locked		
Interlock override function	Yes	
	Yes	
Separate backup control mimic provided for each bay	Yes	
& feeder		
13. Bay Control Unit - MV		
Number of years of proven field experience of offere	5 Var	
d	5 Yrs	
unit	T 7	
Separate Bay controller unit provided for each bay &	Yes	
feeder		
Control functionality implementation in software:	••	
Select before Operate with Open Execute & Close	Yes	
Execute		
Interlocking, Bay & Station Wide	Yes	
Synchrocheck function		
- Maximum Voltage difference	Specify	-
- Maximum Frequency difference	Specify	-
- Maximum Phase difference	Specify	range
Local Display Unit	Yes	
Sequence of event recorder		
- Events	Specify	r
- Time resolution	1 ms	
Disturbance recorder function	Yes	
Comprehensive self-supervision	Yes	
Insulation tests	IEC 602	255-5
Fast disturbance tests	IEC 61	000-4-4, Class 4
MTBF	Hrs	
MTBF	Hrs	
Temperature range: IED's	°C	-10 to +50
- Operation	°C	-10 to +70
- Transport and storage		
Relative humidity:	%	93
- Operating max./min	%	93
- Transport and storage	/0	20
14. Back up control mimic - MV		
Control functionality:	Yes	
Control of breaker as well as all isolators/earthing		
switches	Yes	

	Separate backup control mimic provided for each bay	
	& feeder	
15. System	m Performance:	
	Exchange of display (First reaction) Presentation of a binary change in the process displa y Presentation of an analogue change in the process	< 1 S < 0.5 S < 1 S
	display From order to process output From order to updated of display	< 0.5 S < 1.5 S

APPENDIX A8

SCHEDULE OF TECHNICAL REQUIREMENTS OF FIBRE OPTIC MULTIPLEXER EQUIPMENT

SL.No.	DESCRIPTION	UNIT	REQUIRED
1.0	GENERAL:		
1.1	Type of multiplexer		SDH: ADM
1.2	Complying to ITU-T rec.		Yes
1.3	Transmission Capacity	Mbit/s	STM-4: 620
1.4	Access capacity on 64 kbit/s	channels	Minimum 200
1.5	Access capacity on 2 Mbit/s	channels	Minimum 40
1.6	Redundant central processor		Shall be available
1.7	Digital cross connect function		Fully non-blocking
2.0	Available AGGREGATES:		
2.1	Optical aggregates (ITU-T G.957)		L-1.1, L-1.2
3.0	Available TRUNK INTERFACES:		
3.1	HDB3, 2 Mbit/s interfaces per module	No.	Minimum 8
3.2	Complying to ITU-T rec.		G.703, transparent G.704, selectable
3.3	HDSL, 2Mbit/s interface: no of copper wires Capacity on 2Mbit/s or on 1Mbit/s Capacity selectable	No. ch ch / pair of wire	4 or 2 30 or 15 30 / 2 pairs 30 / 1 pair 15 / 1 pair
4.0	Available USER INTERFACES		10 / 1 pull
4.1	Voice interfaces for trunk lines:		
4.1.1	1 + 1 com path protection, available for all		yes
4.1.2	Analogue, 4wire with E&M: Input level	dBr	+7.516
1.1.2	Output level		+7.016.5
4.1.3	Analogue, 2wire with E&M: Input level Output level	dBr	+6.512.5 -1.020
4.1.4	Digital, 2Mbit/s CAS or PRI		ves
4.2	Voice interfaces for remote subscriber:		<i>y</i> es
4.2.1	2wire, subscriber side	dBr	-5 +4 / -7.51
4.2.2	2wire, PABX side	dBr	-5 +4 / -7.53
4.3	Integrated teleprotection		0
4.3.1	Interface for Commands:		
4.3.1.1	Number of independent commands	No.	4
4.3.1.2	Transmission time max.	ms	6
4.3.1.3	Signal voltage	Vpeak	250
4.3.1.4	1 + 1 com path protection	-	yes
4.3.2	Interface(s) for Distance Protection:		
4.3.2.1	Electrical interface: G.703	kbit/s	64
4.3.2.2	Optical Interface	kbit/s	Minimum 64
4.4	Data: channels per module		Transmuni OT

		-	
4.4.1	1 + 1 com path protection, available for all		yes
4.4.2	V.24/V.28 (RS-232): up to 38.4kbit/s	No.	4
4.4.3	V.11/X.24 (RS-422): 64kbit/s	No.	4
4.4.4	V.35: 64kbit/s	No.	4
4.4.5	V.36 (RS-449): 64kbit/s	No.	2
4.4.6	G.703: 64kbit/s	No.	8
4.4.7	Ethernet: 10/100 BaseT WAN capacity Protocols	No. Mbit/s	1 Min: 2x 2Mbit/s Min.: IP
4.5	Integrated alarm gathering module:		
4.5.1	Number of external alarms per module	No.	Min. 20
4.5.2	Auxiliary power supply for ext. contacts		Yes
4.6	Network Management System		
4.6.1	Type/Name of configuration tool		
4.6.2	For fault / configuration management		Yes / yes
4.6.3	For local / remote operation		Yes / yes
4.6.4	Data communication network (DCN)		Ethernet / IP or Ethernit / OSI
4.7	Ambient Conditions:		
4.7.1	Storage: ETS 300 019-1-1, class 1.2	°C / % hum	-25 + 55 / class 1.2
4.7.2	Transport: ETS 300 019-1-2, class 2.2	°C / % hum	-25 + 70 / class 2.2
4.7.3	Operation: ETS 300 019-1-3, class 3.1E	°C / % hum	-5 +45 / class 3.1E
4.8	Power Supply		
4.8.1	Operation	VDC	48 / 60 (-15/+20%)
4.8.2	Fully redundant power supply		yes

APPENDIX A9

SCHEDULE OF TECHNICAL REQUIREMENTS OF OPERATIONAL TELEPHONE SYSTEM (PABX)

SL.No.	DESCRIPTION	UNIT	REQUIRED
1.0	GENERAL:		
1.1	Туре		IP PABX
1.2	Complying to ITU-T rec.		Yes
1.3	Analogue Trunk Connectivity		Yes
1.4	Digital Trunk Connectivity(E1/T1)		Yes
1.5	10/100 BaseT Ethernet Connection		Yes
1.6	No of Subscribers	No.	Up to 32
2.0	Trunk Connectivity		
2.1	Analogue Trunk		
2.1.1	- Loop Start/Ground Start(Via peripheral)		Yes
2.1.2	- E&M		Yes
2.1.3	- DID(Direct Inward Dial)		Yes
2.2	Digital Trunk		
2.2.1	- T1		Yes
2.2.2	- E1		Yes
2.2.3	- ISDN Connectivity using BRI/PRI		Yes
2.3	IP Trunk		
2.3.1	- 10/100 Mbps Ethernet(IEEE 802.3)		Yes
2.3.2	- TCP/IP, H.323, T.38(Switching)		Yes
2.3.3	- Voice Compressor : G.711, G729		Yes
2.3.4	- QoS(Quality of Signal) : 802.1		Yes
2.3.5	- SIP(Session Initiation Protocol): RFC 3261		Yes
3.0	Main Features		
3.1	- Ring Back		Yes
3.2	- Call Forwarding, park, waiting, pick-up		Yes
3.3	- Call/Message waiting lamp		Yes
3.4	- Hands Free operation		Yes
3.5	- Speed Calling, Stored number redial		Yes
3.6	- Account Code		Yes
3.7	- Automatic Attendant, Auto Answer		Yes
3.8	- Automatic Route Selection		Yes
3.9	- Call-by- call Service, Call Duration Display		Yes
3.10	- Call Transfer, Direct Outward Dialing		Yes
3.11	- Hunt Group, Music on Hold		Yes
3.12	- Night Service, Off-hook Alarm, Redial		Yes
4.0	Network Management System		

4.2	For fault / configuration management		Yes / yes
4.3	For local / remote operation		Yes / yes
4.4	Data communication network (DCN)		Ethernet / IP or
			Ethernet / OSI
5.0	Ambient Conditions:		
5.1	Storage: ETS 300 019-1-1, class 1.2	°C / % hum	-25 + 55 / class 1.2
5.2	Transport: ETS 300 019-1-2, class 2.2	°C / % hum	-25 + 70 / class 2.2
5.3	Operation: ETS 300 019-1-3, class 3.1E	°C / % hum	-5 +45 / class 3.1E

APPENDIX A10.1 SCHEDULE OF TECHNICAL REQUIREMENTS DIGITAL FAULT AND DISTURBANCE RECORDER [DFDR] FOR SHYAMPUR 230/132kV SUBSTATION

Sl.	ITEM	UNITS	
(A)	GENERAL		
1	Manufacturer's name & address		
2	Туре		
3	Power Supply	VDC	110
	-Power supply for printer	VAC	230
(D)			
(B)	ANALOGUE INPUTS		
1	Number of Channel		256
_	-Expandability		Min. 336
2	Nominal Current	Amp	1A/5A
3	Nominal voltage	Vac/Vdc	
	- Current	mA/Amp	
45	Frequency response		
5	Cut-off frequency (a) Bandwidth	dB	
	(b) Attenuation at	dB dB	
	(c) Auto adjusted anti-aliasing filters for	Yes/No	Yes
	chosen sampling rate	103/100	103
d	Simultaneously programmable sampling		Min 2 for FAST and SLOW Recording
	rate for all feeders/inputs		
	-Locally Changeable	Yes/No	Yes
	-Remotely Changeable	Yes/No	Yes
e	Possible sampling rates		3 different sampling rates:
		Samples/sec	Slow. 1Hz-500Hz
		Samples/sec	fast: 0.5 kHz – 6kHz
		Samples/sec	continuous (variable rate)
6	DC coupled inputs	Yes/No	Yes
7	Resolution	bits	12 or better
8	Accuracy	%	Min 0.5
9	Burden 1. Current Circuit at IN	VA	
	2. Voltage Circuit	VA VA	
10	Over load	V A	
10	1. Current	% In	100% In continuously, Min 600 %
	2. Voltage circuit	% Vn	in for 1 Second
	2. , onage on our	70 VII	2Vn and max. 350 Vn
(C)	DIGITAL INPUTS		

1	Number of Channel -Expandability (Without and time skew)		768 min, 1008
2	Selectable input level	Vdc	N/O or N/C, 110 VDC
3	Туре		Potential or potential free contact
4	Resolution	ms	*
(D)	MEMORY		
1	Size	MB	64 MB or Higher
2	Туре		Solid State
3	Pre-fault time (fast scanning rate)	sec	0.1-2 user programmable
4	Post-fault (fast scanning rate	sec	0.1-2 user programmable
5	Pre and Post-fault time (slow scanning rate)	sec	min. 180 user programmable
6	In-Built hard disk (auto-maintained	GB	min. 4 GB

Sl.	ITEM	UNITS	
(E)	SENSORS/ TRIGERRING CRITERIA		
	All sensors/trigerrs are preferable	Yes/No	Yes
	Programmable and Virtually recordable		
1.	Logical combination sensor	Yes/No	Yes
2.	Three phase over or under Voltage / Current	Yes/No	Yes
3.	Mono phase over or under Voltage / Current	Yes/No	Yes
4.	*du/dt, dp/dt, dq/dt, [Single/3 Phases], df/dt. etc.	Yes/No	Yes
5.	RMS [Voltage / Current]	Yes/No	Yes
6.	Zero Sequence	Yes/No	Yes
7.	Negative, Positive Sequence	Yes/No	Yes
8.	Frequency	Yes/No	Yes
9.	DC Step	Yes/No	Yes
10.	Pendling / Swing	Yes/No	Yes
11.	Digital level and edge	Yes/No	Yes
12.	Sensor trigger Event Trigger	Yes/No Yes/No	Yes Yes
13. 14.	Manual Trigger	Yes/No	Yes
14.	Remote Trigger	Yes/No	Yes
15.		I es/Ino	I es
(F)	CLOCK SYSTEM		
1.	Internal Clock	Yes/No	Yes
2.	Accuracy		
3.	External Synchronization	Yes/No	Yes
4.	Time resolution between 2 synchronized pulses		
(G)	OUTPUT ALARM RELAY CONTACT		
1.	Max. operation Voltage DC/AC	Vac / Vdc	250 Vac or above, 60 Vdc or above
2.	Make and carry for 0.5 sec	Α	Min 8A
3.	Carry Continuously	Α	Min 5A
4.	Break (DC) – resistive	W	
(H)	INTERFACE FOR DATA COMMUNICATION		
1.	Full definition compression	Yes/No	Yes
2.	Maximum transmission rate	bits / Sec	
3.	Standard serial port (EIA-232-D)	Yes / No	Yes
4.	Printer Port	Yes/No	Yes
5.	Dedicated serial port for modem	Yes/No	Yes
(I)	PRINTER DATA		
1.	Printer amplitude (scaling peak to peak)		
2.	Time Scal (mm / s)		
3.	Printer resolution	mm	
4.	Auto printing	Yes/No	Yes
(J)	Fault Priority transmission	Yes/No	Yes
(K)	Fault location (distance calculation)	Yes/No	Vac
(N)	raun location (distance calculation)	I CS/INO	Yes

(L)	Test certificates from internationally recognized Laboratories	Yes/No	Yes
(M)	COMMUNICATION AND REMOTE ANALYZING UNIT		
	1. Processor Pentium	(MHz) Yes/No	Yes, at least 450 MHz Pentium
	2. Co-Processor pentium	Yes/No	Yes
	3. Main memory capacity	(Mb) Yes/No	Yes, at least 64 MB
	4. Color graphics board S-VGA	Yes/No	Yes
	5. Screen S-VGA	Yes/No	Yes
	6. Hard disk unit	Yes/No	Yes, at least 40 GB
	7. Printer	Yes/No	Yes
	8. Modem	Yes/No	Yes.

*Note: du/dt=Change of voltage, dp/dt=Change of active power, dq/dt=change of reactive power, df/dt=Change of frequency.

APPENDIX A10.2 SCHEDULE OF TECHNICAL REQUIREMENTS DIGITAL FAULT AND DISTURBANCE RECORDER [DFDR] FOR EXISTING OLD AIRPORT 230/132kV SUBSTATION

Sl.	ITEM	UNITS	
(A)	GENERAL		
1	Manufacturer's name & address		
2	Type		
3	Power Supply	VDC	110
	-Power supply for printer	VAC	230
(B)	ANALOGUE INPUTS		
1	Number of Channel		232
	-Expandability		Min. 312
2	Nominal Current	Amp	1A/5A
3	Nominal voltage	Vac/Vdc	
	- Current	mA/Amp	
4	Frequency response		
5	Cut-off frequency		
	(a) Bandwidth	dB	
	(b) Attenuation at	dB	
	(c) Auto adjusted anti-aliasing filters for	Yes/No	Yes
	chosen sampling rate		
d	Simultaneously programmable sampling		Min 2 for FAST and SLOW Recording
	rate for all feeders/inputs		
	-Locally Changeable	Yes/No	Yes
	-Remotely Changeable	Yes/No	Yes
e	Possible sampling rates	Samulas/200	3 different sampling rates: Slow, 1Hz-500Hz
		Samples/sec Samples/sec	fast: $0.5 \text{ kHz} - 6 \text{kHz}$
		Samples/sec Samples/sec	
6	DC coupled inputs	Yes/No	continuous (variable rate) Yes
7	Resolution	bits	12 or better
8	Accuracy	%	Min 0.5
9	Burden	/0	10111 0.5
	1. Current Circuit at IN	VA	
	2. Voltage Circuit	VA	
10	Over load		
	1. Current	% In	100% In continuously, Min 600 %
	2. Voltage circuit	% Vn	in for 1 Second

			2Vn and max. 350 Vn
(C)	DIGITAL INPUTS		
1	Number of Channel -Expandability (Without and time skew)		696 min. 936
2	Selectable input level	Vdc	N/O or N/C, 110 VDC
3	Туре		Potential or potential free contact
4	Resolution	ms	
(D)	MEMORY		
1	Size	MB	64 MB or Higher
2	Туре		Solid State
3	Pre-fault time (fast scanning rate)	sec	0.1-2 user programmable
4	Post-fault (fast scanning rate	sec	0.1-2 user programmable
5	Pre and Post-fault time (slow scanning rate)	sec	min. 180 user programmable
6	In-Built hard disk (auto-maintained	GB	min. 4 GB

SI.	ITEM	UNITS	
(E)	SENSORS/ TRIGERRING CRITERIA		
	All sensors/trigerrs are preferable Programmable and Virtually recordable	Yes/No	Yes
1.	Logical combination sensor	Yes/No	Yes
2.	Three phase over or under Voltage / Current	Yes/No	Yes
3.	Mono phase over or under Voltage / Current	Yes/No	Yes
4.	*du/dt, dp/dt, dq/dt, [Single/3 Phases], df/dt. etc.	Yes/No	Yes
5.	RMS [Voltage / Current]	Yes/No	Yes
6.	Zero Sequence	Yes/No	Yes
7.	Negative, Positive Sequence	Yes/No	Yes
8.	Frequency	Yes/No	Yes
9.	DC Step	Yes/No	Yes
10.	Pendling / Swing	Yes/No	Yes
11.	Digital level and edge	Yes/No	Yes
12.	Sensor trigger	Yes/No	Yes
13.	Event Trigger	Yes/No	Yes
14.	Manual Trigger	Yes/No	Yes
15.	Remote Trigger	Yes/No	Yes
(F)	CLOCK SYSTEM		
1. 2. 3. 4.	Internal Clock Accuracy External Synchronization Time resolution between 2 synchronized pulses	Yes/No Yes/No	Yes Yes
4. (G)	OUTPUT ALARM RELAY CONTACT		
Ì, í		X7 / X7-1-	250 Mars and see (0 Mile and see
1. 2.	Max. operation Voltage DC/AC Make and carry for 0.5 sec	Vac / Vdc A	250 Vac or above, 60 Vdc or above Min 8A
2. 3.	Carry Continuously	A	Min 5A
3. 4.	Break (DC) – resistive	W	MIII JA
(H)	INTERFACE FOR DATA COMMUNICATION		
l í		Yes/No	Yes
1.	Full definition compression		Yes
2.	Maximum transmission rate	bits / Sec	Yes
3. 4.	Standard serial port (EIA-232-D) Printer Port	Yes / No Yes/No	Yes
4. 5.	Dedicated serial port for modem	Yes/No	Yes
5.	Dedicated serial port for modelin	1 05/100	1 es
(I)	PRINTER DATA		
1.	Printer amplitude (scaling peak to peak)		
2.	Time Scal (mm / s)		
3.	Printer resolution	mm	
4.	Auto printing	Yes/No	Yes

(J)	Fault Priority transmission	Yes/No	Yes
(K)	Fault location (distance calculation)	Yes/No	Yes
(L)	Test certificates from internationally recognized Laboratories	Yes/No	Yes
(M)	COMMUNICATION AND REMOTE ANALYZING UNIT		
	1. Processor Pentium	(MHz) Yes/No	Yes, at least 450 MHz Pentium
	2. Co-Processor pentium	Yes/No	Yes
	3. Main memory capacity	(Mb) Yes/No	Yes, at least 64 MB
	4. Color graphics board S-VGA	Yes/No	Yes
	5. Screen S-VGA	Yes/No	Yes
	6. Hard disk unit	Yes/No	Yes, at least 40 GB
	7. Printer	Yes/No	Yes
	8. Modem	Yes/No	Yes.

*Note: du/dt=Change of voltage, dp/dt=Change of active power, dq/dt=change of reactive power, df/dt=Change of frequency.

APPENDIX A10.3 SCHEDULE OF TECHNICAL REQUIREMENTS DIGITAL FAULT AND DISTURBANCE RECORDER [DFDR] FOR EXISTING TONGI 230/132kV SUBSTATION

Sl.	ITEM	UNITS	
(A)	GENERAL		
1	Manufacturer's name & address		
2	Туре		
3	Power Supply	VDC	110
	-Power supply for printer	VAC	230
(B)	ANALOGUE INPUTS		
1	Number of Channel		224
	-Expandability		Min. 304
2	Nominal Current	Amp	1A/5A
3	Nominal voltage	Vac/Vdc	
	- Current	mA/Amp	
4	Frequency response		
5	Cut-off frequency		
	(a) Bandwidth	dB	
	(b) Attenuation at	dB	
	(c) Auto adjusted anti-aliasing filters for	Yes/No	Yes
	chosen sampling rate		
d	Simultaneously programmable sampling		Min 2 for FAST and SLOW Recording
	rate for all feeders/inputs	X7 AT	N/
	-Locally Changeable	Yes/No	Yes
	-Remotely Changeable	Yes/No	Yes
e	Possible sampling rates	Samplas/saa	3 different sampling rates: Slow, 1Hz-500Hz
		Samples/sec Samples/sec	fast: $0.5 \text{ kHz} - 6 \text{kHz}$
		Samples/sec	continuous (variable rate)
6	DC coupled inputs	Yes/No	Yes
7	Resolution	bits	12 or better
8	Accuracy	%	Min 0.5
9	Burden		
	1. Current Circuit at IN	VA	
	2. Voltage Circuit	VA	
10	Over load		

	1. Current	% In	100% In continuously, Min 600 %
	2. Voltage circuit	% Vn	in for 1 Second
			2Vn and max. 350 Vn
(C)	DIGITAL INPUTS		
1	Number of Channel		672
	-Expandability (Without and time skew)		min. 912
2	Selectable input level	Vdc	N/O or N/C, 110 VDC
3	Туре		Potential or potential free contact
4	Resolution	ms	
(D)	MEMORY		
1	Size	MB	64 MB or Higher
2	Туре		Solid State
3	Pre-fault time (fast scanning rate)	sec	0.1-2 user programmable
4	Post-fault (fast scanning rate	sec	0.1-2 user programmable
5	Pre and Post-fault time (slow scanning rate)	sec	min. 180 user programmable
6	In-Built hard disk (auto-maintained	GB	min. 4 GB

SI.	ITEM	UNITS	
(E)	SENSORS/ TRIGERRING CRITERIA		
	All sensors/trigerrs are preferable	Yes/No	Yes
	Programmable and Virtually recordable		
1.	Logical combination sensor	Yes/No	Yes
2.	Three phase over or under Voltage / Current	Yes/No	Yes
3.	Mono phase over or under Voltage / Current	Yes/No	Yes
4.	*du/dt, dp/dt, dq/dt, [Single/3 Phases], df/dt. etc.	Yes/No	Yes
5.	RMS [Voltage / Current]	Yes/No	Yes
6.	Zero Sequence	Yes/No	Yes
7.	Negative, Positive Sequence	Yes/No	Yes
8.	Frequency	Yes/No	Yes
9.	DC Step	Yes/No	Yes
10.	Pendling / Swing	Yes/No	Yes
11.	Digital level and edge	Yes/No	Yes
12.	Sensor trigger	Yes/No	Yes
13.	Event Trigger	Yes/No	Yes
14.	Manual Trigger	Yes/No	Yes
15.	Remote Trigger	Yes/No	Yes
(F)	CLOCK SYSTEM		
1.	Internal Clock	Yes/No	Yes
2.	Accuracy		
3.	External Synchronization	Yes/No	Yes
4.	Time resolution between 2 synchronized pulses		
(G)	OUTPUT ALARM RELAY CONTACT		
1.	Max. operation Voltage DC/AC	Vac / Vdc	250 Vac or above, 60 Vdc or above
2.	Make and carry for 0.5 sec	А	Min 8A
3.	Carry Continuously	Α	Min 5A
4.	Break (DC) – resistive	W	
(H)	INTERFACE FOR DATA COMMUNICATION		
1.	Full definition compression	Yes/No	Yes
2.	Maximum transmission rate	bits / Sec	
3.	Standard serial port (EIA-232-D)	Yes / No	Yes
4.	Printer Port	Yes/No	Yes
5.	Dedicated serial port for modem	Yes/No	Yes
(I)	PRINTER DATA		
1.	Printer amplitude (scaling peak to peak)		
2.	Time Scal (mm / s)		
4.	rine Sear (iiiii / S)		

3. 4.	Printer resolution Auto printing	mm Yes/No	Yes
(J)	Fault Priority transmission	Yes/No	Yes
(K)	Fault location (distance calculation)	Yes/No	Yes
(L)	Test certificates from internationally recognized Laboratories	Yes/No	Yes
(M)	COMMUNICATION AND REMOTE ANALYZING UNIT		
	1. Processor Pentium	(MHz) Yes/No	Yes, at least 450 MHz Pentium
	2. Co-Processor pentium	Yes/No	Yes
	3. Main memory capacity	(Mb) Yes/No	Yes, at least 64 MB
	4. Color graphics board S-VGA	Yes/No	Yes
	5. Screen S-VGA	Yes/No	Yes
	6. Hard disk unit	Yes/No	Yes, at least 40 GB
	7. Printer	Yes/No	Yes
	8. Modem	Yes/No	Yes.

*Note: du/dt=Change of voltage, dp/dt=Change of active power, dq/dt=change of reactive power, df/dt=Change of frequency.

POWER GRID COMPANY OF BANGLADESH LIMITED

BIDDING DOCUMENT

FOR

CONSTRUCTION AND COMPLETION OF 132/33KV GIS SUBSTATION AT DHAMRAI, 230/132KV GIS SUBSTATION AT SHYAMPUR AND ASSOCIATED TRANSMISSION LINES ON TURNKEY BASIS.

SCHEDULE B

BID PRICES & SCHEDULES

POWER GRID COMPANY OF BANGLADESH LIMITED

BIDDING DOCUMENT

CONSTRUCTION AND COMPLETION OF 132/33KV GIS SUBSTATION AT DHAMRAI, 230/132KV GIS SUBSTATION AT SHYAMPUR AND ASSOCIATED TRANSMISSION LINES ON TURNKEY BASIS.

SCHEDULE B (PRICE SCHEDULES)

PREAMBLE

General

- 1. The Price Schedules are divided into separate Schedules as follows:
 - Schedule No. B1: Plant (including Mandatory Spare Parts) Supplied from Abroad.
 - Schedule No. B2: Plant (including Mandatory Spare Parts) Supplied from within the Employer's Country.
 - Schedule No. B3: Design Services
 - Schedule No. B4: Installation & other services.
 - Schedule No. B5: Grand Summery
 - Schedule No. B6: Reccomended Spare Parts.
- 2. The Schedules do not generally give a full description of the plant to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Employer's Requirements and other sections of the Bidding Document and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The entered rates and prices shall be deemed to cover the full scope as aforesaid, including overheads and profit.
- 3. If bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with ITB 7 prior to submitting their bid.

Pricing

4. Prices shall be filled in indelible ink, and any alterations necessary due to errors, etc., shall be initialed by the Bidder.

As specified in the Bid Data Sheet and Special Conditions of Contract, prices shall be fixed and firm for the duration of the Contract, or prices shall be subject to adjustment in accordance with the corresponding Appendix (Price Adjustment) to the Contract Agreement.

5. Bid prices shall be quoted in the manner indicated and in the currencies specified in the Instructions to Bidders in the Bidding Document.

For each item, bidders shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules.

Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in Section 6 (Employer's Requirements) or elsewhere in the Bidding Document.

- 6. Payments will be made to the Contractor in the currency or currencies indicated under each respective item.
- 7. When requested by the Employer for the purposes of making payments or partial payments, valuing variations or evaluating claims, or for such other purposes as the Employer may reasonably require, the Contractor shall provide the Employer with a breakdown of any composite or lump sum items included in the Schedules.

Schedules of Rates and Prices

Schedule_B1 - Plant and Mandatory Spare Parts Supplied from Abroad

Scheu	ule B1. 1: Dhamrai <u>132/33 kV GIS Substation</u>				Foreign C	Currency(in)
Item	Description	Code ¹	Qty	Unit	Unit Price ²	Total Price ²
					CIP	CIP
			(1)		(2)	(1) x (2)
	Outdoor Type Gas Insulated Switchgear(GIS).					
	132kV Overhead line circuit bay,1250A		0	0.1		
/	_GIS for 132kV Overhead line circuit bay		2	Sets		
,	_GIS bus duct		2	Sets		
	_Air Insulated bushing 132kV Transformer circuit bay,1250A		2	Sets		
	_GIS for 132kV Transformer circuit bay		2	Sets		
	GIS bus duct		2	Sets		
,	_GIS bus duct		2	Sets		
	132kV Bus tie circuit bay,3000A		1	Set		
	132kV Main busbar(double busbar) ,3000A, with VT & ES		1	Lot		
	HV GIS Test Bushing		1	Set		
	ir Insulated Switchgear(AIS) and Connection:			001		
	Vacuum Circuit breaker(VCB), live tank, gang operating , 2000A		2	Sets		
	Disconnector, single verticle break, 2000A, ganty mounted		7	Sets		
	Single phase current transformer, post type,3-core		6	Nos.		
	Single phase voltage transformer, post type, 2-core		12	Nos.		
	Single phase, post type, metal oxide surge arrester, 30kV	<u> </u>	12	Nos.		
	Flexible Conductor, clamps & connectors for busbar, Jackbus, Jumper		14	1105.		
100	& equipment Connection					
i)	_Flexible Conductor for jackbus, jumper, equipment connections		1	Lot		
	_Flexible Conductor for main bus		1	Lot		
/	Clamps & Connectors		1	Lot		
	Insulator & Fittings					
	_Insulator		1	Lot		
	Fittings		1	Lot		
	Steel structures & cable tray					
	_Gantry Column including nut&bolts		1	Lot		
	Gantry beam including nut&bolts		1	Lot		
	_Equipment support structures including nut&bolts		1	Lot		
,	Cable tray including fitting, fixing accessories		1	Lot		
	Transformer & Aux. Transformer			201		
	132/33kV, 50/75(ONAN/ONAF) MVA,, three phase power transformer		2	Sets		
	33/.415kV, 200kVA, three phase auxilliary transformer		2	Sets		
	I, Protection, SAS & Metering					
	Circuits					
	Control, Protection, metering and SAS for 132kV overhead line bays		2	Sets		
	Control, Protection, metering and SAS for 132kV Transformer bays		2	Sets		
	Control, Protection, metering and SAS for 132kV Bus-tie bay		1	Set		
	Busbar protection system for complete 132kV bus		1	Lot		
	Tarrif metering for two line bays and two transformer bays		1	Lot		
3kV C	• • •			LOI		
	Control, Protection, metering and SAS for 33kV side of Transformer		2	sots		
סטו	bays		2	sets		
1D7	Tariff metering for two Transformer bays		1	Lot		
	Arrester, Conductor, Steel Structure, Insulator & Hardware & Fittings:					
	Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III,		12	nos.		
	gapless metaloxide					
1E2	Flexible Conductor, clamps & connectors for Jackbus, Jumper &					
	equipment Connection					
	_Flexible Conductor for jackbus, jumper, equipment connections		1	Lot		
	_Clamps & Connectors		1	Lot		
	Insulator & Fittings					
	_Insulator		1	Lot		
ii)	_Fittings		1	Lot		
	Steel structures & cable tray					
	_Gantry Column including nut&bolts		1	Lot		
	_Gantry beam including nut&bolts		1	Lot		
	_Equipment support structures including nut&bolts		1	Lot		
	_Cable tray including fitting, fixing accessories		1	Lot		
	pre Cables					
1F1	Multicore, XLPE, LV Power & Control Cable for control, protection,					
	SAS, metering & power circuits			· ·		
	_LV Control Cable	-	1	Lot		
		1 I	1	Lot		
íi)	_LV Power Cable			201		
ii) Earthir	ng & Lightning Protection		-			
; ii) Earthir			• 			

ltem	Description	Code ¹	Qty	Unit	Unit Price ² CIP	Total Price ² CIP
ii)	Lighting Protection System for complete substation		<u>(1)</u> 1	Lot	(2)	(1) x (2)
	es, Chargers & DC Distribution		•	201		
	Complete 110V Battery Bank with chargers and DC Distribution Board					
i)			2	Sets		
	_Charger		2	Sets		
	_110V DC Distribution panel _110V/48V DC DC Converter,1kVA		1	Set		
	48V DC Disatribution Panel		2	Sets Set		
	_UPS system for SAS panels, 3kVA		2	sets		
	Distribution		-	3013		
111	Complete LVAC Distribution System with necessary DB, MCB, Meters etc		1	Lot		
112	Tariff metering for two station auxilliary Transformer		1	Lot		
	Outdoor weatherproof 3-phase,4 wire, 125A Socket outlet and plu	gs.	1	Nos		
	Building Lighting, Small Power, Air Conditioning & Ventilation _BuildingSmall power		1	Lot		
	Building Lighting & emergency DC lighting		1	Lot		
	_Building airconditioning & ventilation system		1	Lot		
	Outdoor switchyard Lighting, Small Power					
i)			1	Lot		
	_Outdoor Lighting		1	Lot		
	ptic Multiplexer Equipment for Teleprotection and Communication					
	Fibre Optic Multipexer Equipment for communication & protection		1	Lot		
	Hot line telephone system including phone sets, connection cords etc.		1	Lot		
	round opticale fiber cable with Terminal box.					
	Underground Fibre Optic cable(24 cores)		1	Lot		
	Outdoor termination box, indoor MDF & pigtail cables		1	Lot		
	tion with existing SCADA, NLDC system Integration with existing SCADA/NLDC system.		1	Lot		
	tory Spares, tools & test equipment		•	LOI		
	132 kV GIS					
	Arcing contact of CB		2	nos.		
	Moving contact of CB		2	nos.		
iii)	Fixed contact of CB		2	nos.		
	Moving contact of DS & ES		2	nos.		
	Fixed contact of DS & ES		2	nos.		
,	Blast nozzle		2	nos.		
,	CB Closing coil		6	nos.		
	CB Tripping coil Motor for CB operating mechanism		<u>6</u> 1	nos.		
	Dashpot for CB operating mechanism		2	nos.		
	Motor for DS & ES drive		2	nos.		
,	Supporting insulator		2	nos.		
	Supporting insulator with barrier		2	nos.		
xiv)	Indicating lamps (20% of total quantities installed)		1	nos.		
xv)	Indicating lamp covers (10% of total quantities installed)		1	nos.		
xvi)	Set of gaskets (10% of total quantities installed)		1	nos.		
,	Heater		2	nos.		
	Humidity stat and thermostat		2	nos.		
,	Gas pressure monitor		2	nos.		
,	Gas pressure switch Gas pressure gauge		2	nos.		
,	Gas pressure gauge Gas pressure relief device		2	nos.		
	132/33 kV Power Transformer		2	1103.		
(j)	Transformer 132 kV bushings (For 75MVA Transformer)		1	no.		
	Ttransformer 33 kV bushings (For 75MVA Transformer)		2	nos.		
,	Neutral bushing		2	nos.		
,	Winding temperature indicating device		2	nos.		
	Spare transformer oil of 15% of total oil supplied		1	Lot		
	Set of gaskets (10% of total quantities installed)		1	nos.		
	Silica gel (100% of total quantities installed)		1	nos.		
,	Set of special tools, gauges and spanners		1	set		
	Transformer oil treatment plant, 6000 Liters per hour		1	set		
,	120 kV Surge Arrester		3	nos.		
	33 kV SWITCHGEAR Current Transformer, single phase 3-core,		2	noc		
	Current Transformer, single phase 3-core, Closing coils for CB		2	nos.		
,	Tripping coils for CB		2	nos.		
,	Motor for 33 kV circuit breaker operating mechanism	<u> </u>	1	no.		
,	Surge Arrester, single phase		2	nos.		
	Protection		_			
	Line distance relay with complete protection elements		1	set		
ii)	Transformer differential relay with complete REF function overcurrent and earth fault relay		1	set		

Item	Description	Code ¹	Qty	Unit	Unit Price ² CIP (2)	Total Price ² CIP (1) x (2)
iv)	Tripping relay (electrical reset)		<u>(1)</u> 3	nos.	(2)	(1) X (2)
	Bay control unit		1	set		
,	Trip Circuit Supervision relay, 3phase		1	set		
vii)	RelayTest block & plug		1	set		
viii)	Bulbs for annunciator		10	nos.		
1N5	Test Equipment					
i)	SF6 Gas Handling Equipment		1	set		
ii)	SF6 Gas reservoir		1	set		
,	SF6 Gas leak Detector		1	set		
v)	Partial Discharge monitoring Device for GIS		1	set		
,	Contact resistance measurement test set (suitable for measurement down to 1 μ ohm at 200A d.c.)		1	set		
	5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV)		1	set		
,	Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm)		1	set		
,	Clip-on mA meter (for spill current)		1	set		
,	Portable Earthing lead including glass fiber stick		1	set		
,	AVO Meter, digital Test Equipment		1	set		
	SF6 Gas Handling Equipment incld. Storage tank		1	set		
	SF6 Gas leak Detector		1	set		
	Partial Discharge monitoring Device for GIS		1	set		
	Contact resistance measurement test set (suitable for measurement down to 1		1	set		
	5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV)		1	set		
	Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm)		1	set		
	Clip-on mA meter (for spill current)		1	set		
viii)	AVO Meter, digital		1	set		
Total I	Price for Dhamrai 132/33kV GIS Substation					
(carried	to Schedule -B5: Grand Summary)					
Sched	ule B1. 2: Shyampur 230/132 kV GIS Substation					
230kV	Indoor Type Gas Insulated Switchgear(GIS).					
	230kV Overhead line circuit bay,1600A		4	Sets		
	230kV Transformer circuit bay,1600A					
,	GIS bay		2	Sets		
	GIS bus duct		2	Sets		
,	Air Insulated Bushing		2	Sets		
	230kV Bus tie circuit bay,2000A		1	Set		
2A4	230kV Main busbar(double busbar) ,2000A, with VT & ES		1	Lot		
2A4 2A5	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing					
2A4 2A5 132kV	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS).		1 1	Lot set		
2A4 2A5 132kV 2B1	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A		1 1 6	Lot set Sets		
2A4 2A5 132kV 2B1 2B2	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A		1 1 6 2	Lot set Sets Sets		
2A4 2A5 1 32kV 2B1 2B2 2B3	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Bus tie circuit bay,3000A		1 1 6 2 1	Lot set Sets Sets Set		
2A4 2A5 1 32kV 2B1 2B2 2B3 2B4	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Bus tie circuit bay,3000A 132kV Main busbar(double busbar),3000A, with VT & ES		1 1 6 2	Lot set Sets Sets		
2A4 2A5 1 32kV 2B1 2B2 2B3 2B4 33kV A	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Bus tie circuit bay,3000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection:		1 1 6 2 1 1	Lot set Sets Sets Set Lot		
2A4 2A5 132kV 2B1 2B2 2B3 2B4 33kV A 2C1	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Bus tie circuit bay,3000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A		1 1 6 2 1 1 1 2	Lot set Sets Sets Set Lot Sets		
2A4 2A5 1 32kV 2B1 2B2 2B3 2B4 3 3kV A 2C1 2C2	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Bus tie circuit bay,3000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted		1 1 6 2 1 1 1 2 2 2	Lot set Sets Sets Lot Sets Sets Sets		
2A4 2A5 132kV 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Bus tie circuit bay,3000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core		1 1 6 2 1 1 1 2 2 6	Lot set Sets Sets Lot Sets Sets Sets Sets Nos.		
2A4 2A5 132kV 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C3 2C4	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Bus tie circuit bay,3000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV		1 1 6 2 1 1 1 2 2 2	Lot set Sets Sets Lot Sets Sets Sets		
2A4 2A5 132kV 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C3 2C4	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Bus tie circuit bay,3000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment		1 1 6 2 1 1 1 2 2 6	Lot set Sets Sets Lot Sets Sets Sets Sets Nos.		
2A4 2A5 132kV 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C4 2C5 i)	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Bus tie circuit bay,3000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection Flexible Conductor for jumper, equipment connections		1 1 6 2 1 1 1 2 2 6	Lot set Sets Sets Lot Sets Sets Sets Sets Nos.		
2A4 2A5 132kV 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C4 2C5 i)	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection		1 1 6 2 1 1 1 2 2 6 6 6	Lot set Sets Sets Lot Sets Sets Nos. Nos.		
2A4 2A5 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C4 2C5 i) ii) 2C6	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Bus tie circuit bay,3000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment ConnectionFlexible Conductor for jumper, equipment connections _Clamps & Connectors Post Insulator		1 1 2 1 1 2 2 6 6 6 1	Lot set Sets Sets Set Lot Sets Sets Nos. Nos.		
2A4 2A5 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C4 2C5 i)) ii) 2C6	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Bus tie circuit bay,3000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection Flexible Conductor for jumper, equipment connections Clamps & Connectors		1 1 6 2 1 1 1 2 2 6 6 6 1 1	Lot sets Sets Sets Lot Sets Nos. Nos. Lot Lot		
2A4 2A5 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C4 2C5 i)) ii) 2C6	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Bus tie circuit bay,3000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection Flexible Conductor for jumper, equipment connections Clamps & Connectors Post Insulator Steel structures & cable tray		1 1 6 2 1 1 1 2 2 6 6 6 1 1	Lot sets Sets Sets Lot Sets Nos. Nos. Lot Lot		
2A4 2A5 132kV 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C4 2C5 i) ii) 2C6 2C7	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Bus tie circuit bay,3000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection Flexible Conductor for jumper, equipment connections _Clamps & Connectors Post Insulator Steel structures & cable tray Equipment support structures including nut&bolts		1 1 2 1 1 2 2 6 6 6 1 1 1 6	Lot sets Sets Sets Lot Sets Sets Nos. Nos. Lot Lot Lot		
2A4 2A5 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C4 2C5 i) iii) 2C6 2C7 ii) iii) Power	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Bus tie circuit bay,3000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection Flexible Conductor for jumper, equipment connections Clamps & Connectors Post Insulator Steel structures & cable tray Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories Transformer & Aux. Transformer		1 1 6 2 1 1 2 2 6 6 6 1 1 6 1 1	Lot sets Sets Sets Sets Sets Nos. Nos. Nos. Lot Lot Lot Lot		
2A4 2A5 132kV 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C4 2C5 i) iii) 2C6 2C7 ii) iii) 2C6 2C7 ii)	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Bus tie circuit bay,3000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection Flexible Conductor for jumper, equipment connections Clamps & Connectors Post Insulator Steel structures & cable tray Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories Transformer & Aux. Transformer 230/138/33kV, 225/300(ONAN/ONAF) MVA, three phase Auto		1 1 6 2 1 1 2 2 6 6 6 1 1 6 1 1	Lot sets Sets Sets Sets Sets Nos. Nos. Nos. Lot Lot Lot Lot		
2A4 2A5 132kV 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C4 2C5 i) ii) 2C6 2C7 i) 2C6 2C7 i) ii) 2C6 2C7 i) 2C1	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection Flexible Conductor for jumper, equipment connections Clamps & Connectors Post Insulator Steel structures & cable tray Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories Transformer & Aux. Transformer 230/138/33kV, 225/300(ONAN/ONAF) MVA, three phase Auto transformer		1 1 6 2 1 1 2 2 6 6 6 1 1 1 2 2 2 6 6 1 1 1 2 2 2 6 6 1 1 1 2 2 2 6 6 1 1 1 2 2 2 6 6 7 1 1 2 2 2 6 6 7 1 1 2 2 6 7 1 1 2 2 6 7 1 1 2 2 6 7 6 7 7 7 7 7 7 7 7 7 7 7 7 7	Lot Sets Sets Sets Sets Sets Nos. Nos. Nos. Lot Lot Lot Lot Lot Sets		
2A4 2A5 132kV 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C4 2C5 i) ii) 2C6 2C7 i) iii) 2C6 2C7 i) iii) 2C6 2C7 2C1 2C2 2C3 2C4 2C5	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection Flexible Conductor for jumper, equipment connections Clamps & Connectors Post Insulator Steel structures & cable tray Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories Transformer & Aux. Transformer 230/138/33kV, 225/300(ONAN/ONAF) MVA, three phase Auto transformer 33/0.415kV, 300kVA, three phase earthing transformer		1 1 2 1 1 2 2 6 6 6 6 1 1 1 6 1 1	Lot sets Sets Sets Sets Sets Nos. Nos. Nos. Lot Lot Lot Lot Lot		
2A4 2A5 132kV 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C4 2C5 i) ii) 2C6 2C7 i) iii) 2C6 2C7 i) iii) 2C6 2C7 2C1 2C2 2C3 2C4 2C5 2C1 2C2 2C3 2C4 2C5 2C1 2C2 2C3 2C4 2C5 2C1 2C2 2C3 2C4 2C5 2C5 2C4 2C5 2C5 2C7 2C2 2C3 2C4 2C5 2C5 2C4 2C5 2C5 2C6 2C7 2C2 2C3 2C4 2C5 2C5 2C6 2C7 2C5 2C6 2C7 2C5 2C6 2C7 2C7 2C5 2C6 2C7 2C7 2C7 2C7 2C7 2C7 2C7 2C7 2C7 2C7	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection Flexible Conductor for jumper, equipment connections Clamps & Connectors Post Insulator Steel structures & cable tray Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories Transformer & Aux. Transformer 230/138/33kV, 225/300(ONAN/ONAF) MVA, three phase Auto transformer 33/0.415kV, 300kVA, three phase earthing transformer deleted Fire Prevention & Extinguishing System of two main transformer		1 1 6 2 1 1 2 2 6 6 6 1 1 1 2 2 2 6 6 1 1 1 2 2 2 6 6 1 1 1 2 2 2 6 6 1 1 1 2 2 2 6 6 7 1 1 2 2 2 6 6 7 1 1 2 2 6 7 1 1 2 2 6 7 1 1 2 2 6 7 6 7 7 7 7 7 7 7 7 7 7 7 7 7	Lot Sets Sets Sets Sets Sets Nos. Nos. Nos. Lot Lot Lot Lot Lot Sets		
2A4 2A5 132kV 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C4 2C5 i) ii) 2C6 2C7 i) iii) 2C6 2C7 i) iii) 2C6 2C7 i) 2D1 2D1 2D1 2D2.1 2D2.2 2D2.3	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection Flexible Conductor for jumper, equipment connections Clamps & Connectors Post Insulator Steel structures & cable tray Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories Transformer & Aux. Transformer 230/138/33kV, 225/300(ONAN/ONAF) MVA, three phase Auto transformer 33/0.415kV, 300kVA, three phase earthing transformer deleted Fire Prevention & Extinguishing System of two main transformer (Nitrogen Injection type)		1 1 1 1 2 2 6 6 6 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Sets Sets Sets Sets Nos. Nos. Nos. Lot Lot Lot Lot Sets Sets Sets		
2A4 2A5 132kV 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C4 2C5 i) ii) 2C6 2C7 ii) iii) 2C6 2C7 ii) iii) 2C6 2C7 2D1 2D2.1 2D2.1 2D2.2 2D2.3 Contro	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection Flexible Conductor for jumper, equipment connections Clamps & Connectors Post Insulator Steel structures & cable tray Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories Transformer & Aux. Transformer 230/138/33kV, 225/300(ONAN/ONAF) MVA, three phase Auto transformer 33/0.415kV, 300kVA, three phase earthing transformer deleted Fire Prevention & Extinguishing System of two main transformer (Nitrogen Injection type) I, Protection, SAS & Metering		1 1 1 1 2 2 6 6 6 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Sets Sets Sets Sets Nos. Nos. Nos. Lot Lot Lot Lot Sets Sets Sets		
2A4 2A5 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C4 2C5 i) ii) 2C6 2C7 ii) iii) 2C6 2C7 ii) 2C6 2C7 2D1 2D2.1 2D2.1 2D2.1 2D2.2 2D2.3 2D2.3 2D2.3	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Bus tie circuit bay,3000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection Flexible Conductor for jumper, equipment connections Clamps & Connectors Post Insulator Steel structures & cable tray Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories Transformer & Aux. Transformer 230/138/33kV, 225/300(ONAN/ONAF) MVA, three phase Auto transformer 33/0.415kV, 300kVA, three phase earthing transformer deleted Fire Prevention & Extinguishing System of two main transformer (Nitrogen Injection type) ., Protection, SAS & Metering Circuits		1 1 1 1 2 1 1 2 2 6 6 6 1 1 1 6 1 1 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1	Lot sets Sets Sets Sets Sets Nos. Nos. Nos. Lot Lot Lot Lot Sets Sets Sets Lot		
2A4 2A5 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C4 2C5 i) ii) 2C6 2C7 ii) iii) 2C6 2C7 ii) 2C6 2C7 2D1 2D2.1 2D2.1 2D2.2 2D2.3 2D2.3 2D2.3 2D2.1 2D2.2 2D2.3 2D2.3 2D2.2 2D2.3	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Bus tie circuit bay,3000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection _Flexible Conductor for jumper, equipment connections _Clamps & Connectors Post Insulator Steel structures & cable tray _Equipment support structures including nut&bolts _Cable tray including fitting, fixing accessories Transformer & Aux. Transformer 230/138/33kV, 225/300(ONAN/ONAF) MVA, three phase Auto transformer 33/0.415kV, 300kVA, three phase earthing transformer deleted Fire Prevention & Extinguishing System of two main transformer (Nitrogen Injection type) ., Protection, SAS & Metering Circuits Control, Protection, metering and SAS for 230kV overhead line bays		1 1 1 1 2 2 6 6 6 1 1 1 6 1 1 2 2 2 1 1 4	Lot sets Sets Sets Sets Sets Nos. Nos. Nos. Lot Lot Lot Lot Sets Sets Sets Lot Lot		
2A4 2A5 132kV 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C4 2C5 i) ii) 2C6 2C7 i) iii) 2C6 2C7 i) iii) 2C6 2C7 2D1 2D2.1 2D2.1 2D2.1 2D2.2 2D2.3 2C4 2C5 iii) 2D2.1 2D2.1 2D2.2 2D2.3 2C4 2C5 iii) 2D2.1 2D2.1 2D2.2 2D2.3 2D1 2D2.2 2D2.3 2D1 2D2.2 2D2.3 2D1 2D2.2 2D2.2 2D1 2D2.2 2 2D2.2 2 2D2.2 2	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Main busbar(couble busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection Flexible Conductor for jumper, equipment connections Clamps & Connectors Post Insulator Steel structures & cable tray Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories Transformer & Aux. Transformer 230/138/33kV, 225/300(ONAN/ONAF) MVA, three phase Auto transformer 33/0.415kV, 300kVA, three phase earthing transformer deleted Fire Prevention & Extinguishing System of two main transformer (Nitrogen Injection type) Protection, SAS & Metering Circuits Control, Protection, metering and SAS for 230kV overhead line bays Control, Protection, metering and SAS for 230kV side of Auto transformer bays		1 1 1 1 2 1 1 2 2 6 6 6 1 1 1 6 1 1 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1	Lot sets Sets Sets Sets Sets Nos. Nos. Nos. Lot Lot Lot Lot Sets Sets Sets Lot		
2A4 2A5 2B1 2B2 2B3 2B4 2C1 2C2 2C3 2C4 2C5 i) ii) 2C6 2C7 i) iii) 2C6 2C7 i) iii) 2C6 2C7 2C2 2C3 2C4 2C5 2C2 2C3 2C4 2C5 2C2 2C3 2C4 2C5 2C2 2C3 2C4 2C5 2C2 2C3 2C4 2C5 2C5 2C6 2C7 i) iii) 2C6 2C7 2C1 2C2 2C2 2C3 2C4 2C5 2C2 2C2 2C3 2C4 2C5 2C5 2C6 2C7 iii) 2C6 2C7 2C7 2C7 2C7 2C7 2C7 2C7 2C7 2C7 2C7	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Main busbar(could bay,2000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection Flexible Conductor for jumper, equipment connections Clamps & Connectors Post Insulator Steel structures & cable tray Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories Transformer & Aux. Transformer 230/138/33kV, 225/300(ONAN/ONAF) MVA, three phase Auto transformer 33/0.415kV, 300kVA, three phase earthing transformer deleted Fire Prevention & Extinguishing System of two main transformer (Nitrogen Injection type) 		1 1 1 1 2 2 6 6 6 1 1 1 6 1 1 2 2 2 1 1 4	Lot sets Sets Sets Sets Sets Nos. Nos. Nos. Lot Lot Lot Lot Sets Sets Sets Lot Lot		
2A4 2A5 2B1 2B2 2B3 2B4 2C1 2C2 2C3 2C4 2C5 i) ii) 2C6 2C7 ii) 2C6 2C7 ii) 2C6 2C7 ii) 2C6 2C7 2C3 2C4 2C5 2C2 2C3 2C4 2C5 2C4 2C5 2C2 2C3 2C4 2C5 2C2 2C3 2C4 2C5 2C4 2C5 2C5 2C4 2C5 2C6 2C7 ii) 2C6 2C7 iii) 2C6 2C7 iii) 2C6 2C7 iii) 2C6 2C7 2C7 2C2 2C2 2C3 2C4 2C5 2C5 2C4 2C5 2C5 2C4 2C5 2C5 2C4 2C5 2C5 2C7 2C5 2C6 2C7 2C5 2C6 2C7 2C5 2C7 2C5 2C6 2C7 2C7 2C7 2C6 2C7 2C7 2C7 2C7 2C7 2C7 2C7 2C7 2C7 2C7	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Main busbar(couble busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection Flexible Conductor for jumper, equipment connections Clamps & Connectors Post Insulator Steel structures & cable tray Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories Transformer & Aux. Transformer 230/138/33kV, 225/300(ONAN/ONAF) MVA, three phase Auto transformer 33/0.415kV, 300kVA, three phase earthing transformer deleted Fire Prevention & Extinguishing System of two main transformer (Nitrogen Injection type) Protection, SAS & Metering Circuits Control, Protection, metering and SAS for 230kV overhead line bays Control, Protection, metering and SAS for 230kV side of Auto transformer bays		1 1 1 1 2 2 6 6 6 1 1 1 2 2 6 6 6 1 1 1 2 2 1 1 4 2	Lot Sets Sets Sets Sets Sets Nos. Nos. Nos. Lot Lot Lot Lot Sets Sets Sets Sets Sets Sets Sets		
2A4 2A5 2B1 2B2 2B3 2B4 33kV A 2C1 2C2 2C3 2C4 2C5 i) ii) 2C6 2C7 i) iii) 2C6 2C7 i) iii) 2C6 2C7 2D1 2D2.1 2D2.1 2D2.1 2D2.3 2D2.3 2D4 2D2.1 2D2.3 2D	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Main busbar(couble busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection Flexible Conductor for jumper, equipment connections Clamps & Connectors Post Insulator Steel structures & cable tray Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories Transformer & Aux. Transformer 230/138/33kV, 225/300(ONAN/ONAF) MVA, three phase Auto transformer 33/0.415kV, 300kVA, three phase earthing transformer deleted Fire Prevention & Extinguishing System of two main transformer (Nitrogen Injection type) 		1 1 1 1 2 2 6 6 6 1 1 1 2 2 6 6 6 1 1 1 2 2 1 1 4 2 1 1 1 1 1 1 1 1 1 1 1 1 1	Lot Sets Sets Sets Sets Sets Nos. Nos. Nos. Lot Lot Lot Lot Sets Sets Sets Sets Sets Sets Sets Set		
2A4 2A5 2B1 2B2 2B3 2B4 2C1 2C2 2C3 2C4 2C5 i) ii) 2C6 2C7 i) iii) 2C6 2C7 i) iii) 2C6 2C7 2C3 2C4 2C5 2C3 2C4 2C5 2C4 2C5 2C4 2C5 2C4 2C5 2C4 2C5 2C4 2C5 2C4 2C5 2C4 2C5 2C4 2C5 2C4 2C5 2C4 2C5 2C4 2C5 2C4 2C5 2C4 2C5 2C4 2C5 2C4 2C5 2C6 2C7 i) iii) 2C6 2C7 2C7 2C7 2C7 2C4 2C5 2C4 2C5 2C4 2C5 2C4 2C5 2C5 2C4 2C5 2C5 2C4 2C5 2C5 2C4 2C5 2C5 2C6 2C7 2C5 2C6 2C7 2C7 2C6 2C7 2C7 2C6 2C7 2C7 2C6 2C7 2C7 2C7 2C7 2C7 2C7 2C7 2C7 2C7 2C7	230kV Main busbar(double busbar) ,2000A, with VT & ES HV GIS Test Bushing Indoor Type Gas Insulated Switchgear(GIS). 132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A 132kV Main busbar(double busbar),3000A, with VT & ES ir Insulated Switchgear(AIS) and Connection: Vacuum Circuit breaker(VCB), live tank, gang operating , 800A Disconnector, single verticle break, 800A, gantry mounted Single phase current transformer, post type,3-core Single phase, post type, metal oxide surge arrester, 30kV Flexible Conductor, clamps & connectors,Jumper & equipment Connection Flexible Conductor for jumper, equipment connections Clamps & Connectors Post Insulator Steel structures & cable tray Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories Transformer & Aux. Transformer 230/138/33kV, 225/300(ONAN/ONAF) MVA, three phase Auto transformer 33/0.415kV, 300kVA, three phase earthing transformer deleted Fire Prevention & Extinguishing System of two main transformer (Nitrogen Injection type) I. Protection, metering and SAS for 230kV overhead line bays Control, Protection, metering and SAS for 230kV Bus-tie bay Busbar protection system for complete 230kV bus		1 1 1 1 2 2 6 6 6 1 1 1 2 2 6 6 6 1 1 1 2 2 1 1 4 2 1 1 1 1 1 1 1 1 1 1 1 1 1	Lot Sets Sets Sets Sets Sets Nos. Nos. Nos. Lot Lot Lot Lot Sets Sets Sets Sets Sets Sets Sets Set		

ltem	Description	Code ¹	Qty	Unit	Unit Price ² CIP (2)	Total Price ² CIP (1) x (2)
2F2	Control, Protection, metering and SAS for 132kV side of auto		(1)	Sets	(2)	(1) X (2)
	transformer bays					
	Control, Protection, metering and SAS for 132kV Bus-tie bay Busbar protection system for complete 132kV bus		<u>1</u> 1	Set Lot		
	Tarrif metering for six line bays and two transformer bays		1	Lot		
33kV C						
	Control, Protection, metering for 33/0.4kV Auxilliary Transformers.		2	sets		
	Cables & Cable Termination,Surge Arrester,Conductor,Steel Struct	ure,Insu	lator & Hardy	vare & Fitti	ngs:	
	Circuits	iary Transformers. 2 sets onductor,Steel Structure,Insulator & Hardware & Fittings: mination 720 required necessary 12 ion) per phase with 18 sets 9 ion) per phase with 18 narge Current, Class III, 18 nent connections 1 Lot 1 1 Lot 1 Lot <td></td>				
	230kV, XLPE 2000sqmm, Cu Power cable & termination Power cable		720	meter		
/	Outdoor type Cable Sealing End per phase with required necessary		-	-		
	accessories					
iii)	Indoor type Cable termination(GIS bay termination) per phase with		18	Sets		
ວ⊔ວ	required necessary accessories. Single phase surge arrestor, 186kV, 10kA Discharge Current, Class III,		18	noc		
	gapless metaloxide		10	1105.		
2H3	Flexible Conductor, clamps & connectors for Jackbus, Jumper &					
	equipment Connection					
,	_Flexible Conductor for jackbus, jumper, equipment connections			-		
/	_Clamps & Connectors Insulator & Fittings		I	LOT		
	_Insulator		1	Lot		
	inductor			-		
	Steel structures & cable tray					
i)	_Gantry Column including nut&bolts		1	Lot		
,	Gantry beam including nut&bolts		1	Lot		
iii)	_Equipment support structures including nut&bolts		1	Lot		
,	_Cable tray including fitting, fixing accessories		1	Lot		
132kV	Circuits					
2H6	132kV, XLPE 1000sqmm, Cu Power cable & termination					
	Power cable		1680	meter		
	Outdoor type Cable Sealing End per phase with required necessary		12	Sets		
iii)	accessories for line bays Indoor type Cable termination(GIS bay termination) per phase with		12	Sets		
	required necessary accessories for line bays		40			
	Outdoor type Cable Sealing End with required necessary accessories for Tr bays (per each cable)		12	Sets		
V)	Indoor type Cable termination(GIS bay termination) per phase with		12	Sets		
	required necessary accessories for Tr bays (per each cable)					
2H7	Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III,		18	nos.		
2H8	gapless metaloxide Flexible Conductor, clamps & connectors for Jackbus, Jumper &					
	equipment Connection					
,	_Flexible Conductor for jackbus, jumper, equipment connections		1	Lot		
	_Clamps & Connectors		1	Lot		
	Insulator & Fittings _Insulator		1	Lot		
	_insulation _Fittings		1	Lot		
	Steel structures & cable tray					
	_Gantry Column including nut&bolts		1	Lot		
	_Gantry beam including nut&bolts		1	Lot		
/	_Equipment support structures including nut&bolts		1	Lot		
	_Cable tray including fitting, fixing accessories		1	Lot		
33kV C	Ircuits 33kV, XLPE Cu Power cable, 185sqmm		150	motor		
	33kV Cable termination with required necessary accessories.		12	Meter Nos.		
	re Cables		16	1103.		
	Multicore, XLPE, LV Power & Control Cable for control, protection,					
	SAS, metering & power circuits			<u> </u>		
	_LV Control Cable		1	Lot		
,	_LV Power Cable g & Lightning Protection		1	Lot		
	Earthing and Lightning Protection System					
	_Earthing system for complete substation incld. GIS building		1	Lot		
ii)	Lightning Protection System for complete substation include. GIS		1	Lot		
	building es, Chargers & DC Distribution					
	Complete 110V Battery Bank with chargers and DC Distribution Board					
	_Battery Banks		2	Sets		
	_Charger		2	Sets		
	_110V DC Distribution panel		1	Set		
iv)	_110V/48V DC DC Converter,1.5kVA		2	Sets		
	_48V DC Disatribution Panel		1	Set		
vi)	_UPS system for SAS panels, 3kVA		2	sets		
	Distribution				i	

Item	Description	Code ¹	Qty	Unit	Unit Price ² CIP	Total Price ² CIP
2L1	Complete LVAC Distribution System with necessary DB, MCB, Meters		<u>(1)</u> 1	Lot	(2)	(1) x (2)
01.0	etc		4	1.54		
	Tariff metering for two station auxilliary Transformer Outdoor weatherproof 3-phase,4 wire, 125A Socket outlet and plugs.		<u>1</u>	Lot Nos		
	orks,Building and Foundation		1	Lot		
	Complete Land development with carried earthfilling		24,300.00	Cubic		
				Meter		
	Complete outdoor civil works	-				
i)	_Outdoor gantry foundation 230kV switchyard		1	Lot		
ii)			1	Lot		
iii)	_Outdoor gantry foundation 33kV switchyard		1	Lot		
iv)			1	Lot		
v)	_Outdoor equipment foundation 132kV switchyard		1	Lot		
vi)	_Outdoor equipment foundation 33kV switchyard		1	Lot		
vii)	_Transformer foundation including oilpit & carrage way		1	Lot		
viii)	_Blast wall		1	Lot		
ix)	_Security Boundary Wall		1	Lot		
			1	Lot		
xi)	_Barbed Wire Fencing		1	Lot		
xii)	_Approach raod		1	Lot		
xiii)	Internal road		1	Lot		
xiv)	Surface drain		1	Lot		
xv)	Cable Trench		1	Lot		
,			1	Lot		
	_Gravel laying		1	Lot		
,						
	_Septic tank, sowak way		1	Lot		
	_Pump house including deep tubewell, motor, pump, water reservaoir,		1	Lot		
,	_Gurd house, sentry post, car port		1	Lot		
	Complete civil works for GIS & control room building					
,	_Foundation works		1	Lot		
,	_Super structures		1	Lot		
iii)	_All finish works		1	Lot		
iv)	_EOT crane (5 Ton)		1	Lot		
2N1	Building Lighting, Small Power, Air Conditioning & Ventilation					
i)			1	Lot		
	_Building Lighting & emergency DC lighting		1	Lot		
iii)	_Building airconditioning & ventilation system		1	Lot		
	Outdoor switchyard Lighting, Small Power					
	_OutdoorSmall power		1	Lot		
	_Outdoor Lighting		1	Lot		
	Fault & Disturbance Recorder(DFDR)					
	DFDR complete for all 230kV & 132kV bays for Shyampur new		1	Lot		
	DFDR complete for all 230kV & 132kV bays for existing Old Airport		1	Lot		
	DFDR complete for all 230kV & 132kV bays for existing Tongi		1	Lot		
	optic Multiplexer Equipment for Teleprotection and Communication					
	Fibre Optic Multipexer Equipment for communication & protection		1	Lot		
	Hot line telephone system including phone sets, connection cords etc.		1	Lot		
	round opticale fiber cable with Terminal box.			1		
	Underground Fibre Optic cable(48 cores)		1	Lot		
	Outdoor termination box, indoor MDF & pigtail cables		1	Lot		
	tion with existing SCADA, NLDC system					
	Integration with existing SCADA/NLDC system.		1	Lot		
	tory Spares, tools & test equipment 230 kV GIS					
i)	Set of gas filling equipment and 3 bottles of 48kg of SF6	nos.	1	nos.		
ii)	Arcing contact of CB	nos.	2	nos.		
iii)	Moving contact of CB	nos.	2	nos.		
iv)	Fixed contact of CB	nos.	2	nos.		
,	Moving contact of DS & ES	nos.	2	nos.		
	Fixed contact of DS & ES	nos.	2	nos.		
	Blast nozzle	nos.	2	nos.		
	CB Closing coil	nos.	6	nos.		
			0			
,	CB Tripping coil	nos.	6	nos.	1	

ltem	Description	Code ¹	Qty	Unit	Unit Price ² CIP	Total Price ² CIP
_v)	Motor for CP opprating mechanism	200	<u>(1)</u> 1		(2)	(1) x (2)
-	Motor for CB operating mechanism	nos.		nos.		
,	Dashpot for CB operating mechanism	nos.	2	nos.		
	Motor for DS & ES drive	nos.	2	nos.		
-	Supporting insulator	nos.	2	nos.		
	Supporting insulator with barrier	nos.	2	nos.		
xv)	Indicating lamps (20% of total quantities installed)	nos.	1	nos.		
xvi)	Indicating lamp covers (10% of total quantities installed)	nos.	1	nos.		
xvii)	Set of gaskets (10% of total quantities installed)	nos.	1	nos.		
xviii)	Heater	nos.	2	nos.		
xix)	Humidity stat and thermostat	nos.	2	nos.		
xx)	Gas pressure monitor	nos.	2	nos.		
	Gas pressure switch	nos.	2	nos.		
	Gas pressure gauge	nos.	2	nos.		
	Gas pressure relief device	nos.	2	nos.		
	Gas sniffer					
,		nos.	1	nos.		
,	Gas hygrometer	nos.	1	nos.		
	132 kV GIS					
i)	Arcing contact of CB	nos.	2	nos.		
ii)	Moving contact of CB	nos.	2	nos.		
iii)	Fixed contact of CB	nos.	2	nos.		
iv)	Moving contact of DS & ES	nos.	2	nos.		
V)	Fixed contact of DS & ES	nos.	2	nos.		
vi)	Blast nozzle	nos.	2	nos.		
,	CB Closing coil	nos.	6	nos.		
	CB Tripping coil	nos.	6	nos.		
			1			
	Motor for CB operating mechanism	nos.		nos.		
-	Dashpot for CB operating mechanism	nos.	2	nos.		
	Motor for DS & ES drive	nos.	2	nos.		
xii)	Supporting insulator	nos.	2	nos.		
xiii)	Supporting insulator with barrier	nos.	2	nos.		
xiv)	Indicating lamps (20% of total quantities installed)	nos.	1	nos.		
xv)	Indicating lamp covers (10% of total quantities installed)	nos.	1	nos.		
xvi)	Set of gaskets (10% of total quantities installed)	nos.	1	nos.		
xvii)	Heater	nos.	2	nos.		
xviii)	Humidity stat and thermostat	nos.	2	nos.		
	Gas pressure monitor	nos.	2	nos.		
XX)	Gas pressure switch	nos.	2	nos.		
,	Gas pressure gauge	nos.	2	nos.		
-	Gas pressure relief device	nos.	2	nos.		
,	•	1103.	2	1103.		
	Auto Transformer & Switchgear					
	Transformer 230 kV bushings (For 300MVA Transformer)		1	no.		
	Ttransformer 138 kV bushings (For 300MVA Transformer)		2	nos.		
iii)	33 kV bushing	nos.	2	nos.		
iv)	Neutral bushing	nos.	2	nos.		
v)	Winding temperature indicating device	nos.	2	nos.		
vi)	Set of gaskets (10% of total quantities installed)	nos.	1	nos.		
vii)	Silica gel (100% of total quantities installed)	nos.	1	nos.		
	Set of special tools, gauges and spanners		1	set		
	Transformer oil treatment plant, 6000 Liters per hour		1	set		
	186kV Surge arrester		3	nos.		
	120 kV Surge Arrester		3	nos.		<u> </u>
xi)	-		2	sets		
xi) xii)	245kV, Cable Sealing End (for XLPE, 2000sqmm cu cable) incld. necessary all accessories 145kV, Cable Sealing End (for XLPE, 1000sqmm cu cable) incld. necessary all		2	sets		
xi) xii)	245kV, Cable Sealing End (for XLPE, 2000sqmm cu cable) incld. necessary all accessories		2	sets		
xi) xii) xii)	245kV, Cable Sealing End (for XLPE, 2000sqmm cu cable) incld. necessary all accessories 145kV, Cable Sealing End (for XLPE, 1000sqmm cu cable) incld. necessary all		2	sets		
xi) xii) xii) 2Q4	245kV, Cable Sealing End (for XLPE, 2000sqmm cu cable) incld. necessary all accessories 145kV, Cable Sealing End (for XLPE, 1000sqmm cu cable) incld. necessary all accessories		2	sets set		
xi) xii) xii) 2Q4 i)	245kV, Cable Sealing End (for XLPE, 2000sqmm cu cable) incld. necessary all accessories 145kV, Cable Sealing End (for XLPE, 1000sqmm cu cable) incld. necessary all accessories Protection					
xii) xii) xii) 2Q4 i) ii)	245kV, Cable Sealing End (for XLPE, 2000sqmm cu cable) incld. necessary all accessories 145kV, Cable Sealing End (for XLPE, 1000sqmm cu cable) incld. necessary all accessories Protection Line distance relay with complete protection elements Transformer differential relay with complete REF function		1	set		
xii) xii) xii) 2Q4 i) ii) iii)	245kV, Cable Sealing End (for XLPE, 2000sqmm cu cable) incld. necessary all accessories 145kV, Cable Sealing End (for XLPE, 1000sqmm cu cable) incld. necessary all accessories Protection Line distance relay with complete protection elements		1	set set		

ltem	Description	Code ¹	Qty	Unit	Unit Price ²	Total Price ²
					CIP	CIP
			(1)		(2)	(1) x (2)
vi)	Trip Circuit Supervision relay, 3phase		1	set		
vii)	Relay test block & plug		3	sets		
viii)	Bulbs for annunciator	nos.	10	nos.		
2Q5	Test Equipment					
i)	SF6 Gas Handling Equipment including storage tank		1	set		
ii)	SF6 Gas leak Detector		1	set		
iv)	Partial Discharge monitoring Device for GIS		1	set		
V)	Contact resistance measurement test set (suitable for measurement down to 1 μ ohm at 200A d.c.)		1	set		
vi)	5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV)		1	set		
vii)	Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm)		1	set		
viii)	Clip-on mA meter (for spill current)		1	set		
ix)	Portable Earthing lead including glass fiber stick		1	set		
x)	AVO Meter, digital		1	set		
Total I	Price for Shyampur 230/132kV GIS Substation					

Total Schedule B1 (carried to Schedule B5 Grand Summary)

Name of Bidder

Signature of Bidder

¹ Bidders shall enter a code representing the country of origin of all imported plant and equipment.

² Specifiy currency. Create and use as many column for Unit Price and total Price as there are currencies.

Country of Origin Declaration Form

Item	Description	Country

Schedules of Rates and Prices

Schedule_B2 - Plant and Mandatory Spare Parts Supplied from Employer's Country

Scheu	ule B2. 1: Dhamrai 132/33 kV GIS Substation		1	Eoroign Cu	urronov/in		Curreney	
				-oreign CU	Irrency(in		Currency (וושמוון
Item	Description	Qty	Unit	EXW Unit Price ¹	EXW Total Price ¹	EXW Unit Price	EXW Total Price	VAT on EXW
		(1)		(2)	(3)=(1) x (2)	(4)	(5)=(1) x (4)	(6)
-	Outdoor Type Gas Insulated Switchgear(GIS).							
	132kV Overhead line circuit bay,1250A		-					
,	_GIS for 132kV Overhead line circuit bay	2	Sets					
	_GIS bus duct	2	Sets					
	_Air Insulated bushing	2	Sets					
	132kV Transformer circuit bay,1250A							
/	_GIS for 132kV Transformer circuit bay	2	Sets					
,	_GIS bus duct	2	Sets					
/	_Air Insulated bushing	2	Sets					
	132kV Bus tie circuit bay,3000A	1	Set					
	132kV Main busbar(double busbar) ,3000A, with VT & ES	1	Lot					
	HV GIS Test Bushing	1	Set					
	ir Insulated Switchgear(AIS) and Connection:							
	Vacuum Circuit breaker(VCB), live tank, gang operating, 2000A	2	Sets					
1B2	Disconnector, single verticle break, 2000A, gantry mounted	7	Sets					
1B3	Single phase current transformer, post type,3-core	6	Nos.					
1B4	Single phase voltage transformer, post type, 2-core	12	Nos.					
1B5	Single phase, post type, metal oxide surge arrester, 30kV	12	Nos.					
1B6	Flexible Conductor, clamps & connectors for busbar, Jackbus, Jumper &							
	equipment Connection							
i)	_Flexible Conductor for jackbus, jumper, equipment connections	1	Lot					
ii)	_Flexible Conductor for main bus	1	Lot					
iii)	Clamps & Connectors	1	Lot					
1B.7	Insulator & Fittings							
i)	Insulator	1	Lot					
ii)	_Fittings	1	Lot					
	Steel structures & cable tray							
i)	Gantry Column including nut&bolts	1	Lot					
ii)	Gantry beam including nut&bolts	1	Lot					
iii)	Equipment support structures including nut&bolts	1	Lot					
	Cable tray including fitting, fixing accessories	1	Lot					
/	Transformer & Aux. Transformer							
	132/33kV, 50/75(ONAN/ONAF) MVA,, three phase power transformer	2	Sets					
	33/.415kV, 200kVA, three phase auxilliary transformer	2	Sets					
	ol, Protection, SAS & Metering		0000					
-	Circuits							
	Control, Protection, metering and SAS for 132kV overhead line bays	2	Sets					
	Control, Protection, metering and SAS for 132kV Transformer bays	2	Sets					
	Control, Protection, metering and SAS for 132kV Bus-tie bay	1	Set					
	Busbar protection system for complete 132kV bus	1	Lot					
	Tarrif metering for two line bays and two transformer bays	1	Lot					
33kV C			201					
	Control, Protection, metering and SAS for 33kV side of Transformer	2	sets					
	Tariff metering for two Transformer bays	1	Lot					
	Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings:	1	LOI					
	Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III,	12	nos.					
	gapless metaloxide	12	1105.					
1	Flexible Conductor, clamps & connectors for Jackbus, Jumper & equipment Connection							
	_Flexible Conductor for jackbus, jumper, equipment connections	1	Lot					
ii)	_Clamps & Connectors	1	Lot					
	Insulator & Fittings			İ			1	
	_Insulator	1	Lot				1	
	 _Fittings	1	Lot				1	
	Steel structures & cable tray							
		1	Lat					
i) ;;)	_Gantry Column including nut&bolts		Lot					
ii) iii)	_Gantry beam including nut&bolts Equipment support structures including nut&bolts	1 1	Lot					
		1	Lot	1	1	i	1	1

SB-9

iv) Cable tray including fitting, fixing accessories	1	Lot		I	 1	_
Multicore Cables						
1F1 Multicore, XLPE, LV Power & Control Cable for control, protection, SAS,						
metering & power circuits						_
i) _LV Control Cable	1	Lot				
ii) LV Power Cable	1	Lot				
Earthing & Lightning Protection						
1G1 Earthing and Lightning Protection System						
i) _Earthing system for complete substation	1	Lot				
ii) _Lighting Protection System for complete substation	1	Lot			 	
	1	LOI				
Batteries, Chargers & DC Distribution						
1H1 Complete 110V Battery Bank with chargers and DC Distribution Board						
i) _Battery Banks two sets	2	Sets				
ii) Charger two sets	2	Sets				
iii) _110V DC Distribution panel	1	Set				
iv) _110V/48V DC DC Converter,1kVA	2	Sets				
v) 48V DC Disatribution Panel	1	Set				
iv) UPS system for SAS panels, 3kVA	2	sets				
LVAC Distribution	-	0010				
111 Complete LVAC Distribution System with necessary DB, MCB, Meters	1	Lot				
					 -	_
1/2 Tariff metering for two station auxilliary Transformer	1	Lot			 	
113 Outdoor weatherproof 3-phase,4 wire, 125A Socket outlet and plugs.	1	Nos		1		
1K1 Building Lighting, Small Power, Air Conditioning & Ventilation						
i) _BuildingSmall power	1	Lot		ľ		
ii) _Building Lighting & emergency DC lighting	1	Lot		1		
iii) _Building airconditioning & ventilation system	1	Lot		1	1	
1K2 Outdoor switchyard Lighting, Small Power	•	- 201		1	 1	
i) _OutdoorSmall power	1	Lot				
		Lot				
ii) Outdoor Lighting	1	Lot				
iber Optic Multiplexer Equipment for Teleprotection and Communication						
1L1.1 Fibre Optic Multipexer Equipment for communication & protection	1	Lot				
1L1.2 Hot line telephone system including phone sets, connection cords etc.	1	Lot				
Inderground opticale fiber cable with Terminal box.						
	1	Lot				
L.2.1 Underground Fibre Optic cable(24 cores)	1	Lot				-
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables	1 1	Lot Lot				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system	1	Lot				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system.						
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Jandatory Spares, tools & test equipment	1	Lot				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Jandatory Spares, tools & test equipment 1N1 132 kV GIS	1	Lot Lot				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB	1	Lot Lot nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB	1 1 2 2	Lot Lot				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables Integration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB iii) Fixed contact of CB	1	Lot Lot nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB	1 1 2 2	Lot Lot nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB iii) Fixed contact of CB	1 1 2 2 2 2	Lot Lot nos. nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB iii) Fixed contact of CB iv) Moving contact of DS & ES	1 1 2 2 2 2 2 2	Lot Lot nos. nos. nos. nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Anadatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB iv) Moving contact of DS & ES v) Fixed contact of DS & ES v) Fixed contact of DS & ES	1 1 2 2 2 2 2 2 2 2 2	Lot Lot nos. nos. nos. nos. nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Aandatory Spares, tools & test equipment 1N1 132 kV GIS ii) Arcing contact of CB iii) Fixed contact of CB iv) Moving contact of DS & ES v) Fixed contact of DS & ES vi) Blast nozzle vii) CB Closing coil	1 1 2 2 2 2 2 2 2 2 2 6	Lot Lot nos. nos. nos. nos. nos. nos. nos. nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB iii) Noving contact of CB iv) Moving contact of DS & ES v) Fixed contact of DS & ES vi) Blast nozzle vii) CB Closing coil	1 1 2 2 2 2 2 2 2 2 2 2 6 6 6	Lot Lot nos. nos. nos. nos. nos. nos. nos. nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Aandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB iii) Moving contact of CB iv) Moving contact of DS & ES v) Fixed contact of DS & ES vi) Blast nozzle vii) CB Closing coil viii) CB Tripping coil ix) Motor for CB operating mechanism	1 1 2 2 2 2 2 2 2 2 2 2 2 6 6 6 1	Lot Lot nos. nos. nos. nos. nos. nos. nos. nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables Integration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB iii) Fixed contact of CB iv) Moving contact of DS & ES vi) Blast nozzle viii) CB Closing coil viii) CB Tripping coil ix) Motor for CB operating mechanism x) Dashpot for CB operating mechanism	1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 1 2	Lot Lot nos. nos. nos. nos. nos. nos. nos. nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB iii) Moving contact of CB iv) Moving contact of DS & ES vi) Blast nozzle vii) CB Closing coll viii) CB Tripping coil ix) Motor for CB operating mechanism x) Dashpot for CB operating mechanism xi) Motor for DS & ES drive	1 2 2 2 2 2 2 2 2 2 2 2 6 6 6 1 2 2 2	Lot Lot nos. nos. nos. nos. nos. nos. nos. nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables Integration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB iii) Fixed contact of DS & ES v) Fixed contact of DS & ES vii) CB Closing coil ix) Motor for CB operating mechanism x) Dashpot for CB operating mechanism xi) Motor for DS & ES drive xiii Supporting insulator	1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot nos. nos. nos. nos. nos. nos. nos. nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables Integration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB iii) Fixed contact of DS & ES vi) Blast nozzle vii) CB Closing coil viii) CB Tripping coil ix) Motor for CB operating mechanism x) Dashpot for CB operating mechanism xiii) Supporting insulator xiiiiii Supporting insulator	1 2 2 2 2 2 2 2 2 2 2 2 6 6 6 1 2 2 2	Lot Lot nos. nos. nos. nos. nos. nos. nos. nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables Integration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB iii) Fixed contact of DS & ES v) Fixed contact of DS & ES vii) CB Closing coil ix) Motor for CB operating mechanism x) Dashpot for CB operating mechanism xi) Motor for DS & ES drive xiii Supporting insulator	1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot nos. nos. nos. nos. nos. nos. nos. nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables Integration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB iii) Fixed contact of CB iv) Moving contact of DS & ES v) Fixed contact of DS & ES vi) Blast nozzle vii) CB Closing coil viii) CB Tripping coil ix) Motor for CB operating mechanism xi) Dashpot for CB operating mechanism xii) Supporting insulator xiii) Supporting insulator xiii) Supporting insulator with barrier xiv) Indicating lamps (20% of total quantities installed)	1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot nos. nos. nos. nos. nos. nos. nos. nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables Integration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB iii) Fixed contact of CB iv) Moving contact of DS & ES v) Fixed contact of DS & ES vi) Blast nozzle vii) CB Closing coil viii) CB Tripping coil ix) Motor for CB operating mechanism xi) Motor for DS & ES drive xiii) Supporting insulator xiii) Supporting insulator with barrier xiv) Indicating lamps (20% of total quantities installed) xv) Indicating lamp covers (10% of total quantities installed)	1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Aandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB iii) Fixed contact of CB iv) Moving contact of DS & ES v) Fixed contact of DS & ES vi) Blast nozzle vii) CB Closing coil viii) CB operating mechanism x) Motor for CB operating mechanism xiii) Supporting insulator xiii) Supporting insulator xiii) Supporting insulator xiv) Indicating lamps (20% of total quantities installed) xvi) Set of gaskets (10% of total quantities installed)	1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Aandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB iii) Moving contact of CB iii) Fixed contact of DS & ES v) Fixed contact of DS & ES vi) Blast nozzle viii) CB Closing coil viii) CB operating mechanism x) Dashpot for CB operating mechanism x) Dashpot for CB operating mechanism xiii) Supporting insulator xiiii) Supporting sulator xiiii) Supporting sulator xivi) Indicating lamps (20% of total quantities installed) xvi) Indicating lamp covers (10% of total quantities installed) xvii) Set of gaskets (10% of total quantities installed) xvii) Heater	1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables Integration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Aandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB iii) Moving contact of CB iiii) Fixed contact of DS & ES v) Fixed contact of DS & ES vi) Blast nozzle viii) CB Closing coil viii) CB ripping coil ix) Motor for CB operating mechanism x) Dashpot for CB operating mechanism x) Dashpot for CB operating mechanism xi) Motor for DS & ES drive xiii) Supporting insulator xiii) Supporting sulator with barrier xiv) Indicating lamp covers (10% of total quantities installed) xvv) Netating lamp covers (10% of total quantities installed) xvvi) Heater xvviii) Humidity stat and thermostat	1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Andatory Spares, tools & test equipment 1N1 132 kV GIS i Arcing contact of CB ii) Moving contact of CB iii) Moving contact of DS & ES v) Fixed contact of DS & ES v) Fixed contact of DS & ES v) Fixed contact of DS & ES vi) Blast nozzle vii) CB Closing coil ix) Motor for CB operating mechanism x) Dashpot for CB operating mechanism xi) Motor for DS & ES drive xii) Supporting insulator xiii) Supporting insulator xiv) Indicating lamp covers (10% of total quantities installed) xv) Indicating lamp covers (10% of total quantities installed) xvi) Heater xviii) Heater xviii) Humidity stat and thermostat xix) Gas pressure monitor	1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables Integration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Aandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB iii) Moving contact of CB iiii) Fixed contact of DS & ES v) Fixed contact of DS & ES vi) Blast nozzle vii) CB Closing coil viii) CB ripping coil ix) Motor for CB operating mechanism x) Dashpot for CB operating mechanism xi) Supporting insulator xiii) Supporting insulator xiv) Indicating lamp covers (10% of total quantities installed) xvv) Indicating lamp covers (10% of total quantities installed) xviii) Heater xviii) Heater xviii) Gas pressure monitor xxi Gas pressure switch	1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot Lot Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables Integration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB iii) Moving contact of CB iii) Fixed contact of DS & ES vi) Bast nozzle vii) CB Closing coll viii) CB Tripping coll ix) Motor for CB operating mechanism x) Dashpot for CB operating mechanism x) Dashpot for CB operating mechanism xiii) Supporting insulator xiii) Supporting insulator xiii) Supporting insulator with barrier xiv) Indicating lamp covers (10% of total quantities installed) xvii) Heater xviii) Huating stat and thermostat xix) Gas pressure monitor xxii) Gas pressure switch xxii) Gas pressure switch	1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables Integration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB iii) Moving contact of CB iii) Fixed contact of CB iv) Moving contact of DS & ES v) Fixed contact of DS & ES vi) Blast nozzle vii) CB Closing coll viii) CB Tripping coll ix) Motor for CB operating mechanism x) Dashpot for CB operating mechanism x) Dashpot for CB operating mechanism xiii) Supporting insulator xiii) Supporting insulator xiii) Supporting insulator with barrier xiv) Indicating lamp covers (10% of total quantities installed) xvii) Heater xviii) Heater xviii) Humidity stat and thermostat xix) Gas pressure monitor xix)	1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot Lot Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Anadatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB iii) Fixed contact of CB iv) Moving contact of DS & ES v) Fixed contact of DS & ES vi) Blast nozzle vii) CB Closing coil viii) CB operating mechanism x) Motor for CB operating mechanism x) Dashpot for CB operating mechanism xiii) Supporting insulator xiii) Supporting insulator with barrier xiv) Indicating lamps (20% of total quantities installed) xvii) Set of gaskets (10% of total quantities installed) xvii) Heater xviii) Humidity stat and thermostat xix) Gas pressure monitor xxii Gas pressure monitor xxiii Gas pressure relief device </td <td>1 1 2 2 2 2 2 2 2 2 2 2 2 2 2</td> <td>Lot Lot Lot Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.</td> <td></td> <td></td> <td></td> <td></td>	1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot Lot Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Anadatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB iii) Fixed contact of CB iv) Moving contact of DS & ES v) Fixed contact of DS & ES vi) Blast nozzle vii) CB Closing coil viii) CB operating mechanism x) Motor for CB operating mechanism x) Dashpot for CB operating mechanism xiii) Supporting insulator xiii) Supporting insulator with barrier xiv) Indicating lamps (20% of total quantities installed) xvii) Set of gaskets (10% of total quantities installed) xvii) Heater xviii) Humidity stat and thermostat xix) Gas pressure monitor xxii Gas pressure monitor xxiii Gas pressure relief device </td <td>1 1 2 2 2 2 2 2 2 2 2 2 2 2 2</td> <td>Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.</td> <td></td> <td></td> <td></td> <td></td>	1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables Integration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Aandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB iii) Fixed contact of CB iv) Moving contact of DS & ES v) Fixed contact of DS & ES vi) Blast nozzle vii) CB Closing coil viii) CB Tripping coil ix) Motor for CB operating mechanism x) Dashpot for CB operating mechanism x) Dashpot for DS & ES drive xiii) Supporting insulator xiii) Supporting insulator xiii) Supporting insulator with barrier xiv) Indicating lamps (20% of total quantities installed) xvi) Indicating lamp covers (10% of total quantities installed) xvii) Heater xviii) Heater xviii) Heater xviii)	1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables Integration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Aandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB iii) Fixed contact of CB iv) Moving contact of DS & ES v) Fixed contact of DS & ES vi) Blast nozzle vii) CB Closing coil viii) CB operating mechanism x) Motor for CB operating mechanism x) Motor for DS & ES drive xiii) Supporting insulator xiii) Supporting insulator xiii) Supporting insulator with barrier xiv) Indicating lamps (20% of total quantities installed) xvi) Beat of gaskets (10% of total quantities installed) xvii) Heater xviii) Heater xviii) Hat of thermostat xix) Gas pressure monitor xx) <	1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot Lot Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables Integration with existing SCADA, NLDC system Mandatory Spares, tools & test equipment 1N1 132 kV GIS ii) Arcing contact of CB iii) Fixed contact of CB iii) Fixed contact of DS & ES v) Fixed contact of DS & ES vi) Blast nozzle viii) CB Closing coil viiii) CB operating mechanism x) Dashpot for CB operating mechanism xi) Motor for DS & ES drive xii) Supporting insulator xiii) Supporting insulator with barrier xiv) Indicating lamps (20% of total quantities installed) xvi) Heater xvii) Heater xviii) Gas pressure monitor xix) Gas pressure gauge xixi) Gas pressure relief device <td>1 2 2 2 2 2 2 2 2 2 2 2 2 2</td> <td>Lot Lot Lot Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.</td> <td></td> <td></td> <td></td> <td></td>	1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot Lot Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA, NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB iii) Fixed contact of DS & ES v) Fixed contact of DS & ES vi) Bast nozzle viii) CB Closing coil viiii) CB operating mechanism x) Dashpot for CB operating mechanism xi) Motor for DS & ES drive xiii) Supporting insulator xiii) Supporting insulator with barrier xiv) Indicating lamp covers (10% of total quantities installed) xviii) Heater xviii) Heater xviii) Gas pressure monitor xix) Gas pressure gauge xixi) Gas pressure gauge xixi) Gas pressure gauge xixi) Gas pressure site fedevice 1N2 132/33	1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot Lot Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA/NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB iii) Fixed contact of CB iv) Moving contact of DS & ES v) Fixed contact of DS & ES vii) EB closing coil viii) CB Closing coil viii) CB operating mechanism x) Dashpot for CB operating mechanism x) Dashpot for CB operating mechanism xiii) Supporting insulator with barrier xiii) Supporting insulator with barrier xiii) Supporting insulator with barrier xiv) Indicating lamps (20% of total quantities installed) xvvii Heater xvvii Heater xviii) Humidity stat and thermostat xix) Gas pressure switch xxi Gas pressure switch <	1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot Lot Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.				
L.2.1 Underground Fibre Optic cable(24 cores) L.2.2 Outdoor termination box, indoor MDF & pigtail cables ntegration with existing SCADA, NLDC system 1M1 Integration with existing SCADA, NLDC system. Mandatory Spares, tools & test equipment 1N1 132 kV GIS i) Arcing contact of CB ii) Moving contact of CB iii) Fixed contact of DS & ES v) Fixed contact of DS & ES vi) Bast nozzle viii) CB Closing coil viiii) CB operating mechanism x) Dashpot for CB operating mechanism xi) Motor for DS & ES drive xiii) Supporting insulator xiii) Supporting insulator with barrier xiv) Indicating lamp covers (10% of total quantities installed) xviii) Heater xviii) Heater xviii) Gas pressure monitor xix) Gas pressure gauge xixi) Gas pressure gauge xixi) Gas pressure gauge xixi) Gas pressure site fedevice 1N2 132/33	1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	Lot Lot Lot Lot Lot Nos. Nos. Nos. Nos. Nos. Nos. Nos. Nos.				

viii) Set of special tools, gauges and spanners 1 set ix) Transformer oil treatment plant, 6000 Liters per hour 1 set x) 120 kV Surge Arrester 3 nos. 1 ii) Current Transformer, single phase 3-core, 2 nos. 1 i) Closing coils for CB 2 nos. 1 iii) Transformer, single phase 3-core, 2 nos. 1 ii) Closing coils for CB 2 nos. 1 iii) Transformer, single phase 2 nos. 1 vij Motor for 33 kV circuit breaker operating mechanism 1 no. 1 vij Motor for 33 kV circuit breaker operating mechanism 1 nos. 1 iii) Transformer differential relay with complete protection elements 1 set 1 iii) Dransformer differential relay with complete REF function 1 set 1 iii) Orecurrent and earth fault relay 1 set 1 1 viii) Transformer								
x) 120 kV Surge Arrester 3 nos. 11X3 33 kV SWITCHGEAR								
1N.3 33 kV SWITCHGEAR 2 nos. ii) Current Transformer, single phase 3-core, 2 nos. 2 iii) Tripping coils for CB 2 nos. 2 iv) Motor for 33 kV circuit breaker operating mechanism 1 no. 2 iv) Motor for 33 kV circuit breaker operating mechanism 1 no. 2 iv) Motor for 33 kV circuit breaker operating mechanism 1 no. 2 iv) Surge Arrester, single phase 2 nos. 2 1N4 Protection 1 set 2 ii) Transformer differential relay with complete REF function 1 set 2 iii) Tripping relay (electrical reset) 3 nos. 2 vi) Tripping relay (electrical reset) 3 nos. 2 vii) RelayTest block & plug 1 set 2 viii) Bulbs for annunciator 10 nos. 2 1V Test Equipment 1 set 2 i) SF6 Gas teak Detector 1 set 2 2 vii) SF6 Gas teak Detector 1 set 2								
i) Current Transformer, single phase 3-core, 2 nos. ii) Closing coils for CB 2 nos. iii) Tripping coils for CB 2 nos. iii) Motor for 33 kV circuit breaker operating mechanism 1 no. v) Surge Arrester, single phase 2 nos. 11M4 Protection 1 set ii) Tripping relay with complete protection elements 1 set iii) Transformer differential relay with complete REF function 1 set iii) Transformer differential relay with complete REF function 1 set vi) Tripping relay (electrical reset) 3 nos. 1 viii) RelayTest block & plug 1 set 1 viii) RelayTest block & aplug 1 set 1 viii) Bulbs for annunciator 10 nos. 1 iii) SF6 Gas reservoir 1 set 1 ii) SF6 Gas reservoir 1 set 1 ii) SF6 Gas reservoir 1 set 1 iv) SF6 Gas reservoir 1 set 1 vii) SF6 Gas reservoir 1 set 1 <								
ii) Closing coils for CB 2 nos. iii) Tripping coils for CB 2 nos. iv) Motor for 33 kV circuit breaker operating mechanism 1 no. v) Surge Arrester, single phase 2 nos. 1N4 Protection 1 no. i) Line distance relay with complete protection elements 1 set 1 ii) Transformer differential relay with complete REF function 1 set 1 iii) overcurrent and earth fault relay 1 set 1 vi) Tripping relay (electrical reset) 3 nos. 1 vi) Tripping relay (electrical reset) 3 nos. 1 vi) Tripping relay (electrical reset) 3 nos. 1 vii) RelayTest block & plug 1 set 1 viii) Bulbs for annunciator 10 nos. 1 1N5 Test Equipment 1 set 1 ii) SF6 Gas Handling Equipment 1 set 1 vi) Contact resistance measurement test set (suitable for measurement down to 1 µ 1								
iii) Tripping coils for CB 2 nos. iv) Motor for 33 kV circuit breaker operating mechanism 1 no. v) Surge Arrester, single phase 2 nos. 1N4 Protection 2 nos. i) Line distance relay with complete protection elements 1 set ii) Transformer differential relay with complete REF function 1 set iii) overcurrent and earth fault relay 1 set iv) Tripping relay (electrical reset) 3 nos. v) Bay control unit 1 set 2 vii) Trip Circuit Supervision relay, 3phase 1 set 2 viii) RelayTest block & plug 1 set 2 viii) RelayTest block & plug 1 set 2 viii) Bulbs for annunciator 10 nos. 2 1NS Test Equipment 1 set 2 viii) SF6 Gas handling Equipment for measurement down to 1 μ 1								
iv) Motor for 33 kV circuit breaker operating mechanism 1 no. v) Surge Arrester, single phase 2 nos. 1N4 Protection								
iv) Motor for 33 kV circuit breaker operating mechanism 1 no. v) Surge Arrester, single phase 2 nos. 1N4 Protection								
v) Surge Arrester, single phase 2 nos. 1 1N4 Protection 1 set 1 i) Line distance relay with complete protection elements 1 set 1 ii) Transformer differential relay with complete REF function 1 set 1 iii) overcurrent and earth fault relay 1 set 1 vi) Tripping relay (electrical reset) 3 nos. 1 vi) Tripping relay (electrical reset) 3 nos. 1 vi) Bay control unit 1 set 1 set vii) RelayTest block & plug 1 set 1 set viii) Bulbs for annunciator 10 nos. 1 set 1 iii) SF6 Gas Handling Equipment 1 set 1 set 1 ii) SF6 Gas reservoir 1 set 1 set 1 vi) Sch Gas leak Detector 1 set 1 set 1 vi) SF6 Gas leak Detector 1								
1N4 Protection Image: Section of the section of th								
i) Line distance relay with complete protection elements 1 set ii) Transformer differential relay with complete REF function 1 set iii) overcurrent and earth fault relay 1 set								
ii)Transformer differential relay with complete REF function1setiii)overcurrent and earth fault relay1setiv)Tripping relay (electrical reset)3nos.v)Bay control unit1setvi)Trip Circuit Supervision relay, 3phase1setvii)RelayTest block & plug1setviii)Bulbs for annunciator10nos.1NSTest Equipment1seti)SF6 Gas Handling Equipment1setii)SF6 Gas reservoir1setiv)SF6 Gas reservoir1setiv)SF6 Gas reservoir1setiv)SF6 Gas reservoir1setiv)SF6 Gas leak Detector1setvii)Contact resistance measurement test set (suitable for measurement down to 1 µ1setviii)5 kV insulation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV)1setviii)Earth resistance test set (range 0.5 -1.0 - 2.5 - 5 kV)1setviii)Earth resistance test set (range 10-1000 ohm: min scale division 0.01 ohm)1setix)Olipon mA meter (for spill current)1setix)Portable Earthing lead including glass fiber stick1setixi)AVO Meter, digital1setii1N.5Test Equipment1setii								
iii) overcurrent and earth fault relay 1 set iv) Tripping relay (electrical reset) 3 nos. vi) Bay control unit 1 set vi) Trip Circuit Supervision relay, 3phase 1 set vii) RelayTest block & plug 1 set viii) RelayTest block & plug 1 set viii) Bulbs for annunciator 10 nos. 1N5 Test Equipment 1 set i) SF6 Gas Handling Equipment 1 set ii) SF6 Gas leak Detector 1 set vi) SF6 Gas leak Detector 1 set vi) SF6 Gas leak Detector 1 set vii) Contact resistance measurement test set (suitable for measurement down to 1 μ 1 set viii) Contact resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 </td <td></td>								
iv)Tripping relay (electrical reset)3nos.v)Bay control unit1setvi)Trip Circuit Supervision relay, 3phase1setvii)RelayTest block & plug1setviii)Bulbs for annunciator10nos.1NSTest Equipment1seti)SF6 Gas Handling Equipment1setii)SF6 Gas leak Detector1setviv)SF6 Gas leak Detector1setv)Partial Discharge monitoring Device for GIS1setvi)Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.)1setviii)5 kV insulation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV)1setviii)Cilip-on mA meter (for spill current)1setix)Portable Earthing lead including glass fiber stick1setixi)AVO Meter, digital1setii1N.5Test Equipment1setii								
v)Bay control unit1setvi)Trip Circuit Supervision relay, 3phase1setvii)RelayTest block & plug1setviii)Bulbs for annunciator10nos.1N5Test Equipment1setii)SF6 Gas Handling Equipment1setiii)SF6 Gas reservoir1setviv)SF6 Gas leak Detector1setv)Partial Discharge monitoring Device for GIS1setvi)Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.)1setviii)5 kV insulation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV)1setviii)Earth resistance test set (range 10-100-000 ohm: min scale division 0.01 ohm)1setviii)Cilip-on mA meter (for spill current)1setix)Portable Earthing lead including glass fiber stick1setixi)AVO Meter, digital1setii1N.5Test Equipment1setii								
vi)Trip Circuit Supervision relay, 3phase1setvii)RelayTest block & plug1setviii)Bulbs for annunciator10nos.1N5Test Equipment1seti)SF6 Gas Handling Equipment1setii)SF6 Gas reservoir1setiii)SF6 Gas leak Detector1setv)Partial Discharge monitoring Device for GIS1setvi)Contact resistance measurement test set (suitable for measurement down to 1 µ1setviii)5 kV insulation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV)1setviii)Earth resistance test set (range 10-100-000 ohm: min scale division 0.01 ohm)1setviii)Clip-on mA meter (for spill current)1setx)Portable Earthing lead including glass fiber stick1setxi)AVO Meter, digital1set								
vi)Trip Circuit Supervision relay, 3phase1setvii)RelayTest block & plug1setviii)Bulbs for annunciator10nos.1N5Test Equipment1seti)SF6 Gas Handling Equipment1setii)SF6 Gas reservoir1setiii)SF6 Gas leak Detector1setv)Partial Discharge monitoring Device for GIS1setv)Partial Discharge monitoring Device for GIS1setvi)SF6 Vi insulation resistance test set (suitable for measurement down to 1 µ ohm at 200A d.c.)1setviii)Earth resistance test set (range 0.5 -1.0 - 2.5 - 5 kV)1setviii)Earth resistance test set (range 10-100-000 ohm: min scale division 0.01 ohm)1setix)Clip-on mA meter (for spill current)1setix)Portable Earthing lead including glass fiber stick1setixi)AVO Meter, digital1setii1N.5Test Equipmentisetii								
viiiRelayTest block & plug1setviii)Bulbs for annunciator10nos.1N5Test Equipment1seti)SF6 Gas Handling Equipment1setii)SF6 Gas reservoir1setiii)SF6 Gas leak Detector1setv)Partial Discharge monitoring Device for GIS1setvi)Contact resistance measurement test set (suitable for measurement down to 1 µ1setviii)S kV insulation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV)1setviii)Earth resistance test set (range 10-100-000 ohm: min scale division 0.01 ohm)1setviii)Clip-on mA meter (for spill current)1setx)Portable Earthing lead including glass fiber stick1setxi)AVO Meter, digital1set1N.5Test Equipment1set								
viii) Bulbs for annunciator 10 nos. 1N5 Test Equipment 1 set ii) SF6 Gas Handling Equipment 1 set iii) SF6 Gas reservoir 1 set iv) SF6 Gas leak Detector 1 set v) Partial Discharge monitoring Device for GIS 1 set vi) Contact resistance measurement test set (suitable for measurement down to 1 µ 1 set vii) Contact resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) 5 kV insulation resistance test set (range 10-100-000 ohm: min scale division 0.01 ohm) 1 set viii) Earth resistance test set (range 10-1000 ohm: min scale division 0.01 ohm) 1 set viii) Clip-on mA meter (for spill current) 1 set x) Portable Earthing lead including glass fiber stick 1 set xi) AVO Meter, digital 1 set								
1N5Test EquipmentImage: Constraint of the set of the s								
i) SF6 Gas Handling Equipment 1 set ii) SF6 Gas reservoir 1 set iv) SF6 Gas leak Detector 1 set v) Partial Discharge monitoring Device for GIS 1 set vi) Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.) 1 set vii) 5 kV insulation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) Earth resistance test set (range 10-100-000 ohm: min scale division 0.01 ohm) 1 set viii) Earth resistance test set (range 10-1000 ohm: min scale division 0.01 ohm) 1 set viii) Clip-on mA meter (for spill current) 1 set x) Portable Earthing lead including glass fiber stick 1 set xi) AVO Meter, digital 1 set 1N.5 Test Equipment								
ii) SF6 Gas reservoir 1 set iv) SF6 Gas leak Detector 1 set v) Partial Discharge monitoring Device for GIS 1 set vi) Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.) 1 set vii) 5 kV insulation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) 1 set viii) Earth resistance test set (range 10-100-state test set) 1 set viii) Earth resistance test set (range 10-100 ohm: min scale division 0.01 ohm) 1 set viii) Clip-on mA meter (for spill current) 1 set x) Portable Earthing lead including glass fiber stick 1 set xi) AVO Meter, digital 1 set 1N.5 Test Equipment <								
iv) SF6 Gas leak Detector 1 set v) Partial Discharge monitoring Device for GIS 1 set vi) Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.) 1 set vii) 5 kV insulation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) 1 set viii) Clip-on mA meter (for spill current) 1 set x) Portable Earthing lead including glass fiber stick 1 set xi) AVO Meter, digital 1 set 1N.5 Test Equipment								
v) Partial Discharge monitoring Device for GIS 1 set vi) Contact resistance measurement test set (suitable for measurement down to 1 µ 1 set vii) 5 kV insulation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) 1 set viii) Clip-on mA meter (for spill current) 1 set x) Portable Earthing lead including glass fiber stick 1 set xi) AVO Meter, digital 1 set 1N.5 Test Equipment								
vi) Contact resistance measurement test set (suitable for measurement down to 1 µ 1 set ohm at 200A d.c.) 5 kV insulation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) 5 kV insulation resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) 1 set viii) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) 1 set ix) Clip-on mA meter (for spill current) 1 set x) Portable Earthing lead including glass fiber stick 1 set xi) AVO Meter, digital 1 set 1N.5 Test Equipment								
vi) Contact resistance measurement test set (suitable for measurement down to 1 µ 1 set ohm at 200A d.c.) 5 kV insulation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) 5 kV insulation resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) 1 set viii) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) 1 set ix) Clip-on mA meter (for spill current) 1 set x) Portable Earthing lead including glass fiber stick 1 set xi) AVO Meter, digital 1 set 1N.5 Test Equipment								
ohm at 200A d.c.) 1 set viii) 5 kV insulation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set 1 viii) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) 1 set 1 ix) Clip-on mA meter (for spill current) 1 set 1 set 1 x) Portable Earthing lead including glass fiber stick 1 set 1 set 1 xi) AVO Meter, digital 1 set 1 set 1 1N.5 Test Equipment 1 set 1 set 1								
viii) 5 kV insulation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) 1 set ix) Clip-on mA meter (for spill current) 1 set x) Portable Earthing lead including glass fiber stick 1 set xi) AVO Meter, digital 1 set 1N.5 Test Equipment								
viii) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) 1 set ix) Clip-on mA meter (for spill current) 1 set x) Portable Earthing lead including glass fiber stick 1 set xi) AVO Meter, digital 1 set 1N.5 Test Equipment								
ix) Clip-on mA meter (for spill current) 1 set x) Portable Earthing lead including glass fiber stick 1 set xi) AVO Meter, digital 1 set 1N.5 Test Equipment								
x) Portable Earthing lead including glass fiber stick 1 set xi) AVO Meter, digital 1 set 1N.5 Test Equipment								
xi) AVO Meter, digital 1 set 1 1N.5 Test Equipment 1								
1N.5 Test Equipment								
i) SF6 Gas Handling Equipment incld. Storage tank 1 set								
iii) Partial Discharge monitoring Device for GIS 1 set								
iv) Contact resistance measurement test set (suitable for measurement down to 1 µ 1 set								
ohm at 200A d.c.)								
v) 5 kV insulation resistance test set (range 0.5 – 1.0 - 2.5 - 5 kV) 1 set								
vi) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) 1 set								
vii) Clip-on mA meter (for spill current) 1 set								
viii) AVO Meter, digital 1 set								
Total Price for Dhamrai 132/33kV GIS Substation								
(carried to Schedule -B5: Grand Summary)								
Schedule B1. 2: Shyampur 230/132 kV GIS Substation								
230kV Indoor Type Gas Insulated Switchgear(GIS).								
2A1 230kV Overhead line circuit bay,1600A 4 Sets								
2A2 230kV Transformer circuit bay,1600A								
	_							
	<u> </u>							
ii) GIS bus duct 2 Sets								
iii) Air Insulated Bushing 2 Sets								
2A3 230kV Bus tie circuit bay,2000A 1 Set								
2A4 230kV Main busbar(double busbar) ,2000A, with VT & ES 1 Lot	_							
2A5 HV GIS Test Bushing 1 set								
132kV Indoor Type Gas Insulated Switchgear(GIS).	_							
2B1 132kV Overhead line circuit bay,1250A 6 Sets								
2B2 132kV Transformer circuit bay,2000A 2 Sets								
2B3 132kV Bus tie circuit bay,3000A 1 Set								
2B4 132kV Main busbar(double busbar),3000A, with VT & ES 1 Lot								
33kV Air Insulated Switchgear(AIS) and Connection:								
2C1 Vacuum Circuit breaker(VCB), live tank, gang operating , 800A 2 Sets								
2C2 Disconnector, single verticle break, 800A, gantry mounted 2 Sets								
2C3 Single phase current transformer, post type,3-core 6 Nos.								
2C4 Single phase, post type, metal oxide surge arrester, 30kV 6 Nos.								
2C5 Flexible Conductor, clamps & connectors, Jumper & equipment								
i) Flexible Conductor for jumper, equipment connections 1 Lot								
ii) _Clamps & Connectors 1 Lot								
	_Equipment support structures including nut&bolts	1	Lot					
------------------	--	--------------	----------	----------	-----------	---	---	----------
ii)	_Cable tray including fitting, fixing accessories	1	Lot					
Power	<u> Transformer & Aux. Transformer</u>							
2D1	230/138/33kV, 225/300(ONAN/ONAF) MVA, three phase Auto	2	Sets					
	33/0.415kV, 300kVA, three phase earthing transformer	2	Sets					
2D2.2	deleted							
	Fire Prevention & Extinguishing System of two main transformer	1	Lot					
202.0	(Nitrogen Injection type)	'	201					
Contro	bl, Protection, SAS & Metering							
	/ Circuits							
	Control, Protection, metering and SAS for 230kV overhead line bays	4	Sets					
200	Control, Protection, metering and SAS for 230kV overhead line bays							
		2	Sets					
	Control, Protection, metering and SAS for 230kV Bus-tie bay	1	Set					
2E4	Busbar protection system for complete 230kV bus	1	Lot					
2E5	Tarrif metering for four line bays and two transformer bays	1	Lot					
132k\	/ Circuits							
	Control, Protection, metering and SAS for 132kV overhead line bays	6	Sets					
	Control, Protection, metering and SAS for 132kV side of auto	2	Sets					
	Control, Protection, metering and SAS for 132kV Bus-tie bay	1	Set					
	Busbar protection system for complete 132kV bus	1	Lot					
	Tarrif metering for six line bays and two transformer bays	1	Lot			1		
<u>33kV (</u>								
	Control, Protection, metering for 33/0.4kV Auxilliary Transformers.	2	sets			1		
Power	Cables & Cable Termination, Surge Arrester, Conductor, Steel Structu	ıre,Insula	tor & Ha	rdware &	Fittings:			
230kV	Circuits							
2H1	230kV, XLPE 2000sqmm, Cu Power cable & termination							
	Power cable	720	meter					
/	Outdoor type Cable Sealing End per phasewith required necessary	12	Sets					
,	accessories		0010					
iii)	Indoor type Cable termination(GIS bay termination) per phasewith	18	Sets					
,	required necessary accessories.		00.0					
2H2	Single phase surge arrestor, 186kV, 10kA Discharge Current, Class III,	18	nos.					
	gapless metaloxide							
2H3	Flexible Conductor, clamps & connectors for Jackbus, Jumper &							
	equipment Connection							
i)	_Flexible Conductor for jackbus, jumper, equipment connections	1	Lot					
	Clamps & Connectors	1	Lot					
	Insulator & Fittings		201					
i)	Insulator	1	Lot					
,		1						
	_Fittings	1	Lot					
	Steel structures & cable tray							
	_Gantry Column including nut&bolts	1	Lot					
ii)	_Gantry beam including nut&bolts	1	Lot					
iii)	_Equipment support structures including nut&bolts	1	Lot					
iv)	Cable tray including fitting, fixing accessories	1	Lot					
	Circuits							
-	132kV, XLPE 1000sqmm, Cu Power cable & termination	1	1		1	1	1	
-	Power cable	1680	meter					
,	Outdoor type Cable Sealing End per phasewith required necessary	1000	Sets			1		
")	accessories for line bays	12	Jeis			1		
:::)	Indoor type Cable termination (GIS bay termination) per phase with	12	Sets					<u> </u>
"")	required necessary accessories for line bays	12	000					
iv)	Outdoor type Cable Sealing End with required necessary accessories	12	Sets			1		<u> </u>
(¹)	for Tr bavs (ber each cable)	¹	000			1		
(v)	Indoor type Cable termination(GIS bay termination) per phase with	12	Sets				1	1
l ^{v)}	required necessary accessories for Tr bays (per each cable)		000					
2H7	Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III,	18	nos.			1	1	1
	apless metaloxide		1.00.					
2H8	Flexible Conductor, clamps & connectors for Jackbus, Jumper &	1			1	1	1	1
2.10	equipment Connection					1	[1
i)	Flexible Conductor for jackbus, jumper, equipment connections	1	Lot			1		
ii)	Clamps & Connectors	1	Lot					1
,	Insulator & Fittings							
		4	1 -+					<u> </u>
i)	_Insulator	1	Lot					
	_Fittings	1	Lot					
2H10	Steel structures & cable tray					1		
i)		1	Lot					
ii)	_Gantry beam including nut&bolts	1	Lot					
iii)	Equipment support structures including nut&bolts	1	Lot					
iv)		1	Lot			1	1	
/	Circuits	1				1	1	1
			1					

			1	1		-
2H11.133kV, XLPE Cu Power cable, 185sqmm	150	meter				
2H11.23kV Cable termination with required necessary accessories.	12	Nos.				
Multicore Cables						
2I1 Multicore, XLPE, LV Power & Control Cable for control, protection, SAS,						
metering & power circuits						
i) LV Control Cable	1	Lot				
ii) _LV Power Cable	1	Lot				
Earthing & Lightning Protection						
2J1 Earthing and Lightning Protection System						
i) Earthing system for complete substation incld. GIS building	1	Lot				
ii) _Lightning Protection System for complete substation include. GIS	1	Lot				
Batteries, Chargers & DC Distribution	1	LUI		-		
2K1 Complete 110V Battery Bank with chargers and DC Distribution Board						-
i) _Battery Banks	2	Sets		_		
ii) _Charger	2	Sets				
iii) _110V DC Distribution panel	1	Set				
iv) 110V/48V DC DC Converter,1.5kVA	2	Sets				
v) 48V DC Disatribution Panel	1	Set				
vi) UPS system for SAS panels, 3kVA	2	sets				
LVAC Distribution						
2L1 Complete LVAC Distribution System with necessary DB, MCB, Meters	1	Lot				
2L2 Tariff metering for two station auxilliary Transformer	1	Lot		-	1	1
2L3 Outdoor weatherproof 3-phase,4 wire, 125A Socket outlet and plugs.	1	Nos		-		1
	1	1				
Civil Works, Building and Foundation	1 24300	Lot Cubic				
2M1 Complete Land development with carried earthfilling	24300					
2M2 Complete outdoor civil works		Meter		-		1
	1	Lot				
ii) _Outdoor gantry foundation 132kV switchyard	1	Lot		_		
iii) Outdoor gantry foundation 33kV switchyard	1	Lot				
iv) _Outdoor equipment foundation 230kV switchyard	1	Lot				
 v) Outdoor equipment foundation 132kV switchyard 	1	Lot				
vi) Outdoor equipment foundation 33kV switchyard	1	Lot				
vii) Transformer foundation including oilpit & carrage way	1	Lot				
viii) Blast wall	1	Lot				
ix) Security Boundary Wall	1	Lot				
x) _Substation Main gate	1	Lot				
	1	Lot				
	1					
xii) _Approach raod		Lot				
xiii) _Internal road	1	Lot		_		
xiv) _Surface drain	1	Lot				
xv) Cable Trench	1	Lot				
xvi) Switchyard surface finishing	1	Lot				
xvii) _Gravel laying	1	Lot				
xviii) Septic tank, sowak way	1	Lot				
Pump house including deep tubewell motor pump water reservaoir	1	Lot				
xix) water pipe line etc.						
xx) _Gurd house, sentry post, car port	1	Lot		1	1	1
2M3 Complete civil works for GIS & control room building			1	1	1	1
i) _Foundation works	1	Lot	-	_		
i) Super structures	1	Lot		-		1
/ = 1						
iii) _All finish works	1	Lot				
iv) _EOT crane (5 Ton)	1	Lot				
2N1 Building Lighting, Small Power, Air Conditioning & Ventilation						
i) BuildingSmall power	1	Lot				
ii) _Building Lighting & emergency DC lighting	1	Lot				
iii) Building airconditioning & ventilation system	1	Lot				
2N2 Outdoor switchyard Lighting, Small Power			1		1	1
i) _OutdoorSmall power	1	Lot	1		1	1
ii) _Outdoor Lighting	1	Lot	1			
Digital Fault & Disturbance Recorder(DFDR)		01		-		1
2N3.1 DFDR complete for all 230kV & 132kV bays for Shyampur new	4	1.04			+	
	1	Lot				
2N3.2 DFDR complete for all 230kV & 132kV bays for existing Old Airport &	1	Lot	1			
Tongi Substation	- A	1				
2N3.3 DFDR complete for all 230kV & 132kV bays for existing Tongi	1	Lot				
Fiber Optic Multiplexer Equipment for Teleprotection and Communication		L				
201 Fibre Optic Multipexer Equipment for communication & protection	1	Lot				
2O2 Hot line telephone system including phone sets, connection cords etc.	1	Lot				
Underground opticale fiber cable with Terminal box.		-				
203 Underground Fibre Optic cable(48 cores)	1	Lot		1	1	1
			•			

	Outdoor termination box, indoor MDF & pigtail cables	1	Lot					1
	ation with existing SCADA, NLDC system					-		-
	Integration with existing SCADA/NLDC system.	1	Lot			-		
	atory Spares, tools & test equipment							_
	230 kV GIS Set of gas filling equipment and 3 bottles of 48kg of SF6	4				-		
,	Arcing contact of CB	1	nos.					
	Moving contact of CB	2	nos.					
	Fixed contact of CB	2	nos. nos.					
	Moving contact of DS & ES	2	nos.					
	Fixed contact of DS & ES	2	nos.					
,	Blast nozzle	2	nos.					
/	CB Closing coil	6	nos.					
,	CB Tripping coil	6	nos.					
	Motor for CB operating mechanism	1	nos.					
	Dashpot for CB operating mechanism	2	nos.					
	Motor for DS & ES drive	2	nos.					1
,	Supporting insulator	2	nos.					
xiv)	Supporting insulator with barrier	2	nos.					
	Indicating lamps (20% of total quantities installed)	1	nos.			1		1
	Indicating lamp covers (10% of total quantities installed)	1	nos.		1			
,	Set of gaskets (10% of total quantities installed)	1	nos.					
	Heater	2	nos.					
,	Humidity stat and thermostat	2	nos.					
,	Gas pressure monitor	2	nos.					
,	Gas pressure switch	2	nos.					
,	Gas pressure gauge	2	nos.					
,	Gas pressure relief device	2	nos.					
xxiv)	Gas sniffer	1	nos.					
	Gas hygrometer	1	nos.					
	132 kV GIS							
,	Arcing contact of CB	2	nos.					
,	Moving contact of CB	2	nos.					
	Fixed contact of CB	2	nos.					
	Moving contact of DS & ES	2	nos.					
/	Fixed contact of DS & ES	2	nos.					
,	Blast nozzle	2	nos.					
	CB Closing coil	6	nos.					
	CB Tripping coil	6	nos.					
,	Motor for CB operating mechanism	1	nos.					
,	Dashpot for CB operating mechanism	2	nos.					
/	Motor for DS & ES drive	2	nos.					
,	Supporting insulator	2	nos.		-			
	Supporting insulator with barrier	2	nos.		-			
,	Indicating lamps (20% of total quantities installed)	1	nos.					
	Indicating lamp covers (10% of total quantities installed)	1	nos.			+		+
,	Set of gaskets (10% of total quantities installed)		nos.			+		+
'	Heater	2	nos.			+		+
'	Humidity stat and thermostat	2	nos.			-		+
,	Gas pressure monitor Gas pressure switch	2	nos.			+		+
,	•	2	nos.			+		+
	Gas pressure gauge Gas pressure relief device	2	nos. nos.					+
,		2	1105.					+
	Auto Transformer & Switchgear Transformer 230 kV bushings (For 300MVA Transformer)	1	no.			-		+
	Ttransformer 138 kV bushings (For 300MVA Transformer)	2	nos.					+
,	33 kV bushing	2	nos.					+
,	Neutral bushing	2	nos.			1		+
,	Winding temperature indicating device	2	nos.			-		+
	Set of gaskets (10% of total quantities installed)	1	nos.			-		+
	Silica gel (100% of total quantities installed)	1	nos.			-		+
	Set of special tools, gauges and spanners	1	set					+
	Transformer oil treatment plant, 6000 Liters per hour	1	set					+
/		3	nos.			+		+
	TOOKY Ourge allester							+
x)	120 kV Surge Arrester	2	noe					1
x) xi)	120 kV Surge Arrester 245kV, Cable Sealing End (for XLPE, 2000sgmm cu cable) incld, necessary all	3	nos.					
x) xi)	120 kV Surge Arrester 245kV, Cable Sealing End (for XLPE, 2000sqmm cu cable) incld. necessary all accessories	3 2	nos. sets					

2Q4	Protection					
	Line distance relay with complete protection elements	1	set			
ii)	Transformer differential relay with complete REF function	1	set			
iii)	overcurrent and earth fault relay	1	set			
iv)	Tripping relay (electrical reset)	3	nos.			
v)	Bay control unit	1	set			
vi)	Trip Circuit Supervision relay, 3phase	1	set			
vii)	Relay test block & plug	3	sets			
viii)	Bulbs for annunciator	10	nos.			
2Q5	Test Equipment					
i)	SF6 Gas Handling Equipment including storage tank	1	set			
ii)	SF6 Gas leak Detector	1	set			
iv)	Partial Discharge monitoring Device for GIS	1	set			
v)	Contact resistance measurement test set (suitable for measurement down to 1 μ ohm at 200A d.c.)	1	set			
vi)	5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV)	1	set			
vii)	Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm)	1	set			
viii)	Clip-on mA meter (for spill current)	1	set			
ix)	Portable Earthing lead including glass fiber stick	1	set			
x)	AVO Meter, digital	1	set			
Total	Price for Shyampur 230/132kV GIS Substation					
Total	Schedule B2 (carried to Schedule B5 Grand Summary)					

¹ Specifiv currency. Create and use as many column for Unit Price and total Price as there are currencies.

Note: EXW price are required to be quoted excluding VAT, VAT on EXW shall be quoted in separate column in Bangladesh Taka. VAT on EXW is included in the Contract Price and shall be paid by the Contractor which

shall be reimbursed by the Employer to the contractor at actual basis

but not more than the quoted amount upon submission of relevant document.

Name of Bidder

Signature of Bidder

Schedule_B3 - Design Service

Schedule B3. 1: Dhamrai 132/33 kV GIS Substation

Item	Description	Qty	Unit	Llni	t Price 1	Tota	I Price 1
nom	Description	Qty	Onit	Foreign	Local	Foreign	
				Curreny	Curreny	Currenv	Local Curreny
						Portion	Portion
		(1)		Portion (2)	Portion (3)	(1) x (3)	(1) x (2)
4221-1/	Outdoor Type Gas Insulated Switchgear(GIS).	(1)		(2)	(3)	(1) ^ (3)	(1) (2)
	132kV Overhead line circuit bay,1250A						
	GIS for 132kV Overhead line circuit bay		Cata				
/	- ,	2	Sets				_
	_GIS bus duct	2	Sets				
	_Air Insulated bushing	2	Sets				
1A2	132kV Transformer circuit bay,1250A						
i)	_GIS for 132kV Transformer circuit bay	2	Sets				
ii)	_GIS bus duct	2	Sets				
iii)	_Air Insulated bushing	2	Sets				
1A3	132kV Bus tie circuit bay,3000A	1	Set				
	132kV Main busbar(double busbar) ,3000A, with VT & ES	1	Lot				
	HV GIS Test Bushing	1	Set				
	Air Insulated Switchgear(AIS) and Connection:						
	Vacuum Circuit breaker(VCB), live tank, gang operating , 2000A	2	Sets				
	Disconnector, single verticle break, 2000A, gantry mounted	7	Sets				
	Single phase current transformer, post type,3-core	6	Nos.				
	Single phase voltage transformer, post type, 2-core	12	Nos.	1	1		
	Single phase, post type, metal oxide surge arrester, 30kV	12	Nos.				
1B6	Flexible Conductor, clamps & connectors for busbar, Jackbus, Jumper &						
L	equipment Connection		<u> </u>				
	_Flexible Conductor for jackbus, jumper, equipment connections	1	Lot		1		
	_Flexible Conductor for main bus	1	Lot				
	_Clamps & Connectors	1	Lot				
1B.7	Insulator & Fittings						
	_Insulator	1	Lot		1		
	Fittings	1	Lot				
	Steel structures & cable tray						
	_Gantry Column including nut&bolts	1	Lot				
	_Gantry beam including nut&bolts	1	Lot				
	Ganny beam including nutabolis Equipment support structures including nut&bolts		-				
		1	Lot				
	_Cable tray including fitting, fixing accessories	1	Lot				
	Transformer & Aux. Transformer						
	132/33kV, 50/75(ONAN/ONAF) MVA,, three phase power transformer	2	Sets				
1C2	33/.415kV, 200kVA, three phase auxilliary transformer	2	Sets				
Contro	ol, Protection, SAS & Metering						
132kV	' Circuits						
1D1	Control, Protection, metering and SAS for 132kV overhead line bays	2	Sets				
1D2	Control, Protection, metering and SAS for 132kV Transformer bays	2	Sets				
	Control, Protection, metering and SAS for 132kV Bus-tie bay	1	Set				
-	Busbar protection system for complete 132kV bus	1	Lot				
	Tarrif metering for two line bays and two transformer bays	1	Lot				
33kV C			LOU				
	Control, Protection, metering and SAS for 33kV side of Transformer bays	2	ooto				
ID6	Control, Protection, metering and SAS for SSKV side of Transformer bays	2	sets				
1D7	Tariff metering for two Transformer bays	1	Lot	+			
		1	LOI				
Surge	Arrester, Conductor, Steel Structure, Insulator & Hardware & Fittings:	10		+			
1E1	Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III,	12	nos.		1		
450	gapless metaloxide Flexible Conductor, clamps & connectors for Jackbus, Jumper &			-	1		
162			1		1		
:\	equipment Connection Flexible Conductor for jackbus, jumper, equipment connections	1	Lot	1	-		
/			Lot		+		
	_Clamps & Connectors	1	Lot		+		
	Insulator & Fittings						
,	_Insulator	1	Lot	1			
	_Fittings	1	Lot		1		
1E4	Steel structures & cable tray				1		
1				1			
		1	Lot				
i)	_Gantry Column including nut&bolts		1 1 4		1		
ii)	_Gantry beam including nut&bolts	1	Lot				1
ii)		1 1	Lot				
ii) iii)	_Gantry beam including nut&bolts						
ii) iii) iv)	Gantry beam_including nut&bolts _Equipment support structures_including nut&bolts	1	Lot				
ii) iii) i∨) Multic	Gantry beam including nut&bolts Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories ore Cables	1	Lot				
ii) iii) i∨) Multic	Gantry beam including nut&bolts Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories ore Cables Multicore, XLPE, LV Power & Control Cable for control, protection, SAS,	1	Lot				
ii) iii) iv) <u>Multic</u> 1F1	Gantry beam including nut&bolts Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories ore Cables Multicore, XLPE, LV Power & Control Cable for control, protection, SAS, metering & power circuits	1	Lot Lot				
ii) iii) iv) <u>Multice</u> 1F1 i)	Gantry beam including nut&bolts Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories ore Cables Multicore, XLPE, LV Power & Control Cable for control, protection, SAS, metering & power circuits _LV Control Cable	1 1 1	Lot Lot Lot				
ii) iii) iv) <u>Multice</u> 1F1 i) ii)	Gantry beam including nut&bolts Equipment support structures including nut&bolts Cable tray including fitting, fixing accessories ore Cables Multicore, XLPE, LV Power & Control Cable for control, protection, SAS, metering & power circuits _LV Control Cable _LV Power Cable	1	Lot Lot				
ii) iii) iv) <u>Multic</u> 1F1 i) ii) <u>Earthi</u>	Gantry beam including nut&bolts _Equipment support structures including nut&bolts _Cable tray including fitting, fixing accessories ore Cables Multicore, XLPE, LV Power & Control Cable for control, protection, SAS, metering & power circuits _LV Control Cable _LV Power Cable _LV Power Cable	1 1 1	Lot Lot Lot				
ii) iii) iv) <u>Multice</u> 1F1 i) ii) <u>Earthii</u> 1G1	Gantry beam including nut&bolts _Equipment support structures including nut&bolts _Cable tray including fitting, fixing accessories ore Cables Multicore, XLPE, LV Power & Control Cable for control, protection, SAS, metering & power circuits _LV Control Cable _LV Power Cable	1 1 1 1	Lot Lot Lot Lot				
ii) iii) iv) <u>Multicc</u> 1F1 i) ii) <u>Earthii</u> 1G1 i)	Gantry beam including nut&bolts _Equipment support structures including nut&bolts _Cable tray including fitting, fixing accessories ore Cables Multicore, XLPE, LV Power & Control Cable for control, protection, SAS, metering & power circuits _LV Control Cable _LV Power Cable _LV Power Cable	1 1 1	Lot Lot Lot				

Item	Description	Qty	Unit		Price ¹		Price ¹
				Foreign Curreny	Local Curreny	Foreign Curreny	Local Curre
				Portion	Portion	Portion	Portion
		(1)		(2)	(3)	(1) x (3)	(1) x (2)
	ies, Chargers & DC Distribution						
	Complete 110V Battery Bank with chargers and DC Distribution Board						
	_Battery Banks two sets _Charger two sets	2	Sets Sets				
 iii)		1	Set				
	_110V/48V DC DC Converter,1kVA	2	Sets				
	48V DC Disatribution Panel	1	Set				
	_UPS system for SAS panels, 3kVA	2	sets				
	Distribution						
111	Complete LVAC Distribution System with necessary DB, MCB, Meters	1	Lot				
410	etc Tariff metering for two station auxilliary Transformer	1	Lot				
112	Outdoor weatherproof 3-phase,4 wire, 125A Socket outlet and plug		Nos				
	Vorks, Building and Foundation	1	Lot				
	Complete Land development with carried earthfilling	40500	Cubic				
			Meter				
	Complete outdoor civil works						
i)		1	Lot				
ii)		1	Lot				
iii)		1	Lot				
iv)		1	Lot				
v)		1	Lot				
vi)	_Blast wall	1	Lot				
vii)	- , ,	1	Lot				
viii)	_Substation Main gate	1	Lot				
ix)	_Barbed Wire Fencing	1	Lot				
x)	_Approach raod	1	Lot				
xi)		1	Lot				
xii)	Surface drain	1	Lot				
xiii)		1	Lot				
xiv)		1	Lot				
xv)		1	Lot				
xvi)		1	Lot				
xvii)		1	Lot				
×vii)	water pipe line etc.	'	LOU				
xviii)	_Gurd house, sentry post, car port	1	Lot				
	Complete civil works for two storied control building						
i)	-	1	Lot				
ii)		1	Lot				
iii) 1 14	_All finish works Complete civil works for three storied dormitory building	1	Lot				
	Foundation works (six storied)	1	Lot				
	Super structures	1	Lot				
	All finish works	1	Lot				
1K1	Building Lighting, Small Power, Air Conditioning & Ventilation						
i)	_BuildingSmall power	1	Lot				
	_Building Lighting & emergency DC lighting	1	Lot				
	_Building airconditioning & ventilation system	1	Lot				
	Outdoor switchyard Lighting, Small Power	4	1 64				
	_OutdoorSmall power Outdoor Lighting	1	Lot Lot				
	<u> Optic Multiplexer Equipment for Teleprotection and Communication </u>		LOI				
	Fibre Optic Multiplexer Equipment for communication & protection	1	Lot				
	Hot line telephone system including phone sets, connection cords etc.	1	Lot				
Jnder	ground opticale fiber cable with Terminal box.						
1L.2.1	Underground Fibre Optic cable(24 cores)	1	Lot				
	Outdoor termination box, indoor MDF & pigtail cables	1	Lot				
	ation with existing SCADA, NLDC system						
	Integration with existing SCADA/NLDC system.	1	Lot				
	atory Spares, tools & test equipment						
	132 kV GIS Arcing contact of CB	2	000				
,			nos.				
	Moving contact of CB	2	nos.				
,	Fixed contact of CB	2	nos.				
iv)	Moving contact of DS & ES	2	nos.				
V)	Fixed contact of DS & ES	2	nos.				•
vi)	Blast nozzle	2	nos.				
	CB Closing coil	6	nos.				
,	CB Tripping coil	6	nos.				
,							1
	Motor for CB operating mechanism	1	nos.	1	1		1

Earoign Logal Earoign	Item	Description	Qty	Unit	Unit	Price ¹		Price 1
Jump Currently built on the set of th					Ű		Foreign	Local Curreny
Interpretation(1)(2)(2)(1					-			
a) Solver for CS expension mechanism 2 ros b) Solver for SE Solve 2 ros b) Solver for Section with birs 2 ros b) Solver for Section with birs 1 ros b) Mark of the method maximum installion 1 ros b) Solver for Section maximum installion 1 ros b) Solver for Section maximum installion 2 ros b) Solver for Section maximum installion 2 ros c) Solver Section maximum installion 1 ros c) Solver Section maximum installion 1 ros </td <td></td> <td></td> <td>(1)</td> <td></td> <td></td> <td></td> <td></td> <td>$(1) \times (2)$</td>			(1)					$(1) \times (2)$
Bioporting insulator 2 road. Image: Provide insulator Single Singer Sing	x)	Dashpot for CB operating mechanism		nos.	(-/	(0)	(1) x (0)	(1) X (2)
Bit Spectrag instant with harmer 2 dots. 0 Not indicating unerconvert (Dirk of total quantities installed) 1 dots. 0 On closing uner convert (Dirk of total quantities installed) 1 dots. 0 Star of grader (Dirk of total quantities installed) 2 dots. 0 Will Hunding year and termolosis 2 dots. 0 0 Star of grader construct 2 dots. 0 0 0 Star of grader construct 2 dots. 0 0 0 0 Star of grader construct 2 dots. 0 <t< td=""><td>xi)</td><td>Motor for DS & ES drive</td><td>2</td><td>nos.</td><td></td><td></td><td></td><td></td></t<>	xi)	Motor for DS & ES drive	2	nos.				
Bit Spectrag instant with harmer 2 dots. 0 Not indicating unerconvert (Dirk of total quantities installed) 1 dots. 0 On closing uner convert (Dirk of total quantities installed) 1 dots. 0 Star of grader (Dirk of total quantities installed) 2 dots. 0 Will Hunding year and termolosis 2 dots. 0 0 Star of grader construct 2 dots. 0 0 0 Star of grader construct 2 dots. 0 0 0 0 Star of grader construct 2 dots. 0 <t< td=""><td>, xii)</td><td>Supporting insulator</td><td>2</td><td>nos.</td><td></td><td></td><td></td><td></td></t<>	, xii)	Supporting insulator	2	nos.				
why blocking turns (DM) of total quantities installed) 1 nms. while Gard guardes (UM) of total quantities installed) 1 nms. while Mark guardes installed) 1 nms. while Mark guardes installed) 2 nms. while Mark guardes installed) 2 nms. while Mark guardes installed) 2 nms. (Gard presents which. 2 nms. (Gard presents which. 2 nms. (Gard presents which. 2 nms. (Gard presents): which gard not mark the matter of the first francement of first first francement of f								
and 1 ms. 1 1 ms. 1 ms. 1 ms. 1 ms. 1 ms. 1 1 ms. 1 ms. 1 ms. 1 ms. 1 1 ms. 1 ms. 1 ms. 1 1 1 1 ms. 1 ms. 1 ms. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
Normal Plane 1 not. 1 not. 1 not. 1 not. 1 not. 1 1 not. 1 <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>								
Noil Junitary star and hemonata 2 not. Image and hemonata Noil Amage and hemonata 2 not. Image and hemonata Noil Amage and hemonata 2 not. Image and hemonata Noil Amage and hemonata 2 not. Image and hemonata Noil Amage and hemonata 2 not. Image and hemonata Noil Amage and hemonata 2 not. Image and hemonata Noil Tanashame and hemonata 2 not. Image and hemonata Noil Tanashame and hemonata 2 not. Image and hemonata Noil Tanashame and hemonata 1 not. Image and hemonata Noil Tanashame and hemonata 1 not. Image and hemonata Noil Start and hemonata 1 not. Image and hemonata Noil Start and hemonata 1 not. Image and hemonata Noil Start and hemonata 1 not. Image and hemonata Noil Start and hemonata 1 not. Image and hemonata Noil Start and hemonata 1 not. Image and hemonata Noil Start and hemonata 1 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
xml 1 ed. 1 ed. 1 xml Gas pressure switch 2 not. 1 1 10 Transformer Siz AV buttings (For TANA Transformer) 1 not. 1 1 10 Transformer Gild TSU AV buttings (For TANA Transformer) 1 not. 1	-							
abil Gas pressure monitor 2 not. 1 x00 Gas pressure solich 2 not. 1 x00 Gas pressure solich (not of all supplied 1 not. 1 x01 Sites of 10 di soliches natise() 1 not. 1 1 x01 Sites of 10 di soliches natise() 1 not. 1 1 x01 Sites of 10 di soliches natise() 1 not. 1 1 x01 Sites of 10 di soliches natise() 1 not. 1 1 x01 Sites of 10 di soliches pressure natise() 1 not. 1 1 x01 Sites of 10 di soliches pressure natise() 1 not. 1 1 1 1 1 1 1 1 1 1 <	,					-		
a) Composition space 2 not. 1 (See pressure sended device) 2 nots. 1 (See pressure relief device) 2 nots. 1 (See pressure relief device) 2 nots. 1 (See pressure relief device) 1 not. 1 (See pressure sector) 1 not. 1 (See pressure (Soe sector) 2 not. 1 (See pressure pressure pressure sector) 2 not. 1 (See pressure pressure pressure pressure sector) 2 not. 1 (See pressure pressure pressure pressure pressure sector) 2 not. 1 (See pressure pressure pressure pressure pressure sector) 1 1 1								
init) init) init) init) init) init) init) init) init) init) init) init) init) init) init) init) init) init) init) init)	,							
112: 12:32: M Power Transformer Image of the SMAN Transformer) 1 Image of the SMAN Transformer (The SMAN Transformer) 1 Image of the SMAN Transformer) 1 Image of the SMAN Transformer (The SMAN Transformer) 1 Image of the SMAN Transformer (The SMAN Transformer) 1 Image of the SMAN Transformer (The SMAN Transformer) 1 Image of the SMAN Transformer (The SMAN Transformer) 1 Image of the SMAN Transformer (The SMAN Transformer) 1 Image of the SMAN Transformer (The SMAN Transformer) 1 Image of the SMAN Transformer (The S	xxi)	Gas pressure gauge	2	nos.				
0) Transformer 328 Vb bashings (For 75MVA Transformer) 1 no. 0 10) Transformer 334 Vb bashings (For 75MVA Transformer) 2 nos. 0 10) Munding temperature indicating device 2 nos. 0 10) Munding temperature indicating device 2 nos. 0 10) Spare Transformer of at 15% or total quartifies installed) 1 nos. 0 10) State get (Nos of total quartifies installed) 1 nos. 0 11) State get (Nos of total quartifies installed) 1 nos. 0 11) State get (Nos of total quartifies installed) 1 nos. 0 0 110 State get (Nos of total quartifies installed) 1 nos. 0 </td <td>xxii)</td> <td>Gas pressure relief device</td> <td>2</td> <td>nos.</td> <td></td> <td></td> <td></td> <td></td>	xxii)	Gas pressure relief device	2	nos.				
10 Transformer 33 4V bashings (For 75M/A Transformer) 2 nos. 10 Neutral bashing 2 nos. 10 Neutral bashing 2 nos. 10 Windrig repetitue indicating device 2 nos. 10 Safe of gasekee (from 6 transformer) 1 nos. 10 Safe of gasekee (from 6 transformer) 1 nos. 10 Safe of gasekee (from 6 transformer) 1 nos. 11 Safe of gasekee (from 6 transformer) 1 nos. 12 Intrasformer of transformer, ingite phase 3-core, 2 nos.								
iii) Navard Lussing 2 nos. Image: constraint of the second	i)	Transformer 132 kV bushings (For 75MVA Transformer)	1	no.				
iv) Winding temperature indicating device 2 nos. Image: second s	ii)	Ttransformer 33 kV bushings (For 75MVA Transformer)	2	nos.				
v) Sear transformer of 1 5% of total of applied 1 Lot vi) Set of gaskets (10% of total quantities installed) 1 nos. viii) Set of gaskets (10% of total quantities installed) 1 nos. viii) Set of special tools, gauges and spanners 1 set viii) Tons of the application tools, gauges and spanners 3 nos. viii) Tons of the application tools, gauges and spanners 3 nos. viii) Tons of the application tools, gauges and spanners 3 nos. 10. Current Transformer, single phase 3-core, 2 nos. viii) Choing coils for CB 2 nos. 10. Inde distinct relay with complete protection elements 1 set 11. Set 11. Set 12. nos. <	iii)	Neutral bushing	2	nos.				
v) Sear transformer of 1 5% of total of applied 1 Lot vi) Set of gaskets (10% of total quantities installed) 1 nos. viii) Set of gaskets (10% of total quantities installed) 1 nos. viii) Set of special tools, gauges and spanners 1 set viii) Tons of the application tools, gauges and spanners 3 nos. viii) Tons of the application tools, gauges and spanners 3 nos. viii) Tons of the application tools, gauges and spanners 3 nos. 10. Current Transformer, single phase 3-core, 2 nos. viii) Choing coils for CB 2 nos. 10. Inde distinct relay with complete protection elements 1 set 11. Set 11. Set 12. nos. <	iv)	Winding temperature indicating device	2	nos.		1		
will Sind gradette (10% of total quantities installed) 1 nos. 1 will Sind gradette (10% of total quantities installed) 1 nos. 1 will Sind gradette (10% of total quantities installed) 1 set 1 will Sind gradette (10% of total quantities installed) 1 set 1 will Sind gradette (10% of total quantities installed) 1 set 1 will Sind gradette (10% of total quantities installed) 1 set 1 will Sind gradette (10% of total quantities installed) 1 set 1 will Sind gradette (10% of total quantities installed) 1 set 1 will Sind gradette (10% of total quantities installed) 1 set 1 10 Classing calls for CB 2 nos. 1 set 1 10 Classing calls for CB 2 nos. 1 set 1 <td></td> <td></td> <td>1</td> <td>Lot</td> <td></td> <td>1</td> <td></td> <td></td>			1	Lot		1		
vi) Sitiscing of (100% of total quantities installed) 1 not. viii) Set of special tools, gauges and spanners 1 set viii) Set of special tools, gauges and spanners 1 set viii) Set of special tools, gauges and spanners 1 set viii) Set of special tools, gauges and spanners 3 nos. viii) Set of special tools, gauges and spanners 3 nos.	,							
viii) Set of special tools, gauges and spanners 1 set								
130 Transformer oil treatment plant, 6000 Liters per hour 1 581 581 131 AV Surge Arrester 3 nos. 581 10) Current Transformer, single phase 3-core, 2 nos. 581 10) Closing coils for CB 2 nos. 581 11) Transformer, single phase 3-core, 2 nos. 581 110) Closing coils for CB 2 nos. 581 111 Transformer, single phase 3-core, 1 581 581 111 Transformer, single phase 3-core, 1 581 581 111 Get 3 and 3 581 581 581 111 Set 3								
No. 120 tv Surge Ansate 3 nos. 1133 33 vs SWITCHGEAR								
1N3 33 kV SWITCHGEAR 1 1 1) Current Transformer, single phase 3-core, 2 nos. 1 10) Closing colls for CB 2 nos. 1 10) Strip Arrest, single phase 3-core, 2 nos. 1 10) Motor for 33 kV circuit breaker operating mechanism 1 no. 1 10) Strip Arrest, single phase 2 nos. 1 11M4 Protection 1 set 1 10) Inte distance relay with complete protection elements 1 set 1 110) Overcurrent and earth fault relay 1 set 1 1 110) overcurrent and earth fault relay 1 set 1 1 1 110) overcurrent and earth fault relay 1 set 1	ix)	· · ·						
i) Current Transformer, single phase 3-core, 2 nos.	x)	120 kV Surge Arrester	3	nos.				
ii) Closing coils for CB 2 nos.	1N.3	33 kV SWITCHGEAR						
iii) Tripping coils for CB 2 nos. 1 iv) Motor for 33 kV circuit breaker operating mechanism 1 no. 1 iv) Strige Arrester, single phase 2 nos. 1 11MA Protection 1 set 1 i) Inter distance relay with complete protection elements 1 set 1 ii) overcurrent and earth fault relay 1 set 1 iii) overcurrent and earth fault relay 1 set 1 ivi) Tripping relay (electrical reset) 3 nos. 1 vii) Bay control unit 1 set 1 1 viii) RelayTest block & plug 1 set 1 1 viii) RelayTest block & plug 1 set 1 1 viii) RelayTest block & plug 1 set 1 1 set 1 1 1 1 1 1 1 1 set 1 1 1 1 1 1 1 1 1	i)	Current Transformer, single phase 3-core,	2	nos.				
iv) Motor for 33 kV circuit breaker operating mechanism 1 no. Image Arrester, single phase 2 nos. Image Arrester, single phase 1 Image Arrester, single phase 1 <td>ii)</td> <td>Closing coils for CB</td> <td>2</td> <td>nos.</td> <td></td> <td></td> <td></td> <td></td>	ii)	Closing coils for CB	2	nos.				
visurge Arrester, single phase 2 nos. 1NA Protection	iii)	Tripping coils for CB	2	nos.				
visurge Arrester, single phase 2 nos. 1NA Protection			1	no.				
1NA Protection 1 set 1) Line distance relay with complete REF function 1 set iii) runs/ormer differential relay with complete REF function 1 set iii) overcurrent and earth fault relay 1 set iv) Tripping relay (electrical reset) 3 nos. v) Bay control unit 1 set vi) Tripping relay (electrical reset) 3 nos. vii) Tripping relay (electrical reset) 1 set vii) Relay Test block & plug 1 set viii) Bub for anunciator 10 nos. 1N5 Test Equipment 1 set viii) SFG Gas reservoir 1 set 1 viii) SFG Gas lead Detector 1 set 1 vii) SFG Gas lead Detector 1 set 1 viii) Contact resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set 1 viii Earth resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set 1 viii Earth resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set 1 viiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii								
1) Line distance relay with complete protection elements 1 set ii) Transformer differential relay with complete REF function 1 set iii) overcurrent and earth fault relay 1 set ivi) Bay control unit 1 set ivi) Trip Circuit Supervision relay, 3phase 1 set vii) RelayTest block & plug 1 set viii) RelayTest block & plug 1 set viiii) SF6 Gas reservoir 1 set viii) SF6 Gas leak Detector 1 set viii) Cartac resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viiii) Skindation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viiii) Skindation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viiii) Skindation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii			-	1100.				
ii) Transformer differential relay with complete REF function 1 set iii) Overcurrent and earth fault relay 1 set iv) Tripping relay (electrical reset) 3 nos. iv) Bay control unit 1 set			1	set				
iii) overcurrent and earth fault relay 1 set iv) Tripping relay (electrical reset) 3 nos. v) Bay control unit 1 set vi) Trip Circuit Supervision relay, 3phase 1 set vii) RelayTest block & plug 1 set viii) Bubls for annunciator 10 nos. 1NS Test Equipment 1 set i) SF6 Gas reservoir 1 set ii) SF6 Gas leak Detector 1 set vii) Contact resistance measurement test set (suitable for measurement down to 1 µ 1 set vii) Contact resistance test set (range 0.5 - 1.0 - 2.5 - 5 kV) 1 set vii) Carth resistance test set (range 0.5 - 1.0 - 2.5 - 5 kV) 1 set viii) Carth resistance test set (range 10-100-000 ohm: min scale division 0.01 ohm) 1 set viii) Carth resistance test set (range 10-100-0100 ohm: min scale division 0.01 ohm) 1 set viii) Carth resistance test set (range 0.5 - 1.0 - 2.5 - 5 kV) 1 set viii) Carth resista								
iv) Tripping relay (electrical reset) 3 nos. iv) Bay control unit 1 set ivi) Trip Circuit Supervision relay, 3phase 1 set vii) Relay Fest block & plug 1 set viii) Builts for annunciator 10 nos. 1N5 Test Equipment 1 set 1) SF6 Gas reservoir 1 set vii) SF6 Gas reservoir 1 set vi) SF6 Gas reservoir 1 set vi) SF6 Gas reservoir 1 set vi) Sch Gas leak Detector 1 set vi) Contact resistance measurement test set (suitable for measurement down to 1 µ 1 set vii) Contact resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) Earth resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) Earth resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) Earth resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
v) Bay control unit 1 set		-	1	set				
wi) Trip Circuit Supervision relay, 3phase 1 set wiii) RelayTest block & plug 1 set wiii) Bulbs for annuciator 10 nos. 1NS Test Equipment 1 set i) SF6 Gas Handling Equipment 1 set ii) SF6 Gas reservoir 1 set iv) SF6 Gas leak Detector 1 set vi) Set Gas leak Detector 1 set vi) Contact resistance measurement test set (suitable for measurement down to 1 μ 1 set vii) Contact resistance tests et (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) Earth resistance tests et (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) Earth resistance tests et (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) Earth resistance test et (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) Earth resistance test et (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) Clip-on mA meter (for spill current) 1 set 1 viiii) Clip-on mA meter (for spill current)				nos.				
vii) RelayTest block & plug 1 set viii) Bulbs for annuclator 10 nos. 1NS Test Equipment i) SF6 Gas Handling Equipment 1 set ii) SF6 Gas reak Detector 1 set vii) Dartial Discharge monitoring Device for GIS 1 set vii) Contact resistance measurement test set (suitable for measurement down to 1 µ 1 set viii) Contact resistance test set (range 0.5 – 1.0 - 2.5 – 5 kV) 1 set viii) Earth resistance test set (range 0.5 – 1.0 - 2.5 – 5 kV) 1 set viii) Earth resistance test set (range 0.5 – 1.0 - 2.5 – 5 kV) 1 set <	v)	Bay control unit	1	set				
vii) RelayTest block & plug 1 set viii) Bulbs for annuclator 10 nos. 1NS Test Equipment i) SF6 Gas Handling Equipment 1 set ii) SF6 Gas reak Detector 1 set vii) Dartial Discharge monitoring Device for GIS 1 set vii) Contact resistance measurement test set (suitable for measurement down to 1 µ 1 set viii) Contact resistance test set (range 0.5 – 1.0 - 2.5 – 5 kV) 1 set viii) Earth resistance test set (range 0.5 – 1.0 - 2.5 – 5 kV) 1 set viii) Earth resistance test set (range 0.5 – 1.0 - 2.5 – 5 kV) 1 set <	vi)	Trip Circuit Supervision relay, 3phase	1	set				
viii) Bulbs for annunciator 10 nos. 1N5 Test Equipment			1	set				
i) SF6 Gas Handling Equipment 1 set ii) SF6 Gas reservoir 1 set iv) SF6 Gas leak Detector 1 set vi) Partial Discharge monitoring Device for GIS 1 set vii) Contact resistance measurement test set (suitable for measurement down to 1 µ 1 set viii) Contact resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viiii) Earth resistance test set (range 0.10-1000 ohm: min scale division 0.01 ohm) 1 set viiii) Earth resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viiii) Earth resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) Earth resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set x) Portable Earthing lead including glass fiber stick 1 set x) Portable Earthing lead including glass fiber stick 1 set	viii)	Bulbs for annunciator		nos.				
i) SF6 Gas Handling Equipment 1 set ii) SF6 Gas reservoir 1 set iv) SF6 Gas leak Detector 1 set vi) Partial Discharge monitoring Device for GIS 1 set vii) Contact resistance measurement test set (suitable for measurement down to 1 µ 1 set viii) Contact resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viiii) Earth resistance test set (range 0.10-1000 ohm: min scale division 0.01 ohm) 1 set viiii) Earth resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viiii) Earth resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) Earth resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set x) Portable Earthing lead including glass fiber stick 1 set x) Portable Earthing lead including glass fiber stick 1 set	1N5	Test Equipment						
ii) SF6 Gas reservoir 1 set		· ·	1	set				
iv) SF6 Gas leak Detector 1 set	,							
v) Partial Discharge monitoring Device for GIS 1 set 1 vi) Contact resistance measurement test set (suitable for measurement down to 1 µ 1 set 1 viii) 5 kV insulation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set 1 viiii) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) 1 set 1 ix) Clip-on mA meter (for spill current) 1 set 1 set 1 ix) Clip-on mA meter (for spill current) 1 set	,							
vi) Contact resistance measurement test set (suitable for measurement down to 1 µ 1 set vii) 5 kV insulation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viii) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) 1 set ix) Clip-on mA meter (for spill current) 1 set	,							
iii) 5 kV insulation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set viiii) 5 kV insulation resistance test set (range 10-1000 ohm: min scale division 0.01 ohm) 1 set ix) Clip-on mA meter (for spill current) 1 set x) Portable Earthing lead including glass fiber stick 1 set xi) AVO Meter, digital 1 set 1N.5 Test Equipment ii) SF6 Gas Handling Equipment incld. Storage tank 1 set <								
viii) Earth resistance test set (range 10-100-000 ohm: min scale division 0.01 ohm) 1 set ix) Clip-on mA meter (for spill current) 1 set x) Portable Earthing lead including glass fiber stick 1 set xi) AVO Meter, digital 1 set ii) SF6 Gas Handling Equipment incld. Storage tank 1 set iii) SF6 Gas leak Detector 1 set								
ix Clip-on mA meter (for spill current) 1 set			1	set				
x) Portable Earthing lead including glass fiber stick 1 set	viii)	Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm)	1	set				
xi) AVO Meter, digital 1 set	,			set				
1N.5 Test Equipment Image: Set	,		1	set				
i) SF6 Gas Handling Equipment incld. Storage tank 1 set ii) SF6 Gas leak Detector 1 set iii) Partial Discharge monitoring Device for GIS 1 set iv) Contact resistance measurement test set (suitable for measurement down to 1 µ 1 set vi) Contact resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set vi) Earth resistance test set (range 10-100-000 ohm: min scale division 0.01 ohm) 1 set vii) Clip-on mA meter (for spill current) 1 set viii) AVO Meter, digital 1 set Total Price for Dhamrai 132/33kV GIS Substation carried to Schedule -B5: Grand Summary) schedule B1. 2: Shyampur 230/132 kV GIS Substation schedule B1. 2: Shyampur 230/132 kV GIS Substation </td <td></td> <td></td> <td>1</td> <td>set</td> <td></td> <td></td> <td></td> <td></td>			1	set				
ii) SF6 Gas leak Detector 1 set iii) Partial Discharge monitoring Device for GIS 1 set iv) Contact resistance measurement test set (suitable for measurement down to 1 µ 1 set v) 5 kV insulation resistance test set (range 0.5 -1.0 - 2.5 - 5 kV) 1 set vi) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) 1 set vii) Clip-on mA meter (for spill current) 1 set viii) AVO Meter, digital 1 set carried to Schedule -B5: Grand Summary) 1 set Schedule B1. 2: Shyampur 230/132 kV GIS Substation 1 set			<u> </u>					
iii) Partial Discharge monitoring Device for GIS 1 set	,							
iv) Contact resistance measurement test set (suitable for measurement down to 1 µ 1 set v) 5 kV insulation resistance test set (range 0.5 – 1.0 - 2.5 - 5 kV) 1 set vi) Earth resistance test set (range 10-100-000 ohm: min scale division 0.01 ohm) 1 set vii) Clip-on mA meter (for spill current) 1 set viii) AVO Meter, digital 1 set Total Price for Dhamrai 132/33kV GIS Substation carried to Schedule -B5: Grand Summary) Schedule B1. 2: Shyampur 230/132 kV GIS Substation	,							
v) 5 kV insulation resistance test set (range 0.5 - 1.0 - 2.5 - 5 kV) 1 set vi) Earth resistance test set (range 10-100-000 ohm: min scale division 0.01 ohm) 1 set vii) Clip-on mA meter (for spill current) 1 set viii) AVO Meter, digital 1 set Total Price for Dhamrai 132/33kV GIS Substation carried to Schedule -B5: Grand Summary) Schedule B1. 2: Shyampur 230/132 kV GIS Substation	,							
vi) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) 1 Set Set vii) Clip-on mA meter (for spill current) 1 set Set Set viii) AVO Meter, digital 1 set Set Set Set Total Price for Dhamrai 132/33kV GIS Substation Image: Schedule -B5: Grand Summary) Image: Schedule -B5: Grand Summary) Image: Schedule B1. 2: Shyampur 230/132 kV GIS Substation Image: Schedule -B5: Grand Summary) Image: Schedule -B5: Grand Summary)	,							
vii) Clip-on mA meter (for spill current) 1 set viii) AVO Meter, digital 1 set Total Price for Dhamrai 132/33kV GIS Substation	,							
vii) Clip-on mA meter (for spill current) 1 set	VI)	Laturesistance test set (range 10-100-1000 onm). min scale division 0.01 onm)	1	set				
Total Price for Dhamrai 132/33kV GIS Substation	vii)	Clip-on mA meter (for spill current)		set				
carried to Schedule -B5: Grand Summary) Schedule B1. 2: Shyampur 230/132 kV GIS Substation			1	set				
Schedule B1. 2: Shyampur 230/132 kV GIS Substation								
	carrie	to Schedule -B5: Grand Summary)						
	<u>.</u>							
	sched	ule B1. 2: Shyampur 230/132 kV GIS Substation						
		Indexe Tree Oct Insulated Order (200)				+		

Item	Description	Qty	Unit		it Price 1	Tota	Price ¹
				Foreign Curreny Portion	Local Curreny Portion	Foreign Curreny Portion	Local Curreny Portion
		(1)		(2)	(3)	(1) x (3)	(1) x (2)
	230kV Overhead line circuit bay,1600A 230kV Transformer circuit bay,1600A	4	Sets				
	GIS bay	2	Sets				
	GIS bus duct	2	Sets				
,	Air Insulated Bushing	2	Sets				
	230kV Bus tie circuit bay,2000A	1	Set				
	230kV Main busbar(double busbar) ,2000A, with VT & ES	1	Lot				
	230kV Main busbar(double busbar) ,2000A, with VT & ES	1	Lot				
	Indoor Type Gas Insulated Switchgear(GIS).						
	132kV Overhead line circuit bay,1250A 132kV Transformer circuit bay,2000A	6	Sets Sets		_		
	132kV Hanstomer circuit bay,2000A	2	Set				
	132kV Main busbar(double busbar),3000A, with VT & ES	1	Lot				
	Air Insulated Switchgear(AIS) and Connection:						
	Vacuum Circuit breaker(VCB), live tank, gang operating , 800A	2	Sets				
	Disconnector, single verticle break, 800A, gantry mounted	2	Sets				
	Single phase current transformer, post type,3-core	6	Nos.				
	Single phase, post type, metal oxide surge arrester, 30kV	6	Nos.				
	Flexible Conductor, clamps & connectors, Jumper & equipment	4	1.24				+
i) ii)	_Flexible Conductor for jumper, equipment connections _Clamps & Connectors	1	Lot Lot				
	Post Insulator	6	Nos.	-	-		
	Steel structures & cable tray		1105.	1	+		
	Equipment support structures including nut&bolts	1	Lot				
	_Cable tray including fitting, fixing accessories	1	Lot				
	Transformer & Aux. Transformer						
	230/138/33kV, 225/300(ONAN/ONAF) MVA, three phase Auto	2	Sets				
	33/0.415kV, 300kVA, three phase earthing transformer	2	Sets				
	deleted		1.1				
2D2.3	Fire Prevention & Extinguishing System of two main transformer(Nitrogen Injection type)	1	Lot				
Contro	bl, Protection, SAS & Metering						
	/ Circuits						
	Control, Protection, metering and SAS for 230kV overhead line bays	4	Sets				
	Control, Protection, metering and SAS for 230kV side of Auto	2	Sets				
	Control, Protection, metering and SAS for 230kV Bus-tie bay	1	Set				
	Busbar protection system for complete 230kV bus	1	Lot				
	Tarrif metering for four line bays and two transformer bays	1	Lot				
	/ Circuits Control, Protection, metering and SAS for 132kV overhead line bays	6	Sets				
	Control, Protection, metering and SAS for 132kV overhead line bays	2	Sets				
	Control, Protection, metering and SAS for 132kV Bus-tie bay	1	Set				
	Busbar protection system for complete 132kV bus	1	Lot				
2F5	Tarrif metering for six line bays and two transformer bays	1	Lot				
33kV (<u>Circuit</u>						
2G1	Control, Protection, metering for 33/0.4kV Auxilliary Transformers.	2	sets				
	Cables & Cable Termination, Surge Arrester, Conductor, Steel Structur	re,Insul	ator & H	ardware & F	ittings:		
	Circuits						
	230kV, XLPE 2000sqmm, Cu Power cable & termination	700					
	Power cable	720	meter				
II)	Outdoor type Cable Sealing End per phasewith required necessary accessories	12	Sets				
iii)	Indoor type Cable termination(GIS bay termination) per phasewith	18	Sets				
-	required necessary accessories						
2H2	Single phase surge arrestor, 186kV, 10kA Discharge Current, Class III,	18	nos.				
	gapless metaloxide		+	-			+
	Flexible Conductor clamps & connectors for lackbus lumper &	1	1				
	Flexible Conductor, clamps & connectors for Jackbus, Jumper & equipment Connection						
	equipment Connection	1	Lot				
2H3 i) ii)	equipment Connection _Flexible Conductor for jackbus, jumper, equipment connections _Clamps & Connectors	1 1	Lot Lot				
2H3 i) ii) 2H4	equipment Connection _Flexible Conductor for jackbus, jumper, equipment connections _Clamps & Connectors Insulator & Fittings	1	Lot				
2H3 i) ii) 2H4 i)	equipment ConnectionFlexible Conductor for jackbus, jumper, equipment connectionsClamps & Connectors Insulator & FittingsInsulator	1	Lot				
2H3 i) ii) 2H4 i) ii)	equipment ConnectionFlexible Conductor for jackbus, jumper, equipment connectionsClamps & Connectors Insulator & FittingsInsulatorFittings	1	Lot				<u> </u>
2H3 i) ii) 2H4 i) ii) 2H5	equipment ConnectionFlexible Conductor for jackbus, jumper, equipment connectionsClamps & Connectors Insulator & FittingsInsulatorFittings Steel structures & cable tray	1 1 1	Lot Lot Lot				
2H3 i) ii) 2H4 i) ii) 2H5 i)	equipment ConnectionFlexible Conductor for jackbus, jumper, equipment connectionsClamps & Connectors Insulator & FittingsInsulatorFittings Steel structures & cable trayGantry Column including nut&bolts	1 1 1 1	Lot Lot Lot Lot				
2H3 i) ii) 2H4 i) ii) 2H5 i) ii)	equipment ConnectionFlexible Conductor for jackbus, jumper, equipment connectionsClamps & Connectors Insulator & FittingsInsulatorFittings Steel structures & cable trayGantry Column including nut&boltsGantry beam including nut&bolts	1 1 1	Lot Lot Lot Lot Lot				
2H3 i) ii) 2H4 i) ii) 2H5 i) ii) iii)	equipment ConnectionFlexible Conductor for jackbus, jumper, equipment connectionsClamps & Connectors Insulator & FittingsInsulatorFittings Steel structures & cable trayGantry Column including nut&boltsGantry beam including nut&boltsEquipment support structures including nut&bolts	1 1 1 1 1 1	Lot Lot Lot Lot				
2H3 i) ii) 2H4 i) ii) 2H5 ii) iii) iii) iii)	equipment ConnectionFlexible Conductor for jackbus, jumper, equipment connectionsClamps & Connectors Insulator & FittingsInsulatorFittings Steel structures & cable trayGantry Column including nut&boltsGantry beam including nut&bolts	1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot				
2H3 i) 2H4 i) 2H5 i) 2H5 i) ii) iii) iii) iii) iii) 2H5 2H5	equipment ConnectionFlexible Conductor for jackbus, jumper, equipment connectionsClamps & Connectors Insulator & FittingsInsulatorFittings Steel structures & cable trayGantry Column including nut&boltsGantry beam including nut&boltsCable tray including fitting, fixing accessories Circuits 132kV, XLPE 1000sqmm, Cu Power cable & termination	1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot				
2H3 i) 2H4 i) 2H5 i) 2H5 i) iii) iii) iii) iii) iv) 132kV 2H6 i)	equipment ConnectionFlexible Conductor for jackbus, jumper, equipment connectionsClamps & Connectors Insulator & FittingsInsulatorFittings Steel structures & cable trayGantry Column including nut&boltsGantry beam including nut&boltsCable tray including fitting, fixing accessories Circuits 132kV, XLPE 1000sqmm, Cu Power cable & termination Power cable	1 1 1 1 1 1 1 1 1 680	Lot Lot Lot Lot Lot Lot Lot Lot meter				
2H3 i) 2H4 i) 2H5 i) 2H5 i) iii) iii) iii) iii) 2H5 iii) iii) iii) iii) iii) 2H5 iii) iii) 2H5 iii) 2H5 iii) 2H5 iii) 2H5 iii) 2H5 iii) 2H5 iii) 2H5 iii) 2H5 iii) 2H5 iii) 2H5 iii) 2H5 iii) 2H5 iii) 2H5 iii) 2H5 iii) 2H5 iii) 2H5 iii) iii) 2H5 iii] 2H5 iii] 2H5 iii] 2H5 ii] 2 2H5 ii] 2 2H5 ii] 2 2H5 ii] 2 2H5 2 2H5 i] 2 2H5 i] 2 2H5 i] 2 2H5 i] 2 2H5 i] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	equipment ConnectionFlexible Conductor for jackbus, jumper, equipment connectionsClamps & Connectors Insulator & FittingsInsulatorFittings Steel structures & cable trayGantry Column including nut&boltsGantry beam including nut&boltsCable tray including fitting, fixing accessories Circuits 132kV, XLPE 1000sqmm, Cu Power cable & termination Power cable Outdoor type Cable Sealing End per phasewith required necessary	1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot				
2H3 i) ii) 2H4 ii) 2H5 ii) iii) iii) iii) iv) 132kV 2H6 i) ii)	equipment ConnectionFlexible Conductor for jackbus, jumper, equipment connectionsClamps & Connectors Insulator & FittingsInsulatorFittings Steel structures & cable trayGantry Column including nut&boltsGantry beam including nut&boltsCable tray including fitting, fixing accessories Circuits 132kV, XLPE 1000sqmm, Cu Power cable & termination Power cable	1 1 1 1 1 1 1 1 1 680	Lot Lot Lot Lot Lot Lot Lot Lot meter				

	Description	Qty	Unit		t Price 1		Price ¹
		(1)		Foreign Curreny Portion (2)	Local Curreny Portion (3)	Foreign Curreny Portion (1) x (3)	Local Curreny Portion (1) x (2)
iv)	Outdoor type Cable Sealing End with required necessary accessories for	12	Sets	(2)	(0)		(1) X (2)
	Tr bays (per each cable)	12	Cata				
v)	Indoor type Cable termination(GIS bay termination) per phase with required necessary accessories for Tr bays (per each cable)	12	Sets				
2H7	Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III,	18	nos.				
വം	apless metaloxide Flexible Conductor, clamps & connectors for Jackbus, Jumper &						
200	equipment Connection						
i)	_Flexible Conductor for jackbus, jumper, equipment connections	1	Lot				
ii)		1	Lot				
	Insulator & Fittings	1	Lat				
i) ii)		1	Lot Lot				
,	Steel structures & cable tray		201				
i)		1	Lot				
ii)		1	Lot				
	_Equipment support structures including nut&bolts	1	Lot				
/	_Cable tray including fitting, fixing accessories	1	Lot				
	33kV, XLPE Cu Power cable, 185sqmm	150	meter				
	33kV Cable termination with required necessary accessories.	12	Nos.				
	ore Cables	L					
211	Multicore, XLPE, LV Power & Control Cable for control, protection, SAS, metering & power circuits						
i)	LV Control Cable	1	Lot				
	_LV Power Cable	1	Lot				
	ng & Lightning Protection						
	Earthing and Lightning Protection System	<u> </u>	.				
	_Earthing system for complete substation incld. GIS building _Lightning Protection System for complete substation include. GIS	1	Lot Lot				
	es, Chargers & DC Distribution	1	LOI				
	Complete 110V Battery Bank with chargers and DC Distribution Board						
i)		2	Sets				
ii)		2	Sets				
iii)	_110V DC Distribution panel	1	Set				
iv) v)		2	Sets Set				
	_UPS system for SAS panels, 3kVA	2	sets				
/	Distribution	_	0010				
	Complete LVAC Distribution System with necessary DB, MCB, Meters	1	Lot				
	Tariff metering for two station auxilliary Transformer	1	Lot				
	Outdoor weatherproof 3-phase,4 wire, 125A Socket outlet and plugs. /orks,Building and Foundation	1	Nos Lot				
	Complete Land development with carried earthfilling	24300					
			Meter				
2M2	Complete outdoor civil works						
i)	_Outdoor gantry foundation 230kV switchyard	1	Lot				
i) ii)	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard	1	Lot				
i)	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard						
i) ii)	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard _Outdoor equipment foundation 230kV switchyard	1 1 1	Lot				
i) ii) iii)	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard	1	Lot Lot				
i) ii) iii) iv)	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard _Outdoor equipment foundation 230kV switchyard	1 1 1	Lot Lot Lot				
i) ii) iii) iv) v)	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard	1 1 1 1 1	Lot Lot Lot Lot				
i) ii) iii) iv) v) v) vi)	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard _Outdoor equipment foundation 33kV switchyard	1 1 1 1 1 1	Lot Lot Lot Lot Lot				
i) ii) iii) iv) v) v) vi) vii)	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard _Outdoor equipment foundation 33kV switchyard _Transformer foundation including oilpit & carrage way	1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot				
i) ii) iii) iv) vv) vi) vii) viii)	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard _Outdoor equipment foundation 33kV switchyard _Transformer foundation including oilpit & carrage way _Blast wall	1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot				
i) ii) iii) iv) v) v) vi) vii) viii) viii)	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard _Outdoor equipment foundation 33kV switchyard _Outdoor equipment foundation 33kV switchyard _Transformer foundation including oilpit & carrage way _Blast wall _Security Boundary Wall	1 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot				
i) ii) iii) iv) v) v) vi) vii) viii) viii) ix)	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard _Outdoor equipment foundation 33kV switchyard _Transformer foundation including oilpit & carrage way _Blast wall _Security Boundary Wall _Substation Main gate	1 1 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot Lot				
i) ii) iii) iv) v) v) vi) vii) viii) viii) ix) ix) x) xi)	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard _Outdoor equipment foundation 33kV switchyard _Outdoor equipment foundation 33kV switchyard _Transformer foundation including oilpit & carrage way _Blast wall _Security Boundary Wall _Substation Main gate _Barbed Wire Fencing	1 1 1 1 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot				
i) ii) iii) iv) v) vi) vii) viii) viii) viii) ix) x) xi) xii)	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard _Outdoor equipment foundation 33kV switchyard _Transformer foundation including oilpit & carrage way _Blast wall _Security Boundary Wall _Substation Main gate _Barbed Wire Fencing _Approach raod	1 1 1 1 1 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot				
i) ii) iii) iv) v) v) vii) vii) viii) viii) ix) x) xi) xii) xi	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard _Outdoor equipment foundation 33kV switchyard _Transformer foundation including oilpit & carrage way _Blast wall _Security Boundary Wall _Substation Main gate _Barbed Wire Fencing _Approach raod _Internal road	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot				
i) ii) iii) iv) v) vi) vii) viii) viii) viii) ix) xi) xii) xi	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard _Outdoor equipment foundation 33kV switchyard _Transformer foundation including oilpit & carrage way _Blast wall _Security Boundary Wall _Substation Main gate _Barbed Wire Fencing _Approach raod _Internal road _Surface drain	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot				
i) ii) iii) iv) v) vi) vii) viii) viii) viii) ix) xi) xii) xi	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard _Outdoor equipment foundation 33kV switchyard _Transformer foundation including oilpit & carrage way _Blast wall _Security Boundary Wall _Substation Main gate _Barbed Wire Fencing _Approach raod _Internal road _Surface drain _Cable Trench	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot				
i) iii) iii) iv) v) vi) vii) viii) viii) viii) ix) xii) xii	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard _Outdoor equipment foundation 33kV switchyard _Transformer foundation including oilpit & carrage way _Blast wall _Security Boundary Wall _Substation Main gate _Barbed Wire Fencing _Approach raod _Internal road _Surface drain _Cable Trench _Switchyard surface finishing _Gravel laying	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot				
i) iii) iii) iv) vi) vii) viii) viii) viii) ix) xii) xii	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard _Outdoor equipment foundation 33kV switchyard _Transformer foundation including oilpit & carrage way _Blast wall _Security Boundary Wall _Substation Main gate _Barbed Wire Fencing _Approach raod _Internal road _Surface drain _Cable Trench _Switchyard surface finishing _Gravel laying _Septic tank, sowak way	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot				
i) iii) iii) iv) v) vi) vii) viii) viii) viii) ix) xii) xii	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor gantry foundation 33kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard _Outdoor equipment foundation 33kV switchyard _Transformer foundation including oilpit & carrage way _Blast wall _Security Boundary Wall _Substation Main gate _Barbed Wire Fencing _Approach raod _Internal road _Surface drain _Cable Trench _Switchyard surface finishing _Gravel laying _Septic tank, sowak way _Pump house including deep tubewell, motor, pump, water reservaoir, water pipe line etc.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot				
i) iii) iii) iv) vi) vii) viii) viii) viii) ix) xiii) xii) x	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard _Outdoor equipment foundation 33kV switchyard _Transformer foundation including oilpit & carrage way _Blast wall _Security Boundary Wall _Substation Main gate _Barbed Wire Fencing _Approach raod _Internal road _Surface drain _Cable Trench _Switchyard surface finishing _Gravel laying _Septic tank, sowak way _Pump house including deep tubewell, motor, pump, water reservaoir, water pipe line etc. _Gurd house, sentry post, car port	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot				
i) iii) iii) iv) vi) vii) viii) viii) viii) ix) xii xii) xii)	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard _Outdoor equipment foundation 33kV switchyard _Transformer foundation including oilpit & carrage way _Blast wall _Security Boundary Wall _Substation Main gate _Barbed Wire Fencing _Approach raod _Internal road _Surface drain _Cable Trench _Switchyard surface finishing _Gravel laying _Septic tank, sowak way _Pump house including deep tubewell, motor, pump, water reservaoir, water pipe line etc. _Gurd house, sentry post, car port Complete civil works for GIS & control room building	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot				
i) iii) iii) iv) v) vi) vii) viii) viii) viii) xii) x	_Outdoor gantry foundation 230kV switchyard _Outdoor gantry foundation 132kV switchyard _Outdoor equipment foundation 230kV switchyard _Outdoor equipment foundation 132kV switchyard _Outdoor equipment foundation 132kV switchyard _Outdoor equipment foundation 33kV switchyard _Transformer foundation including oilpit & carrage way _Blast wall _Security Boundary Wall _Substation Main gate _Barbed Wire Fencing _Approach raod _Internal road _Surface drain _Cable Trench _Switchyard surface finishing _Gravel laying _Septic tank, sowak way _Pump house including deep tubewell, motor, pump, water reservaoir, water pipe line etc. _Gurd house, sentry post, car port Complete civil works for GIS & control room building	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot				

Item	Description	Qty	Unit		Price ¹		Price ¹
				Foreign	Local	Foreign	Local Curre
				Curreny	Curreny	Curreny	Portion
		(1)		Portion (2)	Portion (3)	Portion (1) x (3)	(1) x (2)
iv)	_EOT crane (5 Ton)	1	Lot	(2)	(3)	(1) x (3)	(1) x (2)
	Building Lighting, Small Power, Air Conditioning & Ventilation	· ·	Lot				
	_BuildingSmall power	1	Lot				
ii)	- •	1	Lot				
	_Building airconditioning & ventilation system	1	Lot				
	Outdoor switchyard Lighting, Small Power						
	_OutdoorSmall power	1	Lot				
ii)	_Outdoor Lighting	1	Lot				
	Fault & Disturbance Recorder(DFDR)						
	DFDR complete for all 230kV & 132kV bays for Shyampur new	1	Lot				
2N3.2	DFDR complete for all 230kV & 132kV bays for existing Old Airport &	1	Lot				
	Tongi Substation		1.1				
	DFDR complete for all 230kV & 132kV bays for existing Tongi Substation	1	Lot				
	Dptic Multiplexer Equipment for Teleprotection and Communication Fibre Optic Multipexer Equipment for communication & protection	1	Lot				
	Hot line telephone system including phone sets, connection cords etc.	1	Lot				
	ground opticale fiber cable with Terminal box.		LOI				
	Underground Fibre Optic cable(48 cores)	1	Lot				
	Outdoor termination box, indoor MDF & pigtail cables	1	Lot				
	ation with existing SCADA, NLDC system		201				
	Integration with existing SCADA/NLDC system.	1	Lot				
	atory Spares, tools & test equipment	† ·		1			
	230 kV GIS	1	1				
i)	Set of gas filling equipment and 3 bottles of 48kg of SF6	1	nos.				
ii)	Arcing contact of CB	2	nos.				
	Moving contact of CB	2	nos.				
iv)	Fixed contact of CB	2	nos.				
	Moving contact of DS & ES	2	nos.				
,	Fixed contact of DS & ES	2	nos.				
	Blast nozzle	2	nos.				
	CB Closing coil	6	nos.				
	CB Tripping coil	6	nos.				
	Motor for CB operating mechanism	1	nos.				
	Dashpot for CB operating mechanism	2	nos.				
	Motor for DS & ES drive	2	nos.				
	Supporting insulator	2	nos.				
	Supporting insulator with barrier	2	nos.				
	Indicating lamps (20% of total quantities installed)	1	nos.				
	Indicating lamp covers (10% of total quantities installed) Set of gaskets (10% of total quantities installed)	1	nos.				
,	Heater	2	nos.				
,	Humidity stat and thermostat	2	nos.				
,	Gas pressure monitor	2	nos.				
,	Gas pressure switch	2	nos.				
	Gas pressure gauge	2	nos.				
	Gas pressure relief device	2	nos.				
	Gas sniffer	1	nos.				
	Gas hygrometer	1	nos.				
	132 kV GIS	1					
	Arcing contact of CB	2	nos.	1	1		
	Moving contact of CB	2	nos.		1		
	Fixed contact of CB	2	nos.			_	
,	Moving contact of DS & ES	2	nos.				
v)	Fixed contact of DS & ES	2	nos.				
vi)	Blast nozzle	2	nos.				
vii)	CB Closing coil	6	nos.				
,	CB Tripping coil	6	nos.		1		
	Motor for CB operating mechanism	1	nos.				
	Dashpot for CB operating mechanism	2	nos.				
xi)	Motor for DS & ES drive	2	nos.				
xii)	Supporting insulator	2	nos.	1	1		
	Supporting insulator with barrier	2	nos.				
	Indicating lamps (20% of total quantities installed)	1	_				
			nos.				
	Indicating lamp covers (10% of total quantities installed)	1	nos.				
xvi)	Set of gaskets (10% of total quantities installed)	1	nos.				
xvii)	Heater	2	nos.	1			
xviii)	Humidity stat and thermostat	2	nos.				
	Gas pressure monitor	2	nos.				
						_	
	Gas pressure switch	2	nos.				
	Gas pressure gauge	2	nos.		1		

ltem	Description	Qty	Unit		nit Price 1		al Price ¹
		(1)		Foreign Curreny Portion <i>(</i> 2)	Local Curreny Portion (3)	Foreign Curreny Portion (1) x (3)	Local Curreny Portion (1) x (2)
xxii)	Gas pressure relief device	2	nos.				
2Q3	Auto Transformer & Switchgear						
i)	Transformer 230 kV bushings (For 300MVA Transformer)	1	no.				
ii)	Ttransformer 138 kV bushings (For 300MVA Transformer)	2	nos.				
iii)	33 kV bushing	2	nos.				
iv)	Neutral bushing	2	nos.				
,	Winding temperature indicating device	2	nos.				
,	Set of gaskets (10% of total quantities installed)	1	nos.				
,	č						
,	Silica gel (100% of total quantities installed)	1	nos.				
viii)	Set of special tools, gauges and spanners	1	set				
ix)	Transformer oil treatment plant, 6000 Liters per hour	1	set				
x)	186kV Surge arrester	3	nos.				
xi)	120 kV Surge Arrester	3	nos.				
xii)	245kV, Cable Sealing End (for XLPE, 2000sqmm cu cable) incld. necessary all accessories	2	sets				
xii)	145kV, Cable Sealing End (for XLPE, 1000sqmm cu cable) incld. necessary all accessories	2	sets				
	Protection						
	Line distance relay with complete protection elements	1	set				
	Transformer differential relay with complete REF function	1	set				
	overcurrent and earth fault relay Tripping relay (electrical reset)	1	set				
	Bay control unit	3	nos. set				
	Trip Circuit Supervision relay, 3phase	1	set				
	Relay test block & plug	3	sets				
	Bulbs for annunciator	10	nos.				
	Test Equipment						
,	SF6 Gas Handling Equipment including storage tank	1	set				
	SF6 Gas leak Detector	1	set				
	Partial Discharge monitoring Device for GIS	1	set				
,	Contact resistance measurement test set (suitable for measurement down to 1 μ ohm at 200A d.c.)	1	set				
	5 kV insulation resistance test set (range 0.5 – 1.0 - 2.5 - 5 kV)	1	set				
	Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm)	1	set				
	Clip-on mA meter (for spill current)	1	set				
	Portable Earthing lead including glass fiber stick	1	set				
/	AVO Meter, digital	1	set	-			
	Price for Shyampur 230/132kV GIS Substation						
	d to Schedule -B5: Grand Summary) Schedule B3 (carried to Schedule B5 Grand Summary)	r	<u> </u>	1			1

¹ Specify currency in accordance with specifications in Bid Data Sheet under ITB 18.1.

Name of Bidder

Signature of Bidder

Schedule_B4 -Installation & Other Services

Schedule B4. 1: Dhamrai 132/33 kV GIS Substation

1	ule B4. 1: Dhamrai 132/33 KV GIS Substation		r	l locit	Price ¹	Tatal	Price 1
				Foreign	Local	Foreign	Local
Item	Description	Qty	Unit	Curreny	Curreny	Curreny	Curreny
nom	Decemption	ς.,	0	Portion	Portion	Portion	Portion
		(1)		(2)	(3)	(1) x(2)	(1) x (3)
132kV	Outdoor Type Gas Insulated Switchgear(GIS).	(.)		(=)	(0)	(1) (1)	(1) x (0)
_	132kV Overhead line circuit bay,1250A						
	GIS for 132kV Overhead line circuit bay	2	Sets				
· · · ·							
ii)		2	Sets				
,	_Air Insulated bushing	2	Sets				
	132kV Transformer circuit bay,1250A						
i)	_GIS for 132kV Transformer circuit bay	2	Sets				
ii)		2	Sets				
iii)	_Air Insulated bushing	2	Sets				
1A3	132kV Bus tie circuit bay,3000A	1	Set				
1A4	132kV Main busbar(double busbar) ,3000A, with VT & ES	1	Lot				
	HV GIS Test Bushing	1	Set				
	ir Insulated Switchgear(AIS) and Connection:	-					
	Vacuum Circuit breaker(VCB), live tank, gang operating , 2000A	2	Sets				
	Disconnector, single verticle break, 2000A, gantry mounted	7	Sets				
	Single phase current transformer, post type,3-core	6	Nos.				
	Single phase voltage transformer, post type, 2-core	12	Nos.				
	Single phase, post type, metal oxide surge arrester, 30kV	12	Nos.				
1B6	Flexible Conductor, clamps & connectors for busbar, Jackbus, Jumper						
	& equipment Connection		L				
i)	_Flexible Conductor for jackbus, jumper, equipment connections	1	Lot				
ii)	_Flexible Conductor for main bus	1	Lot				
iii)	_Clamps & Connectors	1	Lot				
1B.7	Insulator & Fittings						
i)	Insulator	1	Lot				
ii)		1	Lot				
,	Steel structures & cable tray		200				
i)	_Gantry Column including nut&bolts	1	Lot				
/		1					
ii)			Lot				
	_Equipment support structures including nut&bolts	1	Lot				
	_Cable tray including fitting, fixing accessories	1	Lot				
	Transformer & Aux. Transformer						
1C1	132/33kV, 50/75(ONAN/ONAF) MVA,, three phase power transformer	2	Sets				
1C2	33/.415kV, 200kVA, three phase auxilliary transformer	2	Sets				
Contro	I, Protection, SAS & Metering						
	Circuits						
	Control, Protection, metering and SAS for 132kV overhead line bays	2	Sets				
	Control, Protection, metering and SAS for 132kV Transformer bays	2	Sets				
	Control, Protection, metering and SAS for 132kV Bus-tie bay	1	Set				
	Busbar protection system for complete 132kV bus	1	Lot				
	Tarrif metering for two line bays and two transformer bays	1	Lot				
<u>33kV C</u>							
	Control, Protection, metering and SAS for 33kV side of Transformer	2	sets				
	bavs						
1D7	Tariff metering for two Transformer bays	1	Lot				
1D7 Surge	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings:	1	Lot				
1D7 Surge	Tariff metering for two Transformer bays	1	Lot nos.				
1D7 Surge 1E1	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, gapless metaloxide						
1D7 Surge 1E1	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III,						
1D7 Surge 1E1 1E2	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, aapless metaloxide Flexible Conductor, clamps & connectors for Jackbus,Jumper & equipment Connection	12					
1D7 Surge 1E1 1E2 i)	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, gapless metaloxide Flexible Conductor, clamps & connectors for Jackbus,Jumper & equipment Connection _Flexible Conductor for jackbus, jumper, equipment connections						
1D7 Surge 1E1 1E2 i)	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, aapless metaloxide Flexible Conductor, clamps & connectors for Jackbus,Jumper & equipment Connection	12	nos.				
1D7 Surge 1E1 1E2 i) ii)	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, gapless metaloxide Flexible Conductor, clamps & connectors for Jackbus,Jumper & equipment Connection _Flexible Conductor for jackbus, jumper, equipment connections	12	nos.				
1D7 Surge 1E1 1E2 i)	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, qapless metaloxide Flexible Conductor, clamps & connectors for Jackbus,Jumper & equipment Connection _Flexible Conductor for jackbus, jumper, equipment connections _Clamps & Connectors Insulator & Fittings	12	nos. Lot Lot				
1D7 Surge 1E1 1E2 i) ii) 1E3 i)	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, appless metaloxide Flexible Conductor, clamps & connectors for Jackbus,Jumper & equipment Connection _Flexible Conductor for jackbus, jumper, equipment connections _Clamps & Connectors Insulator & Fittings _Insulator	12 1 1 1	Lot Lot Lot				
1D7 Surge 1E1 1E2 i) ii) 1E3 i) ii)	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, aapless metaloxide Flexible Conductor, clamps & connectors for Jackbus,Jumper & equipment Connection _Flexible Conductor for jackbus, jumper, equipment connections _Clamps & Connectors Insulator & Fittings _Insulator _Fittings	12 1 1 1	nos. Lot Lot				
1D7 Surge 1E1 1E2 i) ii) 1E3 i) ii)	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, appless metaloxide Flexible Conductor, clamps & connectors for Jackbus,Jumper & equipment Connection _Flexible Conductor for jackbus, jumper, equipment connections _Clamps & Connectors Insulator & Fittings _Insulator	12 1 1 1	Lot Lot Lot				
1D7 Surge 1E1 1E2 i) iii) 1E3 ii) iE4	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, aapless metaloxide Flexible Conductor, clamps & connectors for Jackbus,Jumper & equipment Connection _Flexible Conductor for jackbus, jumper, equipment connections _Clamps & Connectors Insulator & Fittings _Insulator _Fittings Steel structures & cable tray	12 1 1 1 1	Lot Lot Lot Lot Lot				
1D7 Surge 1E1 1E2 i) iii) 1E3 ii) 1E4 iii)	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, appless metaloxide Flexible Conductor, clamps & connectors for Jackbus,Jumper & equipment ConnectionFlexible Conductor for jackbus, jumper, equipment connectionsClamps & Connectors Insulator & FittingsInsulatorFittings Steel structures & cable trayGantry Column including nut&bolts	12 1 1 1 1 1	Lot Lot Lot Lot Lot				
1D7 Surge 1E1 1E2 ii) 1E2 iii) 1E3 iii) 1E4 iii) iii)	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, appless metaloxide Flexible Conductor, clamps & connectors for Jackbus,Jumper & equipment Connection _Flexible Conductor for jackbus, jumper, equipment connections _Clamps & Connectors Insulator & Fittings _Insulator _Fittings Steel structures & cable tray _Gantry Column including nut&bolts _Gantry beam including nut&bolts	12 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot				
1D7 Surge 1E1 1E2 i) iii) 1E3 iii) 1E4 iii) iii) iiii)	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, gapless metaloxide Flexible Conductor, clamps & connectors for Jackbus,Jumper & equipment Connection Flexible Conductor for jackbus, jumper, equipment connections _Clamps & Connectors Insulator & Fittings Insulator Fittings Steel structures & cable tray Gantry Column including nut&bolts Gantry beam including nut&bolts Equipment support structures including nut&bolts	12 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot				
1D7 Surge 1E1 1E2 i) iE3 i) 1E3 i) iE4 i) ii) iii) iii) iii) iii) iii)	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, appless metaloxide Flexible Conductor, clamps & connectors for Jackbus,Jumper & equipment Connection _Flexible Conductor for jackbus, jumper, equipment connections _Clamps & Connectors Insulator & Fittings _Insulator _Fittings Steel structures & cable tray _Gantry Column including nut&bolts _Gantry beam including nut&bolts _Cable tray including fitting, fixing accessories	12 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot				
1D7 Surge 1E1 1E2 i) iE3 i) 1E3 ii) 1E4 i) iii) iii) iii) iii) iii) iii) jiii) jii)	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, gapless metaloxide Flexible Conductor, clamps & connectors for Jackbus,Jumper & equipment Connection Flexible Conductor for jackbus, jumper, equipment connections Clamps & Connectors Insulator & Fittings Insulator Fittings Steel structures & cable tray Gantry Column including nut&bolts Gantry beam including nut&bolts Cable tray including fitting, fixing accessories or Cables	12 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot				
1D7 Surge 1E1 1E2 i) iE3 i) 1E3 ii) 1E4 i) iii) iii) iii) iii) iii) iii) jiii) jii)	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, appless metaloxide Flexible Conductor, clamps & connectors for Jackbus,Jumper & equipment Connection _Flexible Conductor for jackbus, jumper, equipment connections _Clamps & Connectors Insulator & Fittings _Insulator _Fittings Steel structures & cable tray _Gantry Column including nut&bolts _Gantry beam including nut&bolts _Cable tray including fitting, fixing accessories	12 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot				
1D7 Surge 1E1 1E2 i) iii) 1E3 ii) 1E4 iii) iii) iii) iii) iv) Multicc 1F1	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, aabless metaloxide Flexible Conductor, clamps & connectors for Jackbus,Jumper & equipment Connection _Flexible Conductor for jackbus, jumper, equipment connections _Clamps & Connectors Insulator & Fittings _Insulator _Fittings Steel structures & cable tray _Gantry beam including nut&bolts _Cable tray including fitting, fixing accessories Dre Cables Multicore, XLPE, LV Power & Control Cable for control, protection, SAS, metering & power circuits	12 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot Lot				
1D7 Surge 1E1 1E2 i)) iE3 ii) 1E3 ii) iii) iii) iii) iii) iii) iii) iii	Tariff metering for two Transformer bays Arrester, Conductor, Steel Structure, Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, aabless metaloxide Flexible Conductor, clamps & connectors for Jackbus, Jumper & equipment Connection Flexible Conductor for jackbus, jumper, equipment connections Clamps & Connectors Insulator & Fittings Insulator Fittings Steel structures & cable tray Gantry Column including nut&bolts Gantry beam including nut&bolts Cable tray including fitting, fixing accessories Ore Cables Multicore, XLPE, LV Power & Control Cable for control, protection, SAS, metering & power circuits LV Control Cable	12 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot				
1D7 Surge 1E1 1E2 i)) iii) 1E3 ii) iii) iii) iii) iii) iii) iii) iii	Tariff metering for two Transformer bays Arrester,Conductor,Steel Structure,Insulator & Hardware & Fittings: Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, aabless metaloxide Flexible Conductor, clamps & connectors for Jackbus,Jumper & equipment Connection _Flexible Conductor for jackbus, jumper, equipment connections _Clamps & Connectors Insulator & Fittings _Insulator _Fittings Steel structures & cable tray _Gantry beam including nut&bolts _Cable tray including fitting, fixing accessories Dre Cables Multicore, XLPE, LV Power & Control Cable for control, protection, SAS, metering & power circuits	12 1 1 1 1 1 1 1 1 1	Lot Lot Lot Lot Lot Lot Lot Lot Lot				

ltem					1		1
Itom				Unit	Price ¹	Total	Price ¹
	Description	0.1	با ا	Foreign	Local	Foreign	Local
ICIII	Description	Qty	Unit	Curreny	Curreny	Curreny	Curreny
		(4)		Portion	Portion	Portion	Portion
101	Forthing and Lightning Distoction System	(1)		(2)	(3)	(1) x(2)	(1) x (3)
	Earthing and Lightning Protection System						
		1	Lot				
ii)	Lighting Protection System for complete substation	1	Lot				
Batterie	es, Chargers & DC Distribution						
	Complete 110V Battery Bank with chargers and DC Distribution Board						
i)	_Battery Banks two sets	2	Sets				
/ -	_Charger two sets	2	Sets				
	_110V DC Distribution panel	1	Set				
	110V/48V DC DC Converter,1kVA	2					
/ -	48V DC Disatribution Panel		Sets Set				
		1					
/	_UPS system for SAS panels, 3kVA	2	sets				
	Distribution						
	Complete LVAC Distribution System with necessary DB, MCB, Meters	1	Lot				
	etc						
	Tariff metering for two station auxilliary Transformer	1	Lot				
	Outdoor weatherproof 3-phase,4 wire, 125A Socket outlet and plug	1	Nos				
	orks,Building and Foundation	1	Lot				
1J1 (Complete Land development with carried earthfilling	40500	Cubic				
			Meter			-	
	Complete outdoor civil works						
i) _	_Outdoor gantry foundation 132kV switchyard	1	Lot				
ii)	_Outdoor gantry foundation 33kV switchyard	1	Lot				
iii)	Outdoor equipment foundation 132kV switchyard	1	Lot				
iv)	Outdoor equipment foundation 33kV switchyard	1	Lot				
v)	Transformer foundation including oilpit & carrage way	1	Lot				
vi)	Blast wall	1	Lot				
	_blast waii _Security Boundary Wall	1	Lot				
vii)		1	LOI				
viii)	_Substation Main gate	1	Lot				
ix)	Barbed Wire Fencing	1	Lot				
x)	Approach raod	1	Lot				
xi)	Internal road	1	Lot				
xii)	Surface drain	1	Lot				
xiii)	Cable Trench	1	Lot				
/ -	_Switchyard surface finishing	1	Lot				
xiv)		1	Lot				
	_Gravel laying						
xvi)	_Septic tank, sowak way	1	Lot				
	_Pump house including deep tubewell, motor, pump, water reservaoir,	1	Lot				
	water pipe line etc.						
	_Gurd house, sentry post, car port	1	Lot				
	Complete civil works for two storied control building						
	_Foundation works	1	Lot				
ii) .	_Super structures	1	Lot				
iii)	_All finish works	1	Lot				
1J4 (Complete civil works for three storied dormitory building						
	Foundation works(six storied)	1	Lot				
, -	Super structures	1	Lot				
	_Ouper structures	1	Lot				
,	Building Lighting, Small Power, Air Conditioning & Ventilation	•	201				
	Building Lighting, Small Power, Air Conditioning & Ventilation BuildingSmall power	1	1.04				
		1	Lot				
	_Building Lighting & emergency DC lighting	1	Lot				
	_Building airconditioning & ventilation system	1	Lot				
	Outdoor switchyard Lighting, Small Power						
/ -	_OutdoorSmall power	1	Lot				
ii)	_Outdoor Lighting	1	Lot				
/ -	ptic Multiplexer Equipment for Teleprotection and Communication						
	Fibre Optic Multipexer Equipment for communication & protection	1	Lot				
	Hot line telephone system including phone sets, connection cords etc.	1	Lot				
	round opticale fiber cable with Terminal box.	•	201				<u></u>
	Underground Fibre Optic cable (24 cores)	1	1.04			-	
			Lot			-	
	Outdoor termination box, indoor MDF & pigtail cables	1	Lot				
	tion with existing SCADA, NLDC system						
1M1	Integration with existing SCADA/NLDC system.	1	Lot				
	tory Spares, tools & test equipment						
	132 kV GIS						
Mandat	Arcing contact of CB	2	nos.			1	
Mandat 1N1 1						1	<u> </u>
Mandat 1N1 1 i) /		2	nos.				
Mandat 1N1 1 i) / ii) 1	Moving contact of CB	2	nos.				
Mandat 1N1 1 i) / ii) / iii) /	Moving contact of CB Fixed contact of CB	2	nos.				
Mandat 1N1 1 i) / ii) / iii) / iii) /	Moving contact of CB						

				Linit	Price ¹	Total	Price 1
				Foreign	Local	Foreign	Local
Item	Description	Qty	Unit	Currenv	Curreny	Curreny	Curreny
nom	Beschpiten	Qty	Onic	Portion	Portion	Portion	Portion
		(1)		(2)	(3)	(1) x(2)	(1) x (3)
vii)	CB Closing coil	6	nos.	(4/	(9)	('/ ^(∠)	(1) × (3)
,	CB Tripping coil	6	nos.				
	Motor for CB operating mechanism	1	nos.				
,	Dashpot for CB operating mechanism	2					
	Motor for DS & ES drive	2	nos.				
,			nos.				
	Supporting insulator	2	nos.				
	Supporting insulator with barrier	2	nos.				
	Indicating lamps (20% of total quantities installed)	1	nos.				
	Indicating lamp covers (10% of total quantities installed)	1	nos.				
xvi)	Set of gaskets (10% of total quantities installed)	1	nos.				
xvii)	Heater	2	nos.				
xviii)	Humidity stat and thermostat	2	nos.				
xix)	Gas pressure monitor	2	nos.				
xx)	Gas pressure switch	2	nos.				
	Gas pressure gauge	2	nos.				
	Gas pressure relief device	2	nos.				
,		2	1103.				
	132/33 kV Power Transformer	4					
,	Transformer 132 kV bushings (For 75MVA Transformer)	1	no.			-	
,	Ttransformer 33 kV bushings (For 75MVA Transformer)	2	nos.				
,	Neutral bushing	2	nos.				
	Winding temperature indicating device	2	nos.				
v)	Spare transformer oil of 15% of total oil supplied	1	Lot				
vi)	Set of gaskets (10% of total quantities installed)	1	nos.				
vii)	Silica gel (100% of total quantities installed)	1	nos.				
	Set of special tools, gauges and spanners	1	set				
	Transformer oil treatment plant, 6000 Liters per hour	1	set				
	120 kV Surge Arrester	3	nos.				
,		3	105.				
	33 kV SWITCHGEAR						
,	Current Transformer, single phase 3-core,	2	nos.				
,	Closing coils for CB	2	nos.				
iii)	Tripping coils for CB	2	nos.				
iv)	Motor for 33 kV circuit breaker operating mechanism	1	no.				
v)	Surge Arrester, single phase	2	nos.				
1N4	Protection						
	Line distance relay with complete protection elements	1	set				
,							
	Transformer differential relay with complete REF function	1	set				
III)	overcurrent and earth fault relay	1	set				
iv)	Tripping relay (electrical reset)	3	nos.				
v)	Bay control unit	1	set				
vi)	Trip Circuit Supervision relay, 3phase	1	set				
vii)	RelayTest block & plug	1	set				
	Bulbs for annunciator	10	nos.				
,	Test Equipment	10	1100.				
		4	t				
	SF6 Gas Handling Equipment	1	set			-	
/	SF6 Gas reservoir	1	set			-	
	SF6 Gas leak Detector	1	set				
,	Partial Discharge monitoring Device for GIS	1	set				
,	Contact resistance measurement test set (suitable for measurement down to 1 $\mbox{\mbox{$\mu$}}$	1	set				
vii)	5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV)	1	set				
viii)	Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm)	1	set				
	Clip-on mA meter (for spill current)	1	set				<u> </u>
	Portable Earthing lead including glass fiber stick	1	set				
		1	set				
	AVO Meter digital		301			-	
xi)	AVO Meter, digital						
xi) 1N.5	Test Equipment						
xi) 1N.5		1	set				
xi) 1N.5 i)	Test Equipment	1	set set				
xi) 1N.5 i) ii)	Test Equipment SF6 Gas Handling Equipment incld. Storage tank						
xi) 1N.5 i) ii) iii)	Test Equipment SF6 Gas Handling Equipment incld. Storage tank SF6 Gas leak Detector	1	set				
xi) 1N.5 i) ii) iii)	Test Equipment SF6 Gas Handling Equipment incld. Storage tank SF6 Gas leak Detector Partial Discharge monitoring Device for GIS	1 1	set set				
xi) 1N.5 i) ii) iii) iii)	Test Equipment SF6 Gas Handling Equipment incld. Storage tank SF6 Gas leak Detector Partial Discharge monitoring Device for GIS Contact resistance measurement test set (suitable for measurement down to 1 μ	1 1	set set				
xi) 1N.5 i) ii) iii) iv) v)	Test Equipment SF6 Gas Handling Equipment incld. Storage tank SF6 Gas leak Detector Partial Discharge monitoring Device for GIS Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.) 5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV)	1 1 1	set set set				
xi) 1N.5 i) ii) iii) iv) v)	Test Equipment SF6 Gas Handling Equipment incld. Storage tank SF6 Gas leak Detector Partial Discharge monitoring Device for GIS Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.)	1 1 1	set set set				
xi) 1N.5 i) ii) iii) iv) v) v) v)	Test Equipment SF6 Gas Handling Equipment incld. Storage tank SF6 Gas leak Detector Partial Discharge monitoring Device for GIS Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.) 5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV)	1 1 1 1	set set set				
xi) 1N.5 i) ii) iii) iv) iv) v) v) vi) vi)	Test Equipment SF6 Gas Handling Equipment incld. Storage tank SF6 Gas leak Detector Partial Discharge monitoring Device for GIS Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.) 5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) Clip-on mA meter (for spill current)	1 1 1 1 1	set set set set set				
xi) 1N.5 i) ii) iii) iv) iv) vv) vi) vii) viii)	Test Equipment SF6 Gas Handling Equipment incld. Storage tank SF6 Gas leak Detector Partial Discharge monitoring Device for GIS Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.) 5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) Clip-on mA meter (for spill current) AVO Meter, digital	1 1 1 1 1 1 1	set set set set set				
xi) 1N.5 i) ii) iii) iv) v) v) vi) vii) viii) Total	Test Equipment SF6 Gas Handling Equipment incld. Storage tank SF6 Gas leak Detector Partial Discharge monitoring Device for GIS Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.) 5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) Clip-on mA meter (for spill current) AVO Meter, digital Price for Dhamrai 132/33kV GIS Substation	1 1 1 1 1 1 1	set set set set set				
xi) 1N.5 i) ii) iii) iv) v) v) vi) vii) viii) Total	Test Equipment SF6 Gas Handling Equipment incld. Storage tank SF6 Gas leak Detector Partial Discharge monitoring Device for GIS Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.) 5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) Clip-on mA meter (for spill current) AVO Meter, digital	1 1 1 1 1 1 1	set set set set set				
xi) 1N.5 i) ii) iii) iv) vi) vi) vii) viii) viii) Total carried	Test Equipment SF6 Gas Handling Equipment incld. Storage tank SF6 Gas leak Detector Partial Discharge monitoring Device for GIS Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.) 5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) Clip-on mA meter (for spill current) AVO Meter, digital Price for Dhamrai 132/33kV GIS Substation d to Schedule -B5: Grand Summary)	1 1 1 1 1 1 1	set set set set set				
xi) 1N.5 i) ii) iii) iv) vi) vi) vii) viii) viii) Total carried	Test Equipment SF6 Gas Handling Equipment incld. Storage tank SF6 Gas leak Detector Partial Discharge monitoring Device for GIS Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.) 5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) Clip-on mA meter (for spill current) AVO Meter, digital Price for Dhamrai 132/33kV GIS Substation	1 1 1 1 1 1 1	set set set set set				
xi) 1N.5 i) iii) iii) iv) v) vi) vii) viii) viii) Total carried	Test Equipment SF6 Gas Handling Equipment incld. Storage tank SF6 Gas leak Detector Partial Discharge monitoring Device for GIS Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.) 5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) Clip-on mA meter (for spill current) AVO Meter, digital Price for Dhamrai 132/33kV GIS Substation d to Schedule -B5: Grand Summary) ule B1. 2: Shyampur 230/132 kV GIS Substation	1 1 1 1 1 1 1	set set set set set				
xi) 1N.5 i) iii) iii) iv) vi) vii) viii) viii) viii) Total carried Sched	Test Equipment SF6 Gas Handling Equipment incld. Storage tank SF6 Gas leak Detector Partial Discharge monitoring Device for GIS Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.) 5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV) Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm) Clip-on mA meter (for spill current) AVO Meter, digital Price for Dhamrai 132/33kV GIS Substation d to Schedule -B5: Grand Summary)	1 1 1 1 1 1 1	set set set set set				

					1		1
					Price ¹		Price 1
Item	Description	Qty	Unit	Foreign	Local	Foreign	Local
nem	Description	Qty	Onit	Curreny Portion	Curreny Portion	Curreny Portion	Curreny Portion
		(1)		(2)	(3)	(1) x(2)	(1) x (3)
i)	GIS bay	2	Sets	(2)	(0)	(1) X(2)	(1) X (0)
	GIS bus duct	2	Sets				
	Air Insulated Bushing	2	Sets				
2A3	230kV Bus tie circuit bay.2000A	1	Set				
2A4	230kV Main busbar(double busbar) ,2000A, with VT & ES	1	Lot				
2A5	HV GIS Test Bushing	1	set				
	Indoor Type Gas Insulated Switchgear(GIS).						
	132kV Overhead line circuit bay,1250A	6	Sets				
	132kV Transformer circuit bay,2000A	2	Sets				
	132kV Bus tie circuit bay,3000A	1	Set				
	132kV Main busbar(double busbar),3000A, with VT & ES	1	Lot				
	Air Insulated Switchgear(AIS) and Connection:						
	Vacuum Circuit breaker(VCB), live tank, gang operating, 800A	2	Sets				
	Disconnector, single verticle break, 800A, gantry mounted	2	Sets				
2C3	Single phase current transformer, post type,3-core	6	Nos.				
2C4	Single phase, post type, metal oxide surge arrester, 30kV	6	Nos.				
	Flexible Conductor, clamps & connectors, Jumper & equipment						
	Connection						
i)	_Flexible Conductor for jumper, equipment connections	1	Lot				
ii)	_Clamps & Connectors	1	Lot				
	Post Insulator	6	Nos.				
	Steel structures & cable tray		_				
i)		1	Lot				
/	_Cable tray including fitting, fixing accessories	1	Lot				
	Transformer & Aux. Transformer	· ·	201				
	230/138/33kV, 225/300(ONAN/ONAF) MVA, three phase Auto	2	Sets				
201	Itransformer	<u> </u>	0013				
2D2.1	33/0.415kV, 300kVA, three phase earthing transformer	2	Sets				
	deleted	-	0010				
	Fire Prevention & Extinguishing System of two main	1	Lot				
202.5	transformer(Nitrogen Injection type)	· ·	LUI				
Contro	ol, Protection, SAS & Metering						
	Circuits						
	Control, Protection, metering and SAS for 230kV overhead line bays	4	Sets				
	Control, Protection, metering and SAS for 230kV side of Auto	2	Sets				
262	Itransformer bavs	2	Seis				
2E3	Control, Protection, metering and SAS for 230kV Bus-tie bay	1	Set				
	Busbar protection system for complete 230kV bus	1	Lot				
	Tarrif metering for four line bays and two transformer bays	1	Lot				
	Circuits	1	LOI				
	Control, Protection, metering and SAS for 132kV overhead line bays	6	Sata				
	Control, Protection, metering and SAS for 132kV overhead line bays	2	Sets				
252		2	Sets				
252	transformer bavs Control, Protection, metering and SAS for 132kV Bus-tie bay	1	Set				
	Busbar protection system for complete 132kV bus	1	Lot				
	Tarrif metering for six line bays and two transformer bays	1	Lot				
<u>33kV (</u>		-					
	Control, Protection, metering for 33/0.4kV Auxilliary Transformers.	2	sets				
	Cables & Cable Termination, Surge Arrester, Conductor, Steel Structu	ire,Insul	ator & H	ardware &	Fittings:		
	Circuits						
	230kV, XLPE 2000sqmm, Cu Power cable & termination						
	Power cable	720	meter				
ii)	Outdoor type Cable Sealing End per phasewith required necessary	12	Sets				
	accessories		L				
iii)	Indoor type Cable termination(GIS bay termination) per phasewith	18	Sets				
	required necessary accessories.						
2H2	Single phase surge arrestor, 186kV, 10kA Discharge Current, Class III,	18	nos.				
	gapless metaloxide						
2H3	Flexible Conductor, clamps & connectors for Jackbus, Jumper &						
	equipment Connection	1	ا م ا		l	I	
i)		1	Lot	-			
	_Clamps & Connectors	1	Lot	-			
	Insulator & Fittings	<u> </u>				1	
i)		1	Lot			ļ	
,	_Fittings	1	Lot				
	Steel structures & cable tray						
	_Gantry Column including nut&bolts	1	Lot				
ii)	_Gantry beam including nut&bolts	1	Lot				
iii)	_Equipment support structures including nut&bolts	1	Lot				
	_Cable tray including fitting, fixing accessories	1	Lot				
,	Circuits						
	132kV, XLPE 1000sqmm, Cu Power cable & termination						
		1000	mater			+	
I)	Power cable	1680	meter				

iii) Indo iv) Outc v) Indo 2H7 Sing 2H8 Flexi i) _Fle: ii) Cla 2H9 Insu ii) Fitt 2H10 Stee ii) _Gar iii) _Equ iii) _Equ iii) _Equ iii) _Cat 33kV Circu 2H11.1 33kV 2H11.2 33kV Multicore C 2l1 Multi mette ii) _LV 2H11.2 33kV Multicore C 2l1 Multi mette iii) _LV 2H11.2 33kV Multicore C 2l1 Multi mette iii) _LV 2l1 Com iii) _LQ 2K1 Com iii) _L1Q build Batteries, C 2K1 Com iii) _L1Q V _A8V Vi) _UP	eel structures & cable tray aantry Column including nut&bolts aantry beam including nut&bolts quipment support structures including nut&bolts able tray including fitting, fixing accessories uits kV, XLPE Cu Power cable, 185sqmm kV Cable termination with required necessary accessories.	Qty (1) 12 12 12 12 12 18 1 1 1 1 1 1 1 1 1 1 1	Unit Sets Sets Sets Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot	Unit I Foreign Curreny Portion (2) 	Price ¹ Local Curreny Portion (3)	Total Foreign Curreny Portion (1) x(2)	Price ¹ Local Curreny Portion (1) x (3)
ii) Outo iii) Indo iv) Outo v) Indo 2H7 Sing 2H8 Flexi i) _Flexi ii) Cla 2H9 Insul ii) Fitt 2H10 Stee ii) _Gar iii) _Gar iii) _Gar iii) _Gar iii) _Gar iii) _Gar iii) _Cat 33kV Circui 2H11.133kV 2H11.233kV <u>2H11.233kV</u> 2H11.233kV <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.232kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV <u>2H11.233kV <u>2H11.233kV <u>2H11.233kV <u>2H11.233kV <u>2</u></u></u></u></u></u>	Atdoor type Cable Sealing End per phasewith required necessary door type Cable termination(GIS bay termination) per phase with tdoor type Cable Sealing End with required necessary accessories door type Cable termination(GIS bay termination) per phase with ngle phase surge arrestor, 120kV, 10kA Discharge Current, Class III, exible Conductor, clamps & connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors sulator & Fittings sulator titings sel structures & cable tray cantry Column including nut&bolts antry beam including nut&bolts autor support structures including nut&bolts able tray including fitting, fixing accessories uits kV, XLPE Cu Power cable, 185sqmm kV Cable termination with required necessary accessories. Cables V Control Cable V Power Cable 8. Lightning Protection rthing and Lightning Protection System arthing system for complete substation includ. GIS building ightning Protection System for complete substation include. GIS idina Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	(1) 12 12 12 12 12 12 12 12 1 1 1 1 1 1 1 1 1 1 1 1 1	Sets Sets Sets nos. Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot	Curreny Portion	Curreny Portion	Curreny Portion	Curreny Portion
ii) Outo iii) Indo iv) Outo v) Indo 2H7 Sing 2H8 Flexi i) _Flexi ii) Cla 2H9 Insul ii) Fitt 2H10 Stee ii) _Gar iii) _Gar iii) _Gar iii) _Gar iii) _Gar iii) _Gar iii) _Cat 33kV Circui 2H11.133kV 2H11.233kV <u>2H11.233kV</u> 2H11.233kV <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.232kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV</u> <u>2H11.233kV <u>2H11.233kV <u>2H11.233kV <u>2H11.233kV <u>2H11.233kV <u>2</u></u></u></u></u></u>	Atdoor type Cable Sealing End per phasewith required necessary door type Cable termination(GIS bay termination) per phase with tdoor type Cable Sealing End with required necessary accessories door type Cable termination(GIS bay termination) per phase with ngle phase surge arrestor, 120kV, 10kA Discharge Current, Class III, exible Conductor, clamps & connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors sulator & Fittings sulator titings sel structures & cable tray cantry Column including nut&bolts antry beam including nut&bolts autor support structures including nut&bolts able tray including fitting, fixing accessories uits kV, XLPE Cu Power cable, 185sqmm kV Cable termination with required necessary accessories. Cables V Control Cable V Power Cable 8. Lightning Protection rthing and Lightning Protection System arthing system for complete substation includ. GIS building ightning Protection System for complete substation include. GIS idina Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	(1) 12 12 12 12 12 12 12 12 1 1 1 1 1 1 1 1 1 1 1 1 1	Sets Sets Sets nos. Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot	Portion	Portion	Portion	Portion
iii) Indo iv) Outc v) Indo 2H7 Sing 2H8 Flexi i) _Fle: ii) Cla 2H9 Insu ii) Fitt 2H10 Stee ii) _Gar iii) _Gar iii) _Gar iii) _Gar iii) _Gar 33kV Circui 2H11.1 33kV 2H11.2 33kV Multicore C 2l1 Multi mete ii) _LV 2H11.2 33kV Multicore C 2l1 Multi mete ii) _LV 2H11.2 33kV Multicore C 2l1 Multi mete ii) _LV 2H11.2 33kV Multicore C 2l1 Multi mete ii) _LV Earthing & 2J1 Earth ii) _LQ 2K1 Com ii) _Bat iii) _Lig build Batteries, C 2K1 Com ii) _Bat iii) _110 v) _48V vi) _UP	Noor type Cable termination (GIS bay termination) per phase with toor type Cable Sealing End with required necessary accessories for type Cable termination (GIS bay termination) per phase with agle phase surge arrestor, 120kV, 10kA Discharge Current, Class III, exible Conductor, clamps & connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor & Fittings fixing accessories for latting fitting, fixing accessories for lable tray including fitting, fixing accessories for lable tray including fitting, fixing accessories for lable tray including fitting, fixing accessories. Cables WV Cable termination with required necessary accessories. Cables Ulticore, XLPE, LV Power & Control Cable for control, protection, SAS, tering & power circuits V Control Cable V Power Cable & Lightning Protection withing and Lightning Protection System arthing system for complete substation include. GIS liding ightning Protection System for co	12 12 12 12 12 18 1 1 1 1 1 1 1 1 1 1 1	Sets Sets Nos. Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot				
iii) Indo iv) Outc v) Indo 2H7 Sing 2H8 Flexi i) _Fle: ii) Cla 2H9 Insu ii) Fitt 2H10 Stee ii) _Gar iii) _Gar iii) _Gar iii) _Gar iii) _Gar 33kV Circui 2H11.1 33kV 2H11.2 33kV Multicore C 2l1 Multi mete ii) _LV 2H11.2 33kV Multicore C 2l1 Multi mete ii) _LV 2H11.2 33kV Multicore C 2l1 Multi mete ii) _LV 2H11.2 33kV Multicore C 2l1 Multi mete ii) _LV Earthing & 2J1 Earth ii) _LQ 2K1 Com ii) _Bat iii) _Lig build Batteries, C 2K1 Com ii) _Bat iii) _110 v) _48V vi) _UP	Noor type Cable termination (GIS bay termination) per phase with toor type Cable Sealing End with required necessary accessories for type Cable termination (GIS bay termination) per phase with agle phase surge arrestor, 120kV, 10kA Discharge Current, Class III, exible Conductor, clamps & connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor & Fittings fixing accessories for latting fitting, fixing accessories for lable tray including fitting, fixing accessories for lable tray including fitting, fixing accessories for lable tray including fitting, fixing accessories. Cables WV Cable termination with required necessary accessories. Cables Ulticore, XLPE, LV Power & Control Cable for control, protection, SAS, tering & power circuits V Control Cable V Power Cable & Lightning Protection withing and Lightning Protection System arthing system for complete substation include. GIS liding ightning Protection System for co	12 12 12 12 12 18 1 1 1 1 1 1 1 1 1 1 1	Sets Sets Nos. Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot				
iii) Indo iv) Outc v) Indo 2H7 Sing 2H8 Flexi i) _Fle: ii) Cla 2H9 Insu ii) Fitt 2H10 Stee ii) _Gar iii) _Gar iii) _Gar iii) _Gar iii) _Gar 33kV Circui 2H11.1 33kV 2H11.2 33kV Multicore C 2l1 Multi mete ii) _LV 2H11.2 33kV Multicore C 2l1 Multi mete ii) _LV 2H11.2 33kV Multicore C 2l1 Multi mete ii) _LV 2H11.2 33kV Multicore C 2l1 Multi mete ii) _LV Earthing & 2J1 Earth ii) _LQ 2K1 Com ii) _Bat iii) _Lig build Batteries, C 2K1 Com ii) _Bat iii) _110 v) _48V vi) _UP	Noor type Cable termination (GIS bay termination) per phase with toor type Cable Sealing End with required necessary accessories for type Cable termination (GIS bay termination) per phase with agle phase surge arrestor, 120kV, 10kA Discharge Current, Class III, exible Conductor, clamps & connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors for Jackbus, Jumper & lexible Conductor & Fittings fixing accessories for latting fitting, fixing accessories for lable tray including fitting, fixing accessories for lable tray including fitting, fixing accessories for lable tray including fitting, fixing accessories. Cables WV Cable termination with required necessary accessories. Cables Ulticore, XLPE, LV Power & Control Cable for control, protection, SAS, tering & power circuits V Control Cable V Power Cable & Lightning Protection withing and Lightning Protection System arthing system for complete substation include. GIS liding ightning Protection System for co	12 12 12 18 1 1 1 1 1 1 1 1 1 50 12 1 1 1 1	Sets Sets Nos. Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot				
iv) Outc v) Indo 2H7 Sing 2H8 Flexi i) _Fle: ii) Cla 2H9 Insul ii) Fle: iii) Cla 2H9 Insul iii) _Fle: iii) _Fle: 2H10 Stee ii) _Gan iii) _Equ iii) _Equ iii) _Equ iii) _Cal 33kV Circui 2H11.1 33kV 2H11.2 33kV Multicore C 2l1 Multi mette ii) _LV 2H11.2 33kV Multicore C 2l1 Multi mette ii) _LV Earthing & 2J1 Earth ii) _LV Earthing & 2J1 Earth ii) _LQ 2K1 Com ii) _Batteries, C 2K1 Com ii) _Batteries, C 2K1 Com ii) _LQ 2K1 Com ii) _LQ 2K1 Com ii) _LQ 2K1 Com ii) _LQ 2K1 Com ii) _LQ 2K1 Com	Intdoor type Cable Sealing End with required necessary accessories loor type Cable termination(GIS bay termination) per phase with higle phase surge arrestor, 120kV, 10kA Discharge Current, Class III, exible Conductor, clamps & connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors sulator & Fittings assulator ittings bel structures & cable tray antry Column including nut&bolts antry beam including nut&bolts able tray including fitting, fixing accessories uits kV, XLPE Cu Power cable, 185sqmm kV Cable termination with required necessary accessories. Cables liticore, XLPE, LV Power & Control Cable for control, protection, SAS, tering & power circuits V Control Cable V Power Cable 8 Lightning Protection rthing and Lightning Protection System arthing system for complete substation include. GIS liding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	12 12 18 1 1 1 1 1 1 1 1 1 50 12 1 1 1 1	Sets Sets nos. Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot				
v) Indo 2H7 Sing 2H8 Flexi i) _Fle: ii) Cla 2H9 Insul ii) Fitt 2H10 Stee ii) _Gau iii) _Equ iii) _Gau iii) _Equ iii) _Cat 33kV Circui 2H11.1 33kV 2H11.2 33kV Multicore C 2I1 Multi mette ii) _LV <u>Earthing &</u> 2J1 Earth ii) _LV <u>Earthing &</u> 2J1 Earth ii) _LV <u>Earthing &</u> 2J1 Earth ii) _LU <u>Batteries, C</u> 2K1 Com ii) _Bat iii) _110 v) _48V vi) _UP	loor type Cable termination(GIS bay termination) per phase with ngle phase surge arrestor, 120kV, 10kA Discharge Current, Class III, exible Conductor, clamps & connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors sulator & Fittings sulator & Fittings sulator ittings bel structures & cable tray antry Column including nut&bolts antry beam including nut&bolts quipment support structures including nut&bolts able tray including fitting, fixing accessories uits kV, XLPE Cu Power cable, 185sqmm kV Cable termination with required necessary accessories. Cables ulticore, XLPE, LV Power & Control Cable for control, protection, SAS, tering & power circuits V Control Cable V Power Cable & Lightning Protection rthing and Lightning Protection System arthing system for complete substation include. GIS liding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	12 18 1 1 1 1 1 1 1 1 1 1 50 12 1 1 1 1	Sets nos. Lot Lot Lot Lot Lot Lot Lot Lot Lot Lot				
2H7 Sing 2H8 Flexi i) _Fle: ii) Cla 2H9 Insul ii) Insu iii) Fitt 2H10 Stee ii) _Gau iii) _Gau iii) _Equ iv) _Cat 33kV Circu 2H11.1 33kV 2H11.2 33kV Multicore C 2l1 Multi mette ii) _LV 2H11.2 33kV Multicore C 2l1 Multi mette ii) _LV 2H11.2 33kV Multicore C 2l1 Multi mette iii) _LV Earthing & 2J1 Earth iii) _LV Earthing & 2J1 Earth iii) _LU Earthing & 2J1 Earth iii) _LU Earthing & 2J1 Earth iii) _LU Earthing & 2J1 Earth iii) _LU 2H1 Com	Index Productor, Clamps & Connectors for Jackbus, Jumper & Conductor, clamps & connectors for Jackbus, Jumper & Lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors sulator & Fittings & Connectors & Cable tray including nut&bolts subtray including nut&bolts subtray including fitting, fixing accessories sulator sulator subtray subtr	18 1 1 1 1 1 1 1 1 1 1 1 1 1	nos. Lot Lot Lot Lot Lot Lot Lot Nos.				
2H8 Flexi i) _Flexi ii) _Flexi iii) Cla 2H9 Insul iii) Fitt 2H10 Stee iii) _Gau iii) _Gau iii) _Gau iii) _Gau 33kV Circui 2H11.133kV 2H11.233kV Multicore C 2H1 _Multi mete ii) _LV 2H11.233kV Multicore C 2H1 _Multi mete ii) _LV Earthing & 2J1 Earth ii) _LV Earthing & 2J1 Earth ii) _LV Earthing & 2K1 Com ii) _Batteries, C 2K1 Com ii) _Batteries, C 2K1 Com iii) _L10 build Batteries, C 2K1 Com iii) _L10 v) _48V vi) _UP	Avible Conductor, clamps & connectors for Jackbus, Jumper & lexible Conductor for jackbus, jumper, equipment connections lamps & Connectors sulator & Fittings sulator & Fittings sulator insulator insulator insulator insulator insulator including nut&bolts insulator including nut&bolts insule tray including fitting, fixing accessories inits kV, XLPE Cu Power cable, 185sqmm kV, XLPE Cu Power cable, 185sqmm kV Cable termination with required necessary accessories. Cables Initicore, XLPE, LV Power & Control Cable for control, protection, SAS, tering & power circuits V Control Cable V Power Cable & Lightning Protection rthing and Lightning Protection System arthing system for complete substation include. GIS liding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	1 1 1 1 1 1 1 1 1 1 50 12 1 1 1	Lot Lot Lot Lot Lot Lot Lot Nos.				
i) _Fle: ii) Cla 2H9 Insul ii) Insu 2H10 Stee ii) _Gau iii) _Equ iv) _Cat 33kV Circu 2H11.1 33kV 2H11.2 33kV Multicore C 2I1 Multi mette ii) _LV 2I11 _Z3kV Multicore C 2I1 Multi mette ii) _LV Earthing & 2J1 Earth ii) _LV Earthing & 2J1 Earth ii) _LU Earthing & 2J1 Earth ii) _LU Earthing & 2J1 Earth ii) _LU Earthing & 2J1 Earth ii) _LU Earthing & 2J1 Earth ii) _LU 2K1 Com ii) _Bat iii) _110 v) _48V vi) _UP	Iexible Conductor for jackbus, jumper, equipment connections Iamps & Connectors Iamps & Connectors Isulator & Fittings Isulator Ittings Isulator Ittings Isulator Ittings Isulator Ittings Isulator Isulator & Cable tray Isulator & Control cable tray Isulator support structures a Control Cable for control, protection, SAS, Istering & power circuits V Control Cable V Power Cable & Lightning Protection Itting and Lightning Protection System Isting System for complete substation include. GIS Isolator Isolator Support Structures Isolator Isol	1 1 1 1 1 1 1 1 1 50 12 1 1 1	Lot Lot Lot Lot Lot Lot Meter Nos.				
ii) Cla 2H9 Insul ii) Insul 2H10 Stee ii) _Gau iii) _Gau iii) _Gau iii) _Cat 33kV Circu 2H11.133kV 2H11.233kV Multicore O 2H1 Multi mete ii) _LV Earthing & 2J1 Earth ii) _LV Earthing & 2J1 Earth ii) _LU Earthing & 2K1 Com ii) _Bat iii) _Lig build Batteries, O 2K1 Com ii) _Bat iii) _110 v) _48V vi) _UP	lamps & Connectors iulator & Fittings isulator ittings isulator ittings isulator ittings isulator ittings isulator ittings isulator including nut&bolts isantry beam including nut&bolts iable tray including nut&bolts iable tray including fitting, fixing accessories iults kV, XLPE Cu Power cable, 185sqmm kV Cable termination with required necessary accessories. Cables Iticore, XLPE, LV Power & Control Cable for control, protection, SAS, itering & power circuits V Control Cable V Power Cable & Lightning Protection rthing and Lightning Protection System arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS liding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	1 1 1 1 1 1 1 1 1 50 12 1 1 1	Lot Lot Lot Lot Lot Lot Meter Nos.				
2H9 Insul i) Insu ii) Fitt 2H10 Stee ii) _Gau iii) _Gau iii) _Equ iv) _Cat 33kV Circu 2H11.1 33kV 2H11.2 33kV Multicore C 2I1 Multi mette ii) _LV 2I1 2I1 2I1 2I1 2I1 2I1 2U1 Earthing & 2J1 Earth ii) _LV Earthing & 2J1 Earth ii) _LU Earthing & 2K1 Com ii) _Bat iii) 2K1 Com ii) 2K1 Com ii) 2K1 Com ii) 2K1 Com iii) 2K1 Com iii) 2K1 Com iii) 2L1 Com	Aulator & Fittings Asulator Asulato	1 1 1 1 1 1 1 1 50 12 1 1 1 1	Lot Lot Lot Lot Lot Meter Nos.				
2H9 Insul i) Insu ii) Fitt 2H10 Stee ii) _Gau iii) _Gau iii) _Equ iv) _Cat 33kV Circu 2H11.1 33kV 2H11.2 33kV Multicore C 2I1 Multi mette ii) _LV 2I1 2I1 2I1 2I1 2I1 2I1 2U1 Earthing & 2J1 Earth ii) _LV Earthing & 2J1 Earth ii) _LU Earthing & 2K1 Com ii) _Bat iii) 2K1 Com ii) 2K1 Com ii) 2K1 Com ii) 2K1 Com iii) 2K1 Com iii) 2K1 Com iii) 2L1 Com	Aulator & Fittings Asulator Asulato	1 1 1 1 1 1 1 1 50 12 1 1 1 1	Lot Lot Lot Lot Lot Meter Nos.				
i) Insi ii) Fitt 2H10 Stee i) _Gai iii) _Gai iii) _Equ iv) _Cat 33kV Circui 2H11.1 33kV 2H11.2 33kV Multic-re C 2I1 Multi mete i) _LV 2I1	Asulator Asulat	1 1 1 1 1 1 50 12 1 1 1	Lot Lot Lot Lot Meter Nos.				
ii) Fitt 2H10 Stee i) _Gar iii) _Gar iii) _Eqr iii) _Cat 33kV Circu 2H11.133kV 2H11.233kV Multicore C 2H1 Multi mete i) _LV Earthing & 2J1 Earth ii) _LV Earthing & 2J1 Earth ii) _LV Earthing & 2J1 Earth iii) _LUg build Batteries, C 2K1 Com ii) _Bat iii) _Cha iii) _Cha iii) _Cha iii) _Cha iii) _Cha iii) _LV V) _48V Vi) _UP	ittings bel structures & cable tray antry Column including nut&bolts antry beam including nut&bolts quipment support structures including nut&bolts able tray including fitting, fixing accessories uits kV, XLPE Cu Power cable, 185sqmm kV Cable termination with required necessary accessories. Cables lifticore, XLPE, LV Power & Control Cable for control, protection, SAS, etering & power circuits V Control Cable V Power Cable & Lightning Protection rthing and Lightning Protection System arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS liding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	1 1 1 1 150 12 1 1 1	Lot Lot Lot Lot Meter Nos.				
2H10 Stee i) _Gai ii) _Gai iii) _Equ iv) _Cat 33kV Circui 2H11.133kV 2H11.233kV Multic-re C 2I1 Multi mette i) _LV Earthing & 2J1 Earth ii) _LV Earthing & 2J1 Earth iii) _LV Earthing & 2J1 Earth iii) _LUg build Batteries, C 2K1 Com ii) _Bat iii) _Cha iii) _Cha iii) _Cha iii) _L10 V) _48V vi) _UP	eel structures & cable tray aantry Column including nut&bolts aantry beam including nut&bolts autry beam including nut&bolts autry beam including nut&bolts autry beam including fitting, fixing accessories uits kV, XLPE Cu Power cable, 185sqmm kV Cable termination with required necessary accessories. Cables Uticore, XLPE, LV Power & Control Cable for control, protection, SAS, etering & power circuits V Control Cable V Power Cable & Lightning Protection rthing and Lightning Protection System arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS liding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	1 1 150 12 1 1 1	Lot Lot Lot Meter Nos.				
ii) _Gar iii) _Equ iv) _Cat 33kV Circui 2H11.133kV 2H11.233kV Multicore C 2I1 Multi i) _LV ii) _LV Earthing & 2J1 Earth ii) _LV Earthing & 2J1 Earth ii) _LUg build Batteries, C 2K1 Com ii) _Bat iii) _Cha iii) _Cha iii) _Cha iii) _Cha Com 2K1 Com Com Com Com Com Com Com Com	antry beam including nut&bolts quipment support structures including nut&bolts able tray including fitting, fixing accessories uits kV, XLPE Cu Power cable, 185sqmm kV Cable termination with required necessary accessories. Cables Uticore, XLPE, LV Power & Control Cable for control, protection, SAS, tetering & power circuits V Control Cable V Power Cable & Lightning Protection rthing and Lightning Protection System arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS liding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	1 1 150 12 1 1 1	Lot Lot meter Nos.				
ii) _Gar iii) _Equ iv) _Cat 33kV Circui 2H11.133kV 2H11.233kV Multicore C 2I1 Multi i) _LV ii) _LV Earthing & 2J1 Earth ii) _LV Earthing & 2J1 Earth ii) _LUg build Batteries, C 2K1 Com ii) _Bat iii) _Cha iii) _Cha iii) _Cha iii) _Cha Com 2K1 Com Com Com Com Com Com Com Com	antry beam including nut&bolts quipment support structures including nut&bolts able tray including fitting, fixing accessories uits kV, XLPE Cu Power cable, 185sqmm kV Cable termination with required necessary accessories. Cables Uticore, XLPE, LV Power & Control Cable for control, protection, SAS, tetering & power circuits V Control Cable V Power Cable & Lightning Protection rthing and Lightning Protection System arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS liding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	1 150 12 1 1 1 1	Lot Lot meter Nos.				
iii) _Equ iv) _Cat 33kV Circui 2H11.133k\ 2H11.233k\ Multicore C 2l1 Multi i) _LV ii) _LV Earthing & 2J1 Earth i) _LV Earthing & 2J1 Earth i) _LG build Batteries, C 2K1 Com i) _Bat iii) _L10 build Batteries, C 2K1 Com i) _Bat con iii) _110 iv) _110 v) _48 vi) _UP	quipment support structures including nut&bolts able tray including fitting, fixing accessories uits kV, XLPE Cu Power cable, 185sqmm kV Cable termination with required necessary accessories. Cables uitcore, XLPE, LV Power & Control Cable for control, protection, SAS, tering & power circuits V Control Cable V Power Cable & Lightning Protection rthing and Lightning Protection System arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS Iding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	1 150 12 1 1 1 1	Lot Lot Meter Nos.				
iv)Cat 33kV Circui 2H11.133kV 2H11.233kV Multicore C 2l1 Multi mete i) _LV 2l1 Earthing & 2J1 Earthing & 2K1 Com i)Batteries, C 2K1 Com i)Batteries, C 2K1 Com i)Cha iii)110 v)110 v)48V vi)UP LVAC Distri	able tray including fitting, fixing accessories uits kV, XLPE Cu Power cable, 185sqmm kV Cable termination with required necessary accessories. <u>Cables</u> liticore, XLPE, LV Power & Control Cable for control, protection, SAS, tering & power circuits V Control Cable V Power Cable & Lightning Protection rthing and Lightning Protection System arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS liding <u>Chargers & DC Distribution</u> mplete 110V Battery Bank with chargers and DC Distribution Board	1 150 12 1 1 1 1	Lot meter Nos. Lot Lot				
33kV Circui 2H11.1 33kV 2H11.2 33kV 2H11.2 33kV 2H11.2 33kV 2H11.2 33kV 2I1 Multicore C 2I1 Multi mete i) LV Earthing & 2J1 Earth ii) _Log build Batteries, C 2K1 Com ii) _Cha iii) _110 iv) _110 vi) _UP LVAC Distri 2L1	uits kV, XLPE Cu Power cable, 185sqmm kV Cable termination with required necessary accessories. Cables ulticore, XLPE, LV Power & Control Cable for control, protection, SAS, tering & power circuits V Control Cable V Power Cable & Lightning Protection rthing and Lightning Protection System arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS Iding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	150 12 1 1 1 1	meter Nos. Lot Lot				
2H11.133kV 2H11.233kV 2H11.233kV 2H11.233kV 2H11.233kV meter i) _LV Earthing & 2J1 Earth i) _Leg build Batteries, C 2K1 Com i) _Bat ii) _Lig build Batteries, C 2K1 Com i) _Bat iii) _110 iv) _110 v) _48V vi) _UP	kV, XLPE Cu Power cable, 185sqmm kV Cable termination with required necessary accessories. Cables ulticore, XLPE, LV Power & Control Cable for control, protection, SAS, stering & power circuits V Control Cable V Power Cable & Lightning Protection rthing and Lightning Protection System arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS Iding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	12 1 1 1	Nos. Lot Lot				
2H11.2 33kV Multicore C 2l1 Multi mete i) _LV Earthing & 2J1 Eartl i) _Eartl build Batteries, C 2K1 Com i) _Bat ii) _Ligl build Batteries, C 2K1 Com i) _Bat iii) _Ligl build Batteries, C 2K1 Com i) _Bat iii) _Ligl build Batteries, C 2K1 Com i) _Lat Com i) _Lat build Char ii) _Ligl build Batteries, C 2K1 Com ii) _Lat Com ii) _Lat Com Com ii) _Lat Com Com Com Com Com Com Com Com	KV Cable termination with required necessary accessories. Cables Ilticore, XLPE, LV Power & Control Cable for control, protection, SAS, tering & power circuits V Control Cable V Power Cable <u>& Lightning Protection</u> rthing and Lightning Protection System arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS Ilding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	12 1 1 1	Nos. Lot Lot				
Multicore C 211 Multimete i) _LV ii) _LV iii) _LV Earthing & 2J1 Earthing & Data iii) Batteries, C 2K1 Com ii) 2K1 Com iii) iii) vi) vi) VV) LVAC Distrit 2L1 Com	Cables ulticore, XLPE, LV Power & Control Cable for control, protection, SAS, tering & power circuits V Control Cable V Power Cable & Lightning Protection rthing and Lightning Protection System arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS Iding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	1 1 1	Lot Lot				
211 Multimete i) LV ii) LV Earthing & 2J1 Earth i) _Earthing & ii) _Ligl build Batteries, C 2K1 Com) Batteries, IC Cm ii) _Cha iii) _Cha iii) _Cha vi) _110 vv) _48\ vi) _UP LVAC Distri 2L1	Iticore, XLPE, LV Power & Control Cable for control, protection, SAS, tering & power circuits V Control Cable V Power Cable & Lightning Protection rthing and Lightning Protection System arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS idding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	1	Lot				
meter i) _LV ii) _LV 2J1 Earth i) _Earth ii) _Ligl build Batteries, C 2K1 Com ii) _Batt iii) _Cha iii) _Cha iii) _Cha iii) _Cha vi) _110 vv) _48\ vi) _UP LVAC Distri _2L1	A power circuits V Control Cable V Power Cable V Power Cable <u>& Lightning Protection</u> rthing and Lightning Protection System arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS ildina <u>Chargers & DC Distribution</u> mplete 110V Battery Bank with chargers and DC Distribution Board	1	Lot				
i) _LV ii) _LV Earthing & 2J1 Earth ii) _Lig build Batteries, C 2K1 Com ii) _Bat iii) _Cha iii) _Cha iii) _11C iv) _11C v) _48 vi) _UP LVAC Distri 2L1 Com	V Control Cable V Power Cable & Lightning Protection rthing and Lightning Protection System arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS ilding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	1	Lot				
ii) _LV Earthing & 2J1 Earth i) _Earthing & 2J1 Earthing & Lighting & Batteries, C 2K1 Com i) _Batt ii) _Cha iii) _110 iv) _110 v) _48 vi) _UP LVAC Distri 2L1 Com	V Power Cable & Lightning Protection trhing and Lightning Protection System arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS ilding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	1	Lot				
Earthing & 2J1 Earth i) _Earth ii) _Lig build Batteries, Com i) _Batt iii) _Cha iii) _Cha iii) _Cha iii) _110 iv) _110 v) _48 vi) _UP LVAC Distri 2L1 Com	& Lightning Protection rthing and Lightning Protection System arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS ilding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	1					
2J1 Earti i) _Ear ii) _Lig build Batteries, C 2K1 Com i) _Bat iii) _Cha iii) _Cha iii) _110 iv) _110 v) _48 vi) _UP LVAC Distri 2L1 Com	rthing and Lightning Protection System arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS ilding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board		Lot				
i) _Ear ii) _Lig build Batteries, C 2K1 Com i) _Bat iii) _Cha iii) _110 iv) _110 v) _48 vi) _UP LVAC Distr 2L1 Com	arthing system for complete substation incld. GIS building ightning Protection System for complete substation include. GIS ilding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board		Lot				
ii) _Ligl build Batteries, C 2K1 Com i) _Bat iii) _Cha iii) _110 iv) _110 v) _48 vi) _UP <u>LVAC Distr</u> 2L1 Com	ightning Protection System for complete substation include. GIS ilding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board		Lot				
build Batteries, C 2K1 Com i) _Bat ii) _Cha iii) _11C iv) _11C v) _48 vi) _UP LVAC Distri 2L1 Com	Iding Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board	1	LUI				
Batteries, C 2K1 Com i) _Bat ii) _Cha iii) _Cha iii) _110 ivy _110 vy) _48\ vi) _UP LVAC Distri _2L1	Chargers & DC Distribution mplete 110V Battery Bank with chargers and DC Distribution Board		Lot				
2K1 Com i) _Bat ii) _Cha iii) _110 iv) _110 v) _48 vi) _UP LVAC Distr 2L1 Com	mplete 110V Battery Bank with chargers and DC Distribution Board						
i) _Bat ii) _Cha iii) _110 iv) _110 v) _48\ vi) _UP <u>LVAC Distr</u> 2L1 Com							
ii) _Cha iii) _110 iv) _110 v) _48\ vi) _UP LVAC Distri 2L1 Com	attery Banks						
iii) _110 iv) _110 v) _48\ vi) _UP <u>LVAC Distr</u> 2L1 Com		2	Sets				
iv) _110 v) _48\ vi) _UP <u>LVAC Distr</u> 2L1 Com	harger	2	Sets				
v) _48\ vi) _UP <u>LVAC Distr</u> 2L1 Com	10V DC Distribution panel	1	Set				
v) _48\ vi) _UP <u>LVAC Distr</u> 2L1 Com	10V/48V DC DC Converter, 1.5kVA	2	Sets				
vi) _UP	8V DC Disatribution Panel	1	Set				
2L1 Com	PS system for SAS panels, 3kVA	2	sets				
2L1 Com			0010				
	mplete LVAC Distribution System with necessary DB, MCB, Meters	1	Lot				
i ieic		•	LOC				
	riff metering for two station auxilliary Transformer	1	Lot				
	tdoor weatherproof 3-phase,4 wire, 125A Socket outlet and plugs.	1	Nos				
	ks,Building and Foundation	1	Lot				
	mplete Land development with carried earthfilling	24300	Cubic				
21011 0011	mplete Land development with carried earthning	24000	Meter				
2M2 Com	mplete outdoor civil works						
	outdoor gantry foundation 230kV switchyard	1	Lot				
/ -	putdoor gantry foundation 132kV switchyard	1	Lot				
/ –	outdoor gantry foundation 33kV switchyard	1	Lot				
	Jutdoor equipment foundation 230kV switchyard	1	Lot				
, –	Jutdoor equipment foundation 132kV switchyard	1	Lot				
/ -	outdoor equipment foundation 132kV switchyard	1	Lot				
/ –	ransformer foundation including oilpit & carrage way	1	Lot				
/ _	last wall	1	Lot				
, –	ecurity Boundary Wall	1	Lot				
	ubstation Main gate	1	Lot				
	arbed Wire Fencing	1	Lot				
	pproach raod	1	Lot				
/ =	iternal road	1	Lot				
xiv) _Sur	urface drain	1	Lot				
xv) _Cat	able Trench	1	Lot				
/ _	witchyard surface finishing	1	Lot				
	iravel laying	1	Lot				
/ _	, ,	1	Lot				
	eptic tank, sowak way	1	Lot				
, –	eptic tank, sowak way						
xx) Gu	ump house including deep tubewell, motor, pump, water reservaoir,		Lot				·
2M3 Com	ump house including deep tubewell, motor, pump, water reservaoir, ter pipe line etc.	1					
	ump house including deep tubewell, motor, pump, water reservaoir, ter pipe line etc. urd house, sentry post, car port	1					
i) Eco	ump house including deep tubewell, motor, pump, water reservaoir, ter pipe line etc. aurd house, sentry post, car port mplete civil works for GIS & control room building		Lot				
/ =	ump house including deep tubewell, motor, pump, water reservaoir, ter pipe line etc. aurd house, sentry post, car port mplete civil works for GIS & control room building oundation works	1	Lot				
ii) _Sup	ump house including deep tubewell, motor, pump, water reservaoir, ter pipe line etc. aurd house, sentry post, car port mplete civil works for GIS & control room building		Lot Lot Lot				

					Price 1	Total	Price 1
				Foreign	Local	Foreign	Local
Item	Description	Qty	Unit	Curreny	Curreny	Curreny	Curreny
		(1)		Portion	Portion	Portion	Portion
014		(1)		(2)	(3)	(1) x(2)	(1) x (3)
	Building Lighting, Small Power, Air Conditioning & Ventilation						
	_BuildingSmall power	1	Lot				
	_Building Lighting & emergency DC lighting	1	Lot				
	_Building airconditioning & ventilation system	1	Lot				
	Outdoor switchyard Lighting, Small Power						
i)	_OutdoorSmall power	1	Lot				
	_Outdoor Lighting	1	Lot				
	Fault & Disturbance Recorder(DFDR)						
2N3.1	DFDR complete for all 230kV & 132kV bays for Shyampur new	1	Lot				
	Substation						
2N3.2	DFDR complete for all 230kV & 132kV bays for existing Old Airport &	1	Lot				
	Tongi Substation						
2N3.3	DFDR complete for all 230kV & 132kV bays for existing Tongi	1	Lot				
	Substation						
	Dptic Multiplexer Equipment for Teleprotection and Communication						
	Fibre Optic Multipexer Equipment for communication & protection	1	Lot				
	Hot line telephone system including phone sets, connection cords etc.	1	Lot				
Under	ground opticale fiber cable with Terminal box.						
	Underground Fibre Optic cable(48 cores)	1	Lot				
204	Outdoor termination box, indoor MDF & pigtail cables	1	Lot				
	ation with existing SCADA, NLDC system						
	Integration with existing SCADA/NLDC system.	1	Lot				
	tory Spares, tools & test equipment						
	230 kV GIS	-	-				
	Set of gas filling equipment and 3 bottles of 48kg of SF6	1	nos.				
	Arcing contact of CB	2	nos.				
	Moving contact of CB	2	nos.				
,							
· · ·	Fixed contact of CB	2	nos.				
	Moving contact of DS & ES	2	nos.				
,	Fixed contact of DS & ES	2	nos.				
/	Blast nozzle	2	nos.				
,	CB Closing coil	6	nos.				
ix)	CB Tripping coil	6	nos.				
x)	Motor for CB operating mechanism	1	nos.				
xi)	Dashpot for CB operating mechanism	2	nos.				
xii)	Motor for DS & ES drive	2	nos.				
xiii)	Supporting insulator	2	nos.				
xiv)	Supporting insulator with barrier	2	nos.				
,	Indicating lamps (20% of total guantities installed)	1	nos.				
,	Indicating lamp covers (10% of total quantities installed)	1	nos.				
,	Set of gaskets (10% of total quantities installed)	1	nos.				
	Heater	2					
	Humidity stat and thermostat	2	nos.				
,			nos.				
,	Gas pressure monitor	2	nos.				
,	Gas pressure switch	2	nos.				
	Gas pressure gauge	2	nos.			ļ	
-	Gas pressure relief device	2	nos.				
,	Gas sniffer	1	nos.				
xxv)	Gas hygrometer	1	nos.				
2Q2	132 kV GIS						
,	Arcing contact of CB	2	nos.				
ii)	Moving contact of CB	2	nos.				
iii)	Fixed contact of CB	2	nos.				
,		2	nos.				
iv)	Moving contact of DS & ES					-	
,			nos			1	
v)	Fixed contact of DS & ES	2	nos.				
v) vi)	Fixed contact of DS & ES Blast nozzle	2 2	nos.				
v) vi) vii)	Fixed contact of DS & ES Blast nozzle CB Closing coil	2 2 6	nos. nos.				
v) vi) vii) viii)	Fixed contact of DS & ES Blast nozzle CB Closing coil CB Tripping coil	2 2 6 6	nos. nos. nos.				
v) vi) vii) viii) viii) ix)	Fixed contact of DS & ES Blast nozzle CB Closing coil CB Tripping coil Motor for CB operating mechanism	2 2 6 6 1	nos. nos.				
v) vi) vii) viii) viii) ix)	Fixed contact of DS & ES Blast nozzle CB Closing coil CB Tripping coil	2 2 6 6	nos. nos. nos.				
v) vi) vii) viii) viii) ix) x)	Fixed contact of DS & ES Blast nozzle CB Closing coil CB Tripping coil Motor for CB operating mechanism	2 2 6 6 1	nos. nos. nos.				
v) vi) vii) viii) viii) ix) x) xi)	Fixed contact of DS & ES Blast nozzle CB Closing coil CB Tripping coil Motor for CB operating mechanism Dashpot for CB operating mechanism Motor for DS & ES drive	2 2 6 6 1 2	nos. nos. nos. nos.				
v) vi) vii) viii) viii) ix) xi) xi) xii)	Fixed contact of DS & ES Blast nozzle CB Closing coil CB Tripping coil Motor for CB operating mechanism Dashpot for CB operating mechanism Motor for DS & ES drive Supporting insulator	2 2 6 1 2 2 2	nos. nos. nos. nos. nos. nos.				
v) vi) vii) viii) viii) ix) xi) xi) xii) xi	Fixed contact of DS & ES Blast nozzle CB Closing coil CB Tripping coil Motor for CB operating mechanism Dashpot for CB operating mechanism Motor for DS & ES drive Supporting insulator Supporting insulator	2 2 6 1 2 2 2 2 2	nos. nos. nos. nos. nos. nos. nos.				
v) vi) vii) viii) viii) viii) xii) xi) xii) xi	Fixed contact of DS & ES Blast nozzle CB Closing coil CB Tripping coil Motor for CB operating mechanism Dashpot for CB operating mechanism Motor for DS & ES drive Supporting insulator Supporting insulator Supporting insulator with barrier Indicating lamps (20% of total quantities installed)	2 2 6 1 2 2 2 2 1	nos. nos. nos. nos. nos. nos. nos. nos.				
v) vi) vii) viii) viii) ix) xii) xii) xi	Fixed contact of DS & ES Blast nozzle CB Closing coil CB Tripping coil Motor for CB operating mechanism Dashpot for CB operating mechanism Motor for DS & ES drive Supporting insulator Supporting insulator Supporting insulator with barrier Indicating lamps (20% of total quantities installed) Indicating lamp covers (10% of total quantities installed)	2 6 6 1 2 2 2 2 1 1	nos. nos. nos. nos. nos. nos. nos. nos.				
v) vi) vii) viii) viii) viii) xii) xii)	Fixed contact of DS & ES Blast nozzle CB Closing coil CB Tripping coil Motor for CB operating mechanism Dashpot for CB operating mechanism Motor for DS & ES drive Supporting insulator Supporting insulator Supporting insulator Indicating lamps (20% of total quantities installed) Indicating lamp covers (10% of total quantities installed) Set of gaskets (10% of total quantities installed)	2 2 6 1 2 2 2 2 2 1 1 1 1	nos. nos. nos. nos. nos. nos. nos. nos.				
v) vi) vii) viii) viii) ix) xi) xii) xii	Fixed contact of DS & ES Blast nozzle CB Closing coil CB Tripping coil Motor for CB operating mechanism Dashpot for CB operating mechanism Motor for DS & ES drive Supporting insulator Supporting insulator Supporting insulator with barrier Indicating lamps (20% of total quantities installed) Indicating lamp covers (10% of total quantities installed) Set of gaskets (10% of total quantities installed) Heater	2 2 6 1 2 2 2 2 2 1 1 1 2	nos. nos. nos. nos. nos. nos. nos. nos.				
v) vi) vii) viii) viii) ix) xi) xii) xii	Fixed contact of DS & ES Blast nozzle CB Closing coil CB Tripping coil Motor for CB operating mechanism Dashpot for CB operating mechanism Motor for DS & ES drive Supporting insulator Supporting insulator Supporting insulator Indicating lamps (20% of total quantities installed) Indicating lamp covers (10% of total quantities installed) Set of gaskets (10% of total quantities installed)	2 2 6 1 2 2 2 2 2 1 1 1 1	nos.				
v) vi) vii) viii) viii) xi) xi) xii) xii	Fixed contact of DS & ES Blast nozzle CB Closing coil CB Tripping coil Motor for CB operating mechanism Dashpot for CB operating mechanism Motor for DS & ES drive Supporting insulator Supporting insulator Supporting insulator with barrier Indicating lamps (20% of total quantities installed) Indicating lamp covers (10% of total quantities installed) Set of gaskets (10% of total quantities installed) Heater	2 2 6 1 2 2 2 2 2 1 1 1 2	nos.				
v) vi) viii) viii) ix) xii) xii) xii) xi	Fixed contact of DS & ES Blast nozzle CB Closing coil CB Tripping coil Motor for CB operating mechanism Dashpot for CB operating mechanism Motor for DS & ES drive Supporting insulator Supporting insulator Supporting insulator with barrier Indicating lamps (20% of total quantities installed) Indicating lamp covers (10% of total quantities installed) Set of gaskets (10% of total quantities installed) Heater Humidity stat and thermostat	2 2 6 1 2 2 2 2 1 1 1 2 2 2 2 2 2 2 2 2	nos. nos.				

				Unit	Price ¹	Total	Price ¹
				Foreign	Local	Foreign	Local
ltem	Description	Qty	Unit	Curreny	Curreny	Curreny	Curreny
				Portion	Portion	Portion	Portion
		(1)		(2)	(3)	(1) x(2)	(1) x (3)
,	Gas pressure relief device	2	nos.				
	Auto Transformer & Switchgear						
	Transformer 230 kV bushings (For 300MVA Transformer)	1	no.				
	Ttransformer 138 kV bushings (For 300MVA Transformer)	2	nos.				
iii)	33 kV bushing	2	nos.				
	Neutral bushing	2	nos.				
	Winding temperature indicating device	2	nos.				
	Set of gaskets (10% of total quantities installed)	1	nos.				
vii)	Silica gel (100% of total quantities installed)	1	nos.				
viii)	Set of special tools, gauges and spanners	1	set				
ix)	Transformer oil treatment plant, 6000 Liters per hour	1	set				
x)	186kV Surge arrester	3	nos.				
	120 kV Surge Arrester	3	nos.				
	245kV, Cable Sealing End (for XLPE, 2000sqmm cu cable) incld. necessary all	2	sets				
xii)	145kV, Cable Sealing End (for XLPE, 1000sqmm cu cable) incld. necessary all	2	sets				
2Q4	Protection						
i)	Line distance relay with complete protection elements	1	set				
ii)	Transformer differential relay with complete REF function	1	set				
iii)	overcurrent and earth fault relay	1	set				
iv)	Tripping relay (electrical reset)	3	nos.				
v)	Bay control unit	1	set				
vi)	Trip Circuit Supervision relay, 3phase	1	set				
	Relay test block & plug	3	sets				
	Bulbs for annunciator	10	nos.				
205	Test Equipment						
	SF6 Gas Handling Equipment including storage tank	1	set				
	SF6 Gas leak Detector	1	set				
	Partial Discharge monitoring Device for GIS	1	set				
	Contact resistance measurement test set (suitable for measurement down to 1 μ ohm at 200A d.c.)	1	set				
vi)	5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV)	1	set				
,	Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm)	1	set				
viii)	Clip-on mA meter (for spill current)	1	set				
/	Portable Earthing lead including glass fiber stick	1	set				1
,	AVO Meter, digital	1	set			1	
			!	!	Į	1	l
(carrie	rice for Shyampur 230/132kV GIS Substation d to Schedule -B5: Grand Summary) Schedule B4 (carried to Schedule B5 Grand Summary)						

Name of Bidder

Signature of Bidder

¹ Specify currency in accordance with specifications in Bid Data Sheet under ITB 18.1.

(TRANSMISSION LINE PART)

PRICES SCHEDULES FOR SCOPE 3.1 & 3.2

Construction and completion of 132/33kV GIS substation at Dhamrai, 230/132kV GIS substation at Shyampur and associated transmission lines on turnkey basis.

TRANSMISSION LINE

Schedule No.B1 - Plant and Mandatory Spare Parts Supplied from Abroad Schedule B1. 3.1 : 230kV Meghnaghat-Hasnabad D/C Transmission Line In-Out)

					Foreign C	urrency in
ltem	Description	Code ¹	Unit	Qty	Unit Price ² CIF	Total Price CIF
				(1)	(2)	(1) x (2)
A1	Towers					
A1.1	Fabrication, galvanising and supply of various types of towers, & its body / leg (equal & unequal) extensions (complete) excluding stubs and bolts & nuts but including hangers, D-shackles, pack washer, earthing (2 Nos. power tower), step bolt, anti-theft nuts & bolts, anti- climbing device, danger plate, number plate etc. as per specification (payment shall be released for identified MT for		MT	444.5		
A1.1.1	High tensile steel and mild steel		MT	414.5		
	Sub-total for Item A1					

Construction and completion of 132/33kV GIS substation at Dhamrai, 230/132kV GIS substation at Shyampur and associated transmission lines on turnkey basis.

TRANSMISSION LINE

	le B1. 3.1 : 230kV Meghnaghat-Hasnabac				,	urrency in
ltem	Description	Code ¹	Unit	Qty	Unit Price ² CIF	Total Price CIF
				(1)	(2)	(1) x (2)
A2	Supply of insulator and fittings:					
	Insulator sets complete with insulators					
	and all hardware fittings including					
	suspension clamps, tension dead ends,					
	armour rods as per requirement, arcing					
A2.1	230kV, 120kN Suspension Insulator String for twin ACSR Mallar, complete		each	36		
A2.2	230kV, 210kN Heavy Suspension		each	12		
RZ.Z	Insulator String for twin ACSR Mallard,		each	12		
	complete assembly					
A2.3	230kV, twin 210kN tension Insulator		each	96		
	String for twin ACSR Mallar, complete					
A2.4	230kV, 120kN Single upright low duty		each	12		
	Tension Insulator String for twin ACSR					
	Mallard. complete assembly					
A2.5	230kV, 120kN Single inverted low duty		each	12		
	Tension Insulator String for twin ACSR					
	Mallard, complete assembly					
A2.6	Weighted spacers complete with 35kg		each	6		
	weight to be used with the jumper of					
A2.7	2Q30 tower		Nee	950		
AZ.7	Spacer damper and or vibration damper for twin ACSR Mallard for all 12 phases		Nos	850		
A2.8	Spacer for twin ACSR Mailard for all 12 brases		Nos	96		
A2.0	phases		1403	30		
A3	Supply of Phase Conductor and OPG	w				
A3.1	Phase conductor ACSR Mallard		route-km	1		
	including the necessary midspan joint					
	and repair sleeves. Twelve nos. twin					
	conductors on the line. Payment for					
	extra length for sag, jumper, joint etc.					
	shall deem to be included in the quoted		and the last			
A3.2	a) 7x4.00mm S earthwire equivalent		route-km	1		
	OPGW Fibre Optic Cable - 48 Fibre inclusive of joint boxes, fixing clamp,					
	fusion splices, connections to to the joint					
	boxes and earth bond as required as per					
	actual site condition. Two nos. OPGW					
	for the line. Payment for extra length due					
	to sag, joint etc. shall deem to be					
	e na ise actor e contra e		aash	0]
	 b) OPGW tension set complete assembly for above OPGW 		each	8		
	c) OPGW suspension set complete		each	2		
	assembly for above OPGW		Caon	~		1
	d) Vibration damper for above OPGW.		Nos	4		
				•		
A4	Aircraft obstruction lights solar		tower	3		
	powered complete with lamps, solar					1
	panels, batteries, control equipment					
	cables, support framework, tower					
	work platform etc	1			1	1

Schedule No.B1 - Plant and Mandatory Spare Parts Supplied from Abroad edule B1, 3.1 : 230kV Meghnaghat-Hasnabad D/C Transmission Line In-Out)

Construction and completion of 132/33kV GIS substation at Dhamrai, 230/132kV GIS substation at Shyampur and associated transmission lines on turnkey basis.

TRANSMISSION LINE

					Foreign C	urrency in
ltem	Description	Code ¹	Unit	Qty	Unit Price ² CIF	Total Price CIF
				(1)	(2)	(1) x (2)
	SPARES S					
S2	Phase Conductor and OPGW					
S2.1	ACSR Mallard		km	3		
S2.2	OPGW (7/4.00mm Steel earthwire		km			
02.2	equivalent)			2		
S3	Insulator					
S3.1	120kN insulator unit		each	204		
S3.2	210kN insulator unit		each	672		
S4	Fittings & Accessories					
S4.1	Mid-span joint for phase condutor		each	25		
	ACSR Mallard			25		
S4.2	Repair sleeve for phase conductor		each	25		
	ACSR Mallard			25		
S4.3	120kN single suspension set without		each	12		
	disc for twin ACSR Mallard			12		
S4.4	210kN twinTension set without disc for		each	24		
	twin ACSR Mallard			24		
S4.5	OPGW (7x4.00 mm S earthwire		each	2		
	equivalent) suspension set, complete			2		
S4.6	OPGW (7x4.00 mm S earthwire		each			
	equivalent) tension set, complete			2	1	
	assembly					
S4.7	Vibration damper for 7x4.00 mm		each			
	S earthwire equivalent OPGW			4		
	Sub-total for Item S					

Schedule No.B1 - Plant and Mandatory Spare Parts Supplied from Abroad nedule B1. 3.1 : 230kV Meghnaghat-Hasnabad D/C Transmission Line In-Out)

Construction and completion of 132/33kV GIS substation at Dhamrai, 230/132kV GIS substation at Shyampur and associated transmission lines on turnkey basis.

TRANSMISSION LINE

Schedule No.B1 - Plant and Mandatory Spare Parts Supplied from Abroad Schedule B1. 3.1 : 230kV Meghnaghat-Hasnabad D/C Transmission Line In-Out)

					Foreign C	urrency in
ltem	Description	Code ¹	Unit	Qty	Unit Price ² CIF	Total Price CIF
				(1)	(2)	(1) x (2)
Е	ERECTION & OTHER EQUIPMENT					
E1	Temporary earthing equipment		each	2		
E2	Elcometer		each	1		
E3	Motorised jointing compressor for conductor complete with disc suitable for ACSR Mallard conductors & 7x4.00 mm		each	1		
	Sub-total for Item E					
A3, A	price for schedule B1(Item A1+Item A2, 4 & A5 +Item S + Item E) forwarded to Schedule No. 5- Grand Summary					

Name of Bidder

Signature of Bidder

¹ Bidders shall enter a code representing the country of origin of all imported plant and equipment.

² Specifiy currency. Create and use as many column for Unit Price and total Price as there are ecurrencies.

Country of Origin Declaration Form

Item	Descritpion		Country	

Construction and completion of 132/33kV GIS substation at Dhamrai, 230/132kV GIS substation at Shyampur and associated transmission lines on turnkey basis.

TRANSMISSION LINE

le B1. 3.2 : 132kV Shyampur-Hasnabad Description 2kV Double Circuit Line Towers Fabrication, galvanising and supply of various types of towers, & its body / leg (equal & unequal) extensions (complete) excluding stubs and bolts & nuts but including hangers, D-shackles, pack washer, earthing (2 Nos. power tower), step bolt, anti-theft nuts & bolts, anti- climbing device, danger plate, number plate etc. as per specification (payment shall be released for identified MT for	-Haripu Code ¹	IT D/C Tra	Qty (1)		Out) Currency in Total Price CIF (1) x (2)
22kV Double Circuit Line Towers Fabrication, galvanising and supply of various types of towers, & its body / leg (equal & unequal) extensions (complete) excluding stubs and bolts & nuts but including hangers, D-shackles, pack washer, earthing (2 Nos. power tower), step bolt, anti-theft nuts & bolts, anti- climbing device, danger plate, number plate etc. as per specification (payment shall be released for identified MT for	Code ¹	Unit	-	Unit Price ² CIF	Total Price CIF
22kV Double Circuit Line Towers Fabrication, galvanising and supply of various types of towers, & its body / leg (equal & unequal) extensions (complete) excluding stubs and bolts & nuts but including hangers, D-shackles, pack washer, earthing (2 Nos. power tower), step bolt, anti-theft nuts & bolts, anti- climbing device, danger plate, number plate etc. as per specification (payment shall be released for identified MT for	Code		-	CIF	CIF
Towers Fabrication, galvanising and supply of various types of towers, & its body / leg (equal & unequal) extensions (complete) excluding stubs and bolts & nuts but including hangers, D-shackles, pack washer, earthing (2 Nos. power tower), step bolt, anti-theft nuts & bolts, anti- climbing device, danger plate, number plate etc. as per specification (payment shall be released for identified MT for			(1)	(2)	(1) x (2)
Towers Fabrication, galvanising and supply of various types of towers, & its body / leg (equal & unequal) extensions (complete) excluding stubs and bolts & nuts but including hangers, D-shackles, pack washer, earthing (2 Nos. power tower), step bolt, anti-theft nuts & bolts, anti- climbing device, danger plate, number plate etc. as per specification (payment shall be released for identified MT for					
Fabrication, galvanising and supply of various types of towers, & its body / leg (equal & unequal) extensions (complete) excluding stubs and bolts & nuts but including hangers, D-shackles, pack washer, earthing (2 Nos. power tower), step bolt, anti-theft nuts & bolts, anti- climbing device, danger plate, number plate etc. as per specification (payment shall be released for identified MT for					
various types of towers, & its body / leg (equal & unequal) extensions (complete) excluding stubs and bolts & nuts but including hangers, D-shackles, pack washer, earthing (2 Nos. power tower), step bolt, anti-theft nuts & bolts, anti- climbing device, danger plate, number plate etc. as per specification (payment shall be released for identified MT for					
High tensile steel and mild steel		MT	176		
Supply of insulator and fittings:					
Insulator sets complete with insulators and all hardware fittings including suspension clamps, tension dead ends, armour rods as per requirement,arcing horn etc.					
132kV 70kN Suspension Insulator String for ACSR Grosbeak		Sets	6		
132kV 120kN Heavy Suspension Insulator String for ACSR Grosbeak		Sets	162		
132kV 120kN tension Insulator String for ACSR Grosbeak		Sets	96		
132kV 70kN inverted low duty Tension Insulator String for ACSR Grosbeak		Sets	12		
132kV 70kN upright low duty_tension Insulator String for ACSR Grosbeak		Sets	12		
Weighted spacers complete with 35kg weight to be used with the jumper of 1Q30 tower		Sets	12		
Vibration Damper for ACSR Grosbeak		Nos	72		
Supply of Conductor and OPGW					
ACSR Grosbeak single conductor per phase. Total six nos. single conductors for double circuit line. Payment for extra length for sag, jumper, joint etc. shall deem to be included in the quoted price. a) OPGW Fibre Optic Cable - 12 Fibre including joint box and earth bond as required as per actual site condition. One no. OPGW for the line.		route-km route-km	1		
	requirement, arcing horn etc. 132kV 70kN Suspension Insulator String for ACSR Grosbeak 132kV 120kN Heavy Suspension Insulator String for ACSR Grosbeak 132kV 120kN tension Insulator String for ACSR Grosbeak 132kV 70kN inverted low duty Tension Insulator String for ACSR Grosbeak 132kV 70kN upright low duty tension Insulator String for ACSR Grosbeak Weighted spacers complete with 35kg weight to be used with the jumper of 1Q30 tower Vibration Damper for ACSR Grosbeak Supply of Conductor and OPGW ACSR Grosbeak single conductor per phase. Total six nos. single conductors for double circuit line. Payment for extra length for sag, jumper, joint etc. shall deem to be included in the quoted price. a) OPGW Fibre Optic Cable - 12 Fibre including joint box and earth bond as required as per actual site condition. One no. OPGW for the line.	requirement, arcing horn etc. 132kV 70kN Suspension Insulator String for ACSR Grosbeak 132kV 120kN Heavy Suspension Insulator String for ACSR Grosbeak 132kV 120kN tension Insulator String for ACSR Grosbeak 132kV 70kN inverted low duty Tension Insulator String for ACSR Grosbeak 132kV 70kN upright low duty tension Insulator String for ACSR Grosbeak Weighted spacers complete with 35kg weight to be used with the jumper of 1Q30 tower Vibration Damper for ACSR Grosbeak Supply of Conductor and OPGW ACSR Grosbeak single conductor per phase. Total six nos. single conductors for double circuit line. Payment for extra length for sag, jumper, joint etc. shall deem to be included in the quoted price. a) OPGW Fibre Optic Cable - 12 Fibre including joint box and earth bond as required as per actual site condition. One no. OPGW for the line.	requirement, arcing horn etc. 132kV 70kN Suspension Insulator String for ACSR Grosbeak 132kV 120kN Heavy Suspension Insulator String for ACSR Grosbeak 132kV 120kN tension Insulator String for ACSR Grosbeak 132kV 70kN inverted low duty Tension Insulator String for ACSR Grosbeak 132kV 70kN upright low duty tension Insulator String for ACSR Grosbeak Weighted spacers complete with 35kg weight to be used with the jumper of 1Q30 tower Vibration Damper for ACSR Grosbeak Supply of Conductor and OPGW ACSR Grosbeak single conductor per phase. Total six nos. single conductors for double circuit line. Payment for extra length for sag, jumper, joint etc. shall deem to be included in the quoted price. a) OPGW Fibre Optic Cable - 12 Fibre including joint box and earth bond as required as per actual site condition. One no. OPGW for the line.	requirement, arcing horn etc. 132kV 70kN Suspension Insulator String for ACSR Grosbeak 132kV 120kN Heavy Suspension Insulator String for ACSR Grosbeak 132kV 120kN tension Insulator String for ACSR Grosbeak 132kV 70kN inverted low duty Tension Insulator String for ACSR Grosbeak 132kV 70kN upright low duty tension Insulator String for ACSR Grosbeak Weighted spacers complete with 35kg weight to be used with the jumper of 1Q30 tower Vibration Damper for ACSR Grosbeak ACSR Grosbeak single conductor per phase. Total six nos. single conductors for double circuit line. Payment for extra length for sag, jumper, joint etc. shall deem to be included in the quoted price. a) OPGW Fibre Optic Cable - 12 Fibre including joint box and earth bond as required as per actual site condition. One no. OPGW for the line. Payment for extra length for the line. Payment for one no. OPGW for the line.	requirement, arcing horn etc. 132kV 70kN Suspension Insulator String for ACSR Grosbeak 132kV 120kN Heavy Suspension Insulator String for ACSR Grosbeak 132kV 120kN tension Insulator String for ACSR Grosbeak 132kV 70kN inverted low duty Tension Insulator String for ACSR Grosbeak 132kV 70kN upright low duty tension Insulator String for ACSR Grosbeak Weighted spacers complete with 35kg weight to be used with the jumper of 1Q30 tower Vibration Damper for ACSR Grosbeak Supply of Conductor and OPGW ACSR Grosbeak single conductor per phase. Total six nos. single conductors for double circuit line. Payment for extra length for sag, jumper, joint etc. shall deem to be included in the quoted price. a) OPGW Fibre Optic Cable - 12 Fibre including joint box and earth bond as required as per actual

Schedules of Rates and Prices Construction and completion of 132/33kV GIS substation at Dhamrai, 230/132kV GIS substation at Shyampur and associated transmission lines on turnkey basis.

	TRANSMIS	SION LI	NE			
	b) OPGW tension set complete assembly for above OPGW		Set	8		
	c) OPGW suspension set complete assembly for		Set	2		
	above OPGW					
	d) OPGW vibration damper		nos.	8		
	Sub-total for Item A1, A2, A3 & A4					
	SPARES S				l	l
S1	Phase Conductor and OPGW					
S1.1	ACSR Grosbeak		km	2		
S1.2	OPGW (7/3.25 Steel earthwire equivalent)		km	2		
S2	Insulator					
S2.1	70kN insulator unit		each	120		
S2.2	120kN insulator unit		each	240		
S3	Fittings & Accessories					
S3.1	Mid-span joint for phase ACSR Grosbeak		each	10		
S3.2	Repair sleeve for phase ACSR Grosbeak		each	10		
S3.3	70kN Suspension fittings without disc for ACSR Grosbeak		set	12		
S3.4	120kN Tension fittings without disc for ACSR Grosbeak		set	24		
S3.5	OPGW (7x3.25 mm S earthwire equivalent) suspension set, complete assembly		set	2		
S3.6	OPGW (7x3.25 mm S earthwire equivalent) tension set, complete assembly		set	2		
\$3.7	Vibration damper for 7x3.25 mm S earthwire equivalent OPGW		each	4		
	Sub-total for Item S					
Е	ERECTION & OTHER EQUIPMENT					
E1	Linesmen Harness (complete)		each	10		
	Sub-total for Item E					
	I price for schedule B1(Item A1+Item A2, A3 & B1+Item B2, B3 & B4+Item S + Item E) forwarded to Schedule No. 5- Grand Summary					

Name of Bidder

Signature of Bidder

¹ Bidders shall enter a code representing the country of origin of all imported plant and equipment.

² Specifiy currency. Create and use as many column for Unit Price and total Price as there are ecurrencies.

Country of Origin Declaration Form

ltem	Descritpion		Country	

Construction and completion of 132/33kV GIS substation at Dhamrai, 230/132kV GIS substation at Shyampur and associated transmission lines on turnkey basis.

TRANSMISSION LINE

Schedule No.B2 - Plant and Mandatory Spare Parts Supplied from within the Employer's country

Schedu	Ile B2. 3.1 : 230kV Meghnaghat-Hasnabac	D/C Tra	ansmission	Line In-O		Currency in	Local cur	rency in Bangla	desh taka
ltem	Description	Code ¹	Unit	Qty	EXW Unit Price ²	EXW Total Price	EXW Unit Price ¹	EXW Total Price ¹	VAT on EXW
				(1)	(2)	(3)=(1) x (2)	(4)	(5)=(1)x(4)	(6)
A1	Towers								
A1.1	Fabrication, galvanising and supply of various types of towers, & its body / leg (equal & unequal) extensions (complete) excluding stubs and bolts & nuts but including hangers, D-shackles, pack washer, earthing (2 Nos. power tower), step bolt, anti-theft nuts & bolts, anti-climbing device, danger plate, number plate etc. as per specification (payment shall be released for identified MT for complete tower)								
A1.1.1	High tensile steel and mild steel		MT	414.5					
	Sub-total for Item A1								

Construction and completion of 132/33kV GIS substation at Dhamrai, 230/132kV GIS substation at Shyampur and associated transmission lines on turnkey basis.

TRANSMISSION LINE

Schedule No.B2 - Plant and Mandatory Spare Parts Supplied from within the Employer's country

	Ile B2. 3.1 : 230kV Meghnaghat-Hasnabad			[Currency in	Local cur	rency in Bangla	adesh taka
ltem	Description	Code ¹	Unit	Qty	EXW Unit Price ²	EXW Total Price	EXW Unit Price ¹	EXW Total Price ¹	VAT on EXW
				(1)	(2)	(3)=(1) x (2)	(4)	(5)=(1)x(4)	(6)
A2	Supply of insulator and fittings:								
	Insulator sets complete with insulators and all hardware fittings including suspension clamps, tension dead ends, armour rods as per requirement, arcing horn etc.								
A2.1	230kV, 120kN Suspension Insulator String for twin ACSR Mallar, complete assembly		each	36					
A2.2	230kV, 210kN Heavy Suspension Insulator String for twin ACSR Mallard, complete assembly		each	12					
A2.3	230kV, twin 210kN tension Insulator String for		each	96					
A2.4	twin ACSR Mallar, complete assembly 230kV, 120kN Single upright low duty Tension Insulator String for twin ACSR Mallard, complete assembly		each	12					
A2.5	230kV, 120kN Single inverted low duty Tension Insulator String for twin ACSR Mallard, complete assembly		each	12					
A2.6	Weighted spacers complete with 35kg weight to be used with the jumper of 2Q30 tower		each	6					
A2.7	Spacer damper and or vibration damper for twin ACSR Mallard for all 12 phases		Nos	850					
A2.8	Spacer for twin ACSR Mallard for all 12 phases		Nos	96					
A3 A3.1	Supply of Phase Conductor and OPGW Phase conductor ACSR Mallard including the necessary midspan joint and repair sleeves. Twelve nos. twin conductors on the line. Payment for extra length for sag, jumper, joint etc. shall deem to be included in the quoted price.		route-km	1					
A3.2	a) 7x4.00mm S earthwire equivalent OPGW Fibre Optic Cable - 48 Fibre inclusive of joint boxes, fixing clamp, fusion splices, connections to to the joint boxes and earth bond as required as per actual site condition. Two nos. OPGW for the line. Payment for extra length due to sag, joint etc. shall deem to be included in the quoted price.		route-km	1					
	b) OPGW tension set complete assembly for		each	8					
	above OPGW c) OPGW suspension set complete assembly for above OPGW		each	2					
	d) Vibration damper for above OPGW.		Nos	4					
A4	Aircraft obstruction lights solar powered complete with lamps, solar panels, batteries, control equipment cables, support framework, tower work platform etc.		tower	3					
				<u> </u>					
	Sub-total for Item A2, A3 & A4								

Construction and completion of 132/33kV GIS substation at Dhamrai, 230/132kV GIS substation at Shyampur and associated transmission lines on turnkey basis.

TRANSMISSION LINE

Schedule No.B2 - Plant and Mandatory Spare Parts Supplied from within the Employer's country Schedule B2. 3.1 : 230kV Meghnaghat-Hasnabad D/C Transmission Line In-Out)

					Foreign C	Currency in	Local cur	rency in Bangla	adesh taka
ltem	Description	Code ¹	Unit	Qty	EXW Unit Price ²	EXW Total Price	EXW Unit Price ¹	EXW Total Price ¹	VAT on EXW
				(1)	(2)	(3)=(1) x (2)	(4)	(5)=(1)x(4)	(6)
	SPARES S								
S2	Phase Conductor and OPGW								
S2.1	ACSR Mallard		km	3					
S2.2	OPGW (7/4.00mm Steel earthwire equivalent)		km	2					
S3	Insulator								
S3.1	120kN insulator unit		each	204					
\$3.2	210kN insulator unit		each	672					
S4	Fittings & Accessories								
S4.1	Mid-span joint for phase condutor ACSR Mallard		each	25					
S4.2	Repair sleeve for phase conductor ACSR Mallard		each	25					
S4.3	120kN single suspension set without disc for twin ACSR Mallard		each	12					
S4.4	210kN twinTension set without disc for twin ACSR Mallard		each	24					
S4.5	OPGW (7x4.00 mm S earthwire equivalent) suspension set, complete assembly		each	2					
S4.6	OPGW (7x4.00 mm S earthwire equivalent) tension set, complete assembly		each	2					
S4.7	Vibration damper for 7x4.00 mm S earthwire equivalent OPGW		each	4					
	Sub-total for Item S								

Construction and completion of 132/33kV GIS substation at Dhamrai, 230/132kV GIS substation at Shyampur and associated transmission lines on turnkey basis.

TRANSMISSION LINE

Schedule No.B2 - Plant and Mandatory Spare Parts Supplied from within the Employer's country

					Foreign (Currency in	Local cur	rency in Bangla	adesh taka
tem	Description	Code ¹	Unit	Qty	EXW Unit Price ²	EXW Total Price	EXW Unit Price ¹	EXW Total Price ¹	VAT on EXW
				(1)	(2)	(3)=(1) x (2)	(4)	(5)=(1)x(4)	(6)
E	ERECTION & OTHER EQUIPMENT								
E1	Temporary earthing equipment		each	2					
E2	Elcometer		each	1					
E3	Motorised jointing compressor for conductor complete with disc suitable for ACSR Mallard conductors & 7x4.00 mm S earthwire to be used for this contract		each	1					
	Sub-total for Item E								
•	rice for schedule B1(Item A1+Item A2, A3, & A4 S + Item E) forwarded to Schedule No. 5- Grand Summary								

Name of Bidder

Signature of Bidder

¹ Bidders shall enter a code representing the country of origin of all imported plant and equipment.

² Specifiy currency. Create and use as many column for Unit Price and total Price as there are ecurrencies.

Country of Origin Declaration Form

ltem	Descritpion		Country	

Construction and completion of 132/33kV GIS substation at Dhamrai, 230/132kV GIS substation at Shyampur and associated transmission lines on turnkey basis.

TRANSMISSION LINE

Sched	lule B2. 3.2 : 132kV Shyampur-Hasnab	<u>untrv</u> ad-Har	ipur D/C	C Transi	nission Lin	e In-Out)			
					-	Surrency in	Local cu	Local currency in Banglad	
ltem	Description	Code ¹	Unit	Qty		EXW Total	EXW Unit		VAT on
					Price ²	Price	Price ¹	Total	EXW
								Price ¹	
								11100	
				(1)	(2)	(3)=(1) x (2)	(4)	(5)=(1)x(4)	(6)
Part A:	132kV Double Circuit Line								
A1	Towers								
A1.1 A1.1.1	Fabrication, galvanising and supply of various types of towers, & its body / leg (equal & unequal) extensions (complete) excluding stubs and bolts & nuts but including hangers, D- shackles, pack washer, earthing (2 Nos. power tower), step bolt, anti-theft nuts & bolts, anti- climbing device, danger plate, number plate etc. as per specification (payment shall be released for identified MT for complete tower) High tensile steel and mild steel		MT	176					
A2	Supply of insulator and fittings:			170					
_	Insulator sets complete with insulators and all hardware fittings including suspension clamps, tension dead ends, armour rods as per requirement, arcing horn etc.								
A2.1	132kV 70kN Suspension Insulator String for ACSR Grosbeak		Sets	6					
A2.2	132kV 120kN Heavy Suspension Insulator String for ACSR Grosbeak		Sets	162					
A2.3	132kV 120kN tension Insulator String for ACSR Grosbeak		Sets	96					

Schedules of Rates and Prices Construction and completion of 132/33kV GIS substation at Dhamrai, 230/132kV GIS substation at Shyampur and associated transmission lines on turnkey basis.

TRANSMISSION LINE

A2.4	132kV 70kN inverted low duty Tension Insulator	Sets	12		٦	
	String for ACSR Grosbeak					
A2.5	132kV 70kN upright low duty tension Insulator	Sets	12			
	String for ACSR Grosbeak					
A2.6	Weighted spacers complete with 35kg weight to	Sets	12			
	be used with the jumper of 1Q30 tower					
A2.7	Vibration Damper for ACSR Grosbeak	Nos	72			
A4	Supply of Conductor and OPGW					
A4.1	ACSR Grosbeak single conductor per phase.	route-	1			
	Total six nos. single conductors for double					
	circuit line. Payment for extra length for sag,					
	jumper, joint etc. shall deem to be included in	km				
A4.2	a) OPGW Fibre Optic Cable - 12 Fibre including	route-	1			
	joint box and earth bond as required as per					
	actual site condition. One no. OPGW for the					
	line. Payment for extra length due to sag, joint	km				
	etc. shall deem to be included in the quoted b) OPGW tension set complete assembly for	km Set	8		+	
	above OPGW	Sei	0			
	c) OPGW suspension set complete assembly	Set	2			
	for above OPGW	001	2			
	d) OPGW vibration damper	nos.	8			
	· · · · · · · · · · · · · · · · · · ·	1100.			+	
	Sub-total for Item A1, A2, A3 & A4					

	SPARES S						
S1	Phase Conductor and OPGW						
S1.1	ACSR Grosbeak		km	2			
S1.2	OPGW (7/3.25 Steel earthwire equivalent)		km	2			
S2	Insulator						
S2.1	70kN insulator unit	e	each	120			
S2.2	120kN insulator unit	e	each	240			
S3	Fittings & Accessories						

Schedules of Rates and Prices Construction and completion of 132/33kV GIS substation at Dhamrai, 230/132kV GIS substation at Shyampur and associated transmission lines on turnkey basis.

TRANSMISSION LINE

S3.1	Mid-span joint for phase ACSR Grosbeak	each	10			
S3.2	Repair sleeve for phase ACSR Grosbeak	each	10			
S3.3	70kN Suspension fittings without disc for ACSR Grosbeak	set	12			
S3.4	120kN Tension fittings without disc for ACSR Grosbeak	set	24			
S3.5	OPGW (7x3.25 mm S earthwire equivalent) suspension set, complete assembly	set	2			
S3.6	OPGW (7x3.25 mm S earthwire equivalent) tension set, complete assembly	set	2			
S3.7	Vibration damper for 7x3.25 mm	each	4			
	S earthwire equivalent OPGW					
	Sub-total for Item S					
E	ERECTION & OTHER EQUIPMENT					
E1	Linesmen Harness (complete)	each	10			
	Sub-total for Item E					
	price for schedule B1(Item A1+Item A2, A3 &					
A4+I	tem B1+Item B2, B3 & B4+Item S + Item E)					
forw	arded to Schedule No. 5- Grand Summary					

Country

Name of Bidder

Signature of Bidder

ltem	Descritpion		Country	

1 Bidders shall enter a code representing the country of origin of all imported plant and equipment.

2 Specifiy currency. Create and use as many column for Unit Price and total Price as there are ecurrencies.

Schedule B1
TRANSMISSION LINE

Schedule No. B3 - Design Service

Schedule B3. 3.1 : 230kV Meghnaghat-Hasnabad D/C Transmission Line In-Out)

Item	Description	Qty	Unit F	Price ¹	Total F	Price ¹
			Local Currency	Foreign Currency	Foreign Curreny	Local Curreny
			Portion	Portion	Portion	Portion
		(1)	(2)	(optional)		(1) x (2)
	All design cost as per requirement					
			to Schedule No. 5-	Grand Gummary)		
			Name of Bidder			-
		S	ignature of Bidder			

¹ specifiy currency in accordance with specifications in Bid Data Sheet under ITB 18.1.

TRANSMISSION LINE

Item	Description	Unit	Qty		Foreign Currency (it Price ¹	, ,	· .
			,	Un	IL FIICE	Total	FIICE
				Foreign Currency Portion	Local Currency Portion	Foreign Currency	Local Currency
			1	2	3	4=1x2	5=1x3
A1	Route Survey and clearance						
A1.1	Profile survey in accordance with the requirements of the technical specification, including full ground survey with change of tower location, if any, tower plotting and preparation and submission of route maps, profile drawings, SIMM documents, etc.	km	1				
A1.2	Route clearance in accordance with requirements of the technical specification including payment of compensation for crops, trees, houses, etc. and all kind of damage compensation.	km	1				
A2	Geotechnical Investigation						
A2.1	Geotechnical Investigation in accordance with the requirements of the Technical						
(a)	Level 2	borehole	5				
(b)	Level 3	borehole	NIL				
(c)	Level 4	borehole	NIL				
A3	Foundations						
	Foundations for towers including all setting out, Concrete, Reinforcement, Excavation, Pumping, Stub-cutting, Shuttering, Leveling, Timbering, supply & Installation of foundation steelwork, Earthing materials,Backfilling,foundation protection (cutting/ filling/ retaining wall etc.), approved Protective Coating & site						
A3.1	Tower Type 2DT6	per tower	2				
A3.2	Tower Type 2Q30	per tower	1				
A3.3	Tower Type 2QT6	per tower	2				
A4 A4.1	Testing of Foundations Supply (incl. Foundation, steel works), install and test foundation to prove compliance with Technical specification, payment for successful test only: Uplift test for pad & chimney type foundation for tower type 2DT6.	per test	1				
A4.2	Individual Pile test including supply,install and test to prove compliance with technical specification, payment for successful test only (applicable for all tower types selected by the Employer's	nertest	1				
(a)	Compression Type test	per test	1		+ +		
(b)	Uplift Type test Pile Integrity Test	per test	1 20		<u>├</u>		
(c)		per test or Item A1, A2		ļ	l – – – – – – – – – – – – – – – – – – –		+

Schedule No. B4: Installation and Other Services Schedule B4. 3.1 : 230kV Meghnaghat-Hasnabad D/C Transmission Line In-Out)

TRANSMISSION LINE

Schedule No. B4: Installation and Other Services
Schedule B4. 3.1 : 230kV Meghnaghat-Hasnabad D/C Transmission Line In-Out)

Item	Description	Unit	Qty		Foreign Currency	. , .	· .
Rom	Decomption	orm	QUY	_	it Price ¹	Total F	
				Foreign Currency Portion	Local Currency Portion	Foreign Currency	Local Currency
			1	2	3	4=1x2	5=1x3
A5	Erection of various types of towers, & its body / leg (equal & unequal) extensions (complete) excluding stubs and bolts & nuts but including hangers, D-shackles, pack washer, spring washer, plain washer, welding, painting (Anti-corrosive painting upt highest flood level of every tower), rest platform installation (if required), ladder installation (if required), aircraft warning sphere installation (if required), aircraft warning light installation (if required) etc. as per specification (payment shall be released for identified complete tower). The item also include installation of tower earthing, number plate, danger plate, bird guard, step bolt,	МТ 	414.5				
A6	Installation of insulator strings complete with arcing horns & necessary hardware, installing & stringing of conductor including fixing of conductor accessories, installing & stringing of two nos. OPGW including fixing of OPGW accessories.	km	1				
Α7	All works associated with making connection of existing 230kV double circuit line to new 230kV four circuit line tower including construction of temporary by-pass line (if required).For constructing temporary by-pass line, single circuit poles may be available at PGCB store. The contractor shall have to transport the poles from PGCB store to site. Other materials required for temporary by-pass line shall be used from the materials of this	Lumpsum	1				
A8	Supply of paint & painting of 60M and over tower in according with the requirements of the Technical Specification.	per tower	NIL				
A9	Aircraft obstruction lights solar powered complete with lamps, solar panels, batteries, control equipment cables, support framework, tower work platform etc.	tower	4				
Section	Sub-Total for Item A5, A6, A7, M: Miscellaneous	A8, A9 & A10					
M1	Erection of twin downleads including downdrops from terminal tower to substation gantry	per set of three	4				
M2	Erection of OPGW connection from terminal tower to substation gantry/mast including installation of OPGW termination boxes at the base of sub-station gantry structures.	Per wire	2				
	Sub-Total for Item	M					

Note: (1) in the Item A5, the unit 'Tower' means all the materials such as conductor, earthwire/OPGW, insulators, fittings etc. are included. (2) in item A3, unit rate of foundation for soil category 4 shall be higher than soil category 3 and unit rate of foundation for soil category 3 shall be higher than soil category 2.

Total Price (in words)

TRANSMISSION LINE

Schedule No. B4: Installation and Other Services

Schedule B4. 3.2 : 132kV Shyampur-Hasnabad-Haripur D/C Transmission Line In-Out)

				Foreig	In Currency	(F/C) Price (in)
Item	Description	Unit	Qty	Unit	Price ¹	Total	Price ¹
				Foreign Currency Portion	Local Currency Portion	Foreign Currency	Local Currency
			1	2	3	4=1x2	5=1x3
Part A: 13	2kV Double Circuit Line						
A1	Route Survey and clearance						
A1.1	Profile survey in accordance with the requirements of the technical specification, including full ground survey with change of tower location, if any, tower plotting and preparation and submission of route maps, profile drawings, SIMM documents, etc.	km	1				
A1.2	Route clearance in accordance with requirements of the technical specification including payment of compensation for crops, trees, houses, etc. and all kind of damage compensation.	km	1				
A2	Geotechnical Investigation						
A2.1	Geotechnical Investigation in accordance with the requirements of the Technical Specification						
(a)	Level 2	borehole	5				
(b)	Level 3	borehole	NIL				
(c)	Level 4	borehole	NIL				
A3	Foundations						
	Foundations for towers including all setting out, Concrete, Reinforcement, Excavation, Pumping, Stub- cutting, Shuttering, Leveling, Timbering, supply & Installation of foundation steelwork, Earthing Materials,Backfilling,foundation protection (cutting/ filling/ retaining wall etc.), approved Protective Coating & site clearing etc.						
A3.1	Tower Type 1DT6	per tower	2				

TRANSMISSION LINE

Schedule No. B4: Installation and Other Services

Schedule B4. 3.2 : 132kV Shyampur-Hasnabad-Haripur D/C Transmission Line In-Out)

				Foreiç	gn Currency ((F/C) Price (in)
Item	Description	Unit	Qty	Unit	Price ¹	Total	Price ¹
				Foreign Currency Portion	Local Currency Portion	Foreign Currency	Local Currency
			1	2	3	4=1x2	5=1x3
A3.2	Tower Type 1QL	per tower	1				
A3.3	Tower Type 1Q30	per tower	1				
A3.4	Tower Type 1QT6	per tower	2				
A4	Testing of Foundations						
A4.1	Supply (incl. Foundation, steel works), install and test foundation to prove compliance with Technical specification, payment for successful test only: Uplift test for pad & chimney type foundation for tower type 1DT6.	per test	1				
A4.2	Individual Pile test including supply,install and test to prove compliance with technical specification, payment for successful test only (applicable for all tower types selected by the Employer's Engineer):						
(a)	Compression Type test	per test	1				
(b)	Uplift Type test	per test	1				
(c)	Pile Integrity Test	per test	24				
A5	Erection of various types of towers, & its body / leg (equal & unequal) extensions (complete) excluding stubs and bolts & nuts but including hangers, D- shackles, pack washer, spring washer, plain washer, welding, painting (Anti-corrosive painting upto highest flood level of every tower), rest platform installation (if required), ladder installation (if required), aircraft warning sphere installation (if required), aircraft warning light installation (if required) etc. as per specification (payment shall be released for identified complete tower). The item also include installation of tower earthing, number plate, danger plate, bird guard, step bolt, anti-climbing device etc.	MT	175.99				
A6	Installation of insulator strings complete with arcing horns & necessary hardware, installing & stringing of conductor including fixing of conductor accessories & installing & stringing of OPGW including fixing of OPGW accessories.	km	16				

TRANSMISSION LINE

Schedule No. B4: Installation and Other Services

Schedule B4. 3.2 : 132kV Shyampur-Hasnabad-Haripur D/C Transmission Line In-Out)

connection of to new 230kV four uction of d).For constructing cuit poles may be ractor shall have store to site. Other by-pass line shall		Qty 1	Unit I Foreign Currency Portion 2	Price ¹ Local Currency Portion <u>3</u>	Total Foreign Currency 4=1x2	Price ¹ Local Currency 5=1x3		
to new 230kV four uction of d).For constructing cuit poles may be ractor shall have store to site. Other		1	Currency Portion	Currency Portion	Currency	Currency		
to new 230kV four uction of d).For constructing cuit poles may be ractor shall have store to site. Other		1	2	3	4=1x2	5=1x3		
to new 230kV four uction of d).For constructing cuit poles may be ractor shall have store to site. Other		1						
contract.								
m A1, A2, A3, A4, A	5 & A6							
tower to substation	Set of three	4						
terminal tower to	Per wire	2						
	Sub-Total for Item M							

Note: (1) in the Item A5 & B5, the unit 'Tower' means all the materials such as conductor, earthwire/OPGW, insulators, fittings etc. are included.

Total Price (in words)

Schedule B5 - Grand Summary

Item	Description	Total	Price ¹
		Foreign in	Local in BDT
Scope-1:	Dhamrai 132/33 kV GIS Substation		
1	Total Schedule B1. Plant, and Mandatory Spare Parts Supplied from Abroad		
2	Total Schedule B2. Plant, and Mandatory Spare Parts Supplied from Within the Employer's Country		
3	Total Schedule B3. Design Service		
4	Total Schedule B4. Installation and Other Services		
Total of S	cope-1		
Scope- 2:	Shyampur 230/132 kV GIS Substation		
1	Total Schedule B1. Plant, and Mandatory Spare Parts Supplied from Abroad		
2	Total Schedule B2. Plant, and Mandatory Spare Parts Supplied from Within the Employer's Country		
3	Total Schedule B3. Design Service		
4	Total Schedule B4. Installation and Other Services		
Total of S			
Scope- 3.	1: 230kV Meghnaghat-Hasnabad D/C Transmission Line	<u>n-Out)</u>	
1	Total Schedule B1. Plant, and Mandatory Spare Parts Supplied from Abroad		
2	Total Schedule B2. Plant, and Mandatory Spare Parts Supplied from Within the Employer's Country		
3	Total Schedule B3. Design Service		
4	Total Schedule B4. Installation and Other Services		
Total of S	cope-3.1		
Scope- 3.2	2 : 132kV Shyampur-Hasnabad-Haripur D/C Transmission	Line In-Out)	
1	Total Schedule B1. Plant, and Mandatory Spare Parts Supplied from Abroad		
2	Total Schedule B2. Plant, and Mandatory Spare Parts Supplied from Within the Employer's Country		
3	Total Schedule B3. Design Service		
4	Total Schedule B4. Installation and Other Services		
Total of S	cope-3.2		
Grand To	tal excluding VAT on EXW(to Bid Form)		

Note: VAT on EXW is included in the contract price and shall be paid by the contractor which shall be re-imbursed by the employer to the contractor at actual basis but not more than the quoted amount upon submission of relevent document.

Name of Bidder

Signature of Bidder

¹ specifiy currency in accordance with specifications in Bid Data Sheet under ITB 18.1. Create and use as many as columns for Foregin Currency requirement as there are foreign currencies.

ltem	Description	Qty		Price ¹	Total Price
			CIF or CIP	EXW	
		(1)	(2)	(optional)	(1) x (2) or (3)

Schedule B6 - Recommended Spare Parts

Name of Bidder

Signature of Bidder

BIDDING DOCUMENT

FOR

CONSTRUCTION AND COMPLETION OF 132/33KV GIS SUBSTATION AT DHAMRAI, 230/132KV GIS SUBSTATION AT SHYAMPUR AND ASSOCIATED TRANSMISSION LINES ON TURNKEY BASIS.

SCHEDULE C

COMPLETION TIME SCHEDULES

BIDDING DOCUMENT

Construction and completion of 132/33kV GIS substation at Dhamrai, 230/132kV GIS substation at Shyampur and associated transmission lines on turnkey basis. SCHEDULE C

TIMES FOR DELIVERY AND COMPLETION

The individual dates are all contractually binding.

The times given under Column D are the commissioning target dates at present planned to be achieved and may be the subject of mutual adjustment.

Column A details the earliest dates by which access to site can be given for storage purposes. The times entered under column B are to be the dates guaranteed for arrival at Site of the first shipment of parts for the circuits in question being also the dates when the contract requires access to the Site for plant erection, to the extent necessary to enable him to proceed with work to meet the dates under column C guaranteed for complete delivery, erection and commissioning of the shipment.

The times include all necessary control, relay, metering, auxiliary power ancillary equipment to enable the respective circuit or item of plant to be completely commissioned and put into commercial operation, together with such other associated equipment, e.g. busbars, etc as will ensure that subsequent shutdown are unnecessary or at least only of a temporary or short time nature.

Site	A* Latest Access Permitted	B* Guaranteed Arrival of first shipment	C* Guaranteed Completion	D* Target Completio n
Dhamrai,Manikganj & Shyampur,Dhaka, Narayanganj	7 days from the date of signing of the Contract		730(Seven Hundred Thirty) Days.	

* Time in days, from contract effective date.

Preliminary SLD, overall layout and control building drawings of the Technical Specifications shall be provided within 2.0 months of the contract commencing date.

SCHEDULE C-1(Substation Part) BAR CHART PROGRAMME OF KEY ACTIVITIES

	Time Period in month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		1		1	Ī			1																
Equipment Design	1	1		1											1									
Drawings of single line diagram																								
Drawings of 230kV,132kV and 33kV Switchgear Layout																								
Drawings of 230kV Switchgear Equipment																								
Drawings of 225/300MVA Power Transformer																								
Drawings of 50/75MVA Power Transformer																								
Manufacture of 230kV,132kV &33kV Switchgear																								
Manufacture of 225/300MVA Power Transformer																								
Manufacture of 50/75MVA Power Transformer																								
Manufacture of Control, Protection, and Metering System																								
																								<u> </u>
Factory Acceptance Test																								
Delivery of equpment to site																								
Building & Foundation Design																								
Calculation/Drawings of gantry structures and equipment supports																								
Calculaiton /Drawings of control building																								
Calculaiton /Drawings of earthing System																								
Construction and Installation Works																								
Site Survey																								
Geo-technical survey																								
Switchyard																								
- Piling																								
- Foundation works incl. earthing																								
- Cable trenches																								
- Gantry and equpment support installation																								
switchgear equipment installation																								
Transformer installation																								
- Busbars, Jumper condcutors and OH earthwire installation																								
Construction of Control Building/GIS Bulding																								
Cable laying & Termination																								
Installation of LVAC & DC system																								
Installation of Indoor equipment (Control, protection, metering, SAS, DFDR																								
etc.)																								
Testing & Commissioning Note: Time to complete the plant and services from the effective date i																								

Note: Time to complete the plant and services from the effective date is 730(Seven Hundred Thirty) days.

SCHEDULE C-2(Transmission Line Part)

BAR CHART PROGRAMME OF KEY ACTIVITIES

													Мс	onth										
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Check Survey																								
Approval of Plan & Profile Drawings																								
Tower Design																								
Foundation Design																								
Soil test & foundation																								
Tower Testing																								
Manufacture of Tower																								
Approval of Specification of conductor, earthwire, OPGE,																								
Insulator & fittings																								
Manufacture of Conductor, Insulator, Earthwire, OPGW &																								
accessories																								
Tower Erection																								
Manufacture of Fiber optic cable & Fittings																								
Stringing																								
Testing & Commissioning																								

The Works under this turnkey contract shall be completed within [24(Twenty) months-(minus) { Total time of delay made by the Bidder to submit the Performance Security as per ITB 45.1, Vol. 1 of 3 of the bidding document}] from the date of signing of the contract.

Schedule C: Bar Chart Programme of Key Activities

BIDDING DOCUMENT

FOR

CONSTRUCTION AND COMPLETION OF 132/33KV GIS SUBSTATION AT DHAMRAI, 230/132KV GIS SUBSTATION AT SHYAMPUR AND ASSOCIATED TRANSMISSION LINES ON TURNKEY BASIS.

SCHEDULE D

MANUFACTURERS, PLACES OF MANUFACTURE AND TESTING

BIDDING DOCUMENT

DESIGN, SUPPLY, ERECTION, TESTING & COMMISSIONING OF 132/33KV GIS SUBSTATION AT DAMRAI, 230/132KV GIS SUBSTATION AT SHYAMPUR AND A SSOCIATED TRANSMISSION LINES ON TURNKEY BASIS.

SCHEDULE D (Substation Part)

MANUFACTURERS, PLACES OF MANUFACTURE AND TESTING

The following Subcontractors and/or manufacturers are proposed for carrying out the item of the facilities indicated.

Bidders are free to propose more than one for each item.

Item	Description	Proposed Subcontractors/ Manufacturers	Place of Manufacture	Place of Testing and Inspection
1	230kV INDOOR GIS			
2	132kV INDOOR GIS			
3	132kV OUTDOOR GIS			
4	230 kV SWITCHGEAR Lightning Arrester Flexible conductors EarthWire Connectors Insulator -Post -Disc Fittings Steel Structures			
5	132 kV SWITCHGEAR Lightning Arrester Flexible conductors EarthWire Connectors Insulator -Post -Disc Fittings Steel Structures			

Item	Description	Proposed Subcontractors/ Manufacturers	Place of Manufacture	Place of Testing and Inspection
6	33 kV SWITCHGEAR			
	Circuit-breakers			
	CB Operating Mechanism			
	Disconnectors			
	Current transformers			
	Voltage Transformers			
	Lightning Arrester			
	Busbar conductor			
	Flexible conductors			
	EarthWire Connectors			
	Insulator			
	-Post			
	-Disc			
	Fittings			
	Steel Structures			
7	230/138/33 kV POWER			
	TRANSFORMERS			
	Complete			
	HV bushings			
	LV bushings			
	TV bushings			
	Porcelain for insulators			
	Tap changers			
	Copper			
	Core plates			
	Tanks			
	Radiators			

Item	Description	Proposed Subcontractors/ Manufacturers	Place of Manufacture	Place of Testing and Inspection
	Fan motors			
	Temperature indicators			
	Oil valves			
	Pressure relief device			
	Motor control equip.			
	Gas/Oil actuated relay			
	Transformer oil			
	Remote control panel			
	Automatic voltage control			
	equipment			
	Indicating instruments			
8	132/33 kV POWER TRANSFORMERS			
	Complete			
	On load Tap Changer			
	HV bushings			
	LV bushings			
	Porcelain for insulators			
	Tap changers			
	Copper			
	Core plates			
	Tanks			
	Radiators			
	Fan motors			
	Temperature indicators			
	Oil valves			
	Pressure relief device			
	Motor control equip.			
	Gas/Oil actuated relay			
	Transformer oil			

Item	Description	Proposed Subcontractors/ Manufacturers	Place of Manufacture	Place of Testing and Inspection
	Remote control panel			
	AutomaticVoltageRegulator			
	Indicating instruments			
9	33/0.4 kV EARTHING TRANSFORMERS			
10	33/0.4 kV AUXILIARY TRANSFORMERS			
11	Deleted			
12	PROTECTION METERING AND CONTROL			
	Control & Relay Panels			
	Protective relays			
	Substation automation			
	System			
	DFDR			
	Meters			
	Transducers			
	Energy meter			
13	DC EQUIPMENT			
	Batteries			
	Chargers			
	Distribution Boards			
14	415 V SWITCH BOARD			
15	MULTICORE CABLES			
	XLPE Insulated Cables			
	Cable trays			
16	POWER CABLES			
	230 kV XLPE Cables 132 kV XLPE Cables			

Item	Description	Proposed Subcontractors/ Manufacturers	Place of Manufacture	Place of Testing and Inspection
	33 kV XLPE Cables			
	230 & 132 kV Cable sealing ends and 33kV Cable termination kits			
17	EARTHING Copper flatbar/ Copper conductor			
	Insulated copper Conductor			
	Earthing Rod			
18	FIBRE OPTIC MULTIPLEXER EQUIPMENT			
19	PABX System			
20	SITE ERECTION AND COMMISSIONING BY			
	CIVIL WORKS			
	Design to be performed by:-			
	Constructed by:-			

SCHEDULE D (Transmission Line Part)

Proposed Subcontractors/Manufacturers for Major Items of Plant and Services

The following Subcontractors and/or manufacturers are proposed for carrying out the item of the facilities indicated:

Bidders are free to propose more than one for each item.

If the bidder proposes equipment from the following manufacturers, then only authorization letter from those manufacturers will require to be submitted, no need to provide any other documents as mentioned above:

Tower: Kalpataru, India or KEC, India, or Bosung, Korea or L& T, India or MAN Structure, India or Jyoti Structures Ltd, India.

Conductor: Sterlite, India or Apar India or Hang Zhou Cable China or ZTT China.

Insulator: NGK Insulator, Japan.

Fittings for Conductor, Earthwire & Insulator: Sefag, Switzerland or Mozdorfer Austria or Sicamax, France or EMI, India.

OPGW: Prysmian, Spain or NKT, Germany or Draka Germany or LS cable, Korea or ZTT, China.

OPGW Fittings: Prysmian, Spain or Sefag, Switzerland or Mozdorfer, Austria or Sicamax, France or ZTT, China.

Item	Description	Manufacturer	Place of Manufacture	Place of Testing and Inspection
1.	TOWER			
	Tower			
	Nuts, Bolts, washer etc.			
2.	CONDUCTOR & FITTINGS		•	
	Conductor			
	Conductor fittings			
3.	EARTHWIRE & FITTINGS			
	Earthwire			
	Earthwire fittings			
4.	OPGW & FITTINGS			
	OPGW			
	OPGW fittings			
	Joint/Splice Boxes			
5.	INSULATOR & FITTINGS		•	
	Insulator units			
	Insulator fittings			

BIDDING DOCUMENT

FOR

CONSTRUCTION AND COMPLETION OF 132/33KV GIS SUBSTATION AT DHAMRAI, 230/132KV GIS SUBSTATION AT SHYAMPUR AND ASSOCIATED TRANSMISSION LINES ON TURNKEY BASIS.

SCHEDULE E

TECHNICAL PARTICULARS AND GUARANTEES

BIDDING DOCUMENT

CONSTRUCTION AND COMPLETION OF 132/33KV GIS SUBSTATION AT DHAMRAI, 230/132KV GIS SUBSTATION AT SHYAMPUR AND ASSOCIATED TRANSMISSION LINES ON TURNKEY BASIS

SCHEDULE E

TECHNICAL PARTICULARS AND GUARANTEES

PART 1 - 230 kV & 132 kV GIS

1.1A SHYAMPUR 230/132kV INDOOR TYPE GIS SUBSTATION:

Sl.	Description	Unit	Bidder's Data		
No.	Description	Omt	230 kV	132 kV	
1	Site Condition				
	Max. Altitude above sea level	m			
	Max. Ambient temperature outdoor	⁰ C			
	Min. Ambient temperature outdoor	⁰ C			
	Max. Ambient relative humidity	%			
	Max. Seismic acceleration at floor level:				
	- horizontal	g			
	- vertical	g			
2	Type Designation				
	Enclosure:				
	- busbar				
	- bay				
	Enclosure Material				
	Standards				
3	Electrical Data				
	Rated Voltage	kV			
	Rated Frequency	Hz			
	Insulation Level:				
	- lightning impulse withstand	kV			
	- 50 Hz withstand 1 minute	kV			
	Rated continuous current at 40 [°] C				
	ambient temperature:				
	- main busbar and bus coupler	A			
	- transformer bay	Α			
	- line bay	A			
	Rated short time withstand:				

Sl.	Decovirtion	TI:4	Bidder	's Data
No.	Description	Unit –	230 kV	132 kV
	- current	kA		
	- duration	sec		
	Rated peak withstand current	kA		
4	Secondary Circuit			
	Auxiliary voltage:			
	- for control and signal	V dc		
	- for remote control	V dc		
	- for heating	V ac		
	- tolerances	%		
5	Solid Insulators			
	Type of solid insulators			
	Material of solid insulators			
	Discharge level at 110% of the	9		
	Rated voltage	pC		
	Gas tight disc type insulator:			
	- bursting pressure	Bar		
	- routine test pressure	Bar		
6	Insulation Medium			
	Insulation medium			
	Max. permissible moisture content	ppmv		
	Max. permissible air content	vol%		
7	Gas Compartments			
	No. of gas compartment per feeder			
	Max. gas losses per gas	0/		
	compartment and year	%		
	Material of filter employed for			
	Moisture absorption			
	Gas filling pressure at 20 [°] C	Den		
	ambient temperature	Bar		
	Max. gas-service pressure at 40 [°] C	Dor		
	ambient temperature	Bar		
	Min. gas-service pressure at 25 ^o C	Bar		
	ambient temperature	Dai		
	Type of gas monitoring			
	Signal: "Loss of SF6-Gas" at 20 ⁰ C ambient temperature	Bar		
	Signal: "Min. of SF6-Gas" at 20 ⁰ C	Bar		

Sl.	Description	Unit	Bidder's Data		
No.	Description		230 kV	132 kV	
	ambient temperature				
	Type of pressure relief device				
	Material of pressure relied device				
	Setting of pressure relief device	Bar			
8	Enclosures				
	Mechanical strength of enclosures:				
	- design pressure	Bar			
	- min. bursting pressure	Bar			
	Temperature rise of enclosures at				
	Rated current:				
	- which have to be touched	IZ			
	during normal operation	K			
	- which need not to be touched	77			
	during normal operation	K			
	- which are not accessible	77			
	to the operation	K			
9	Circuit Breaker				
	Enclosure				
	Enclosure material				
	Material of contacts				
	No. of breaks per phase				
	Rated continuous current at 40 [°] C				
	ambient temperature	A			
	Rated short time breaking current	kA			
	Rated peak withstand current	kA			
	Percentage D.C component	%			
	First-pole-to-clear-factor				
	Rated breaking current, small				
	capacitive currents	A			
	Rated breaking current, small				
	inductive currents	A			
	Switching overvoltage	p.u.			
	Operating mechanism:				
	- for closing				
	- for opening	+ +			
	Making coil:	+			
	- no. per operating mechanism	pcs			
	- rated power each	W			

Sl.	Description	T.L.	Bidder's Data		
No.	Description	Unit –	230 kV	132 kV	
	Tripping coil:				
	- no. per operating mechanism	pcs			
	- rated power each	W			
	- voltage tolerances	%			
	Rated motor voltage	V dc			
	Rated motor power	W			
	No. of auxiliary contacts				
	(NC/NO/wiping)	pcs			
	Rated operating sequence:				
	- t	sec			
	- t'	min			
	Max. closing time	ms			
	Max. dead time	ms			
	Max. break time	ms			
	Max. arcing time	ms			
10	Disconnector				
I	Enclosure				
I	Enclosure material				
I	Rated continuous current at 40 [°] C				
I	ambient temperature	A			
I	Rated breaking current	A			
	Operating mechanism:				
	- for closing				
	- for opening				
	Max. operating time:				
	- for closing	S			
	- for opening	S			
	No. of auxiliary contacts	nos			
	(NC/NO/wiping)	pcs			
I	Rated motor voltage	V dc			
I	Rated motor power	W			
	Hand operating facilities				
L					
11	Maintenance Earthing Switch				
	Enclosure				
	Enclosure material				
	Operating mechanism:				
	- for closing				

Sl.	Description	Unit	Bidder	's Data
No.	Description		230 kV	132 kV
	- for opening			
	Max. operating time:			
	- for closing	S		
	- for opening	S		
	No. of auxiliary contacts			
	(NC/NO/wiping)	pcs		
	Rated motor voltage	V dc		
	Rated motor power	W		
	Hand operating facilities			
12	High Speed Earthing Switch			
	Enclosure			
	Enclosure material			
	Rated current	Α		
	Rated capacitive breaking current	Α		
	Rated inductive breaking current	Α		
	Operating mechanism:			
	- for closing			
	- for opening			
	Max. operating time:			
	- for closing	S		
	- for opening	S		
	No. of auxiliary contacts (NC/NO/wiping)	pcs		
	Rated motor voltage	V dc		
	Rated motor power	W		
	Hand operating facilities			
13	Surge Arrester			
	Rated voltage	kV		
	Nominal discharge current	kA		
	Steep current impulse residual voltage	kV pk		
	Lightning impulse residual voltage	kV pk		
	Duty class			
	Discharge class			
14	CT ratio, class and output			
	(a) Line bay	Α		
	(b) 230 kV Transformer bay	Α		
Sl.	Description	Unit	Bidder	's Data
-----	---------------------------------	------	--------	---------
No.		Umt	230 kV	132 kV
	(c) 132 kV Transformer bay	Α		
	(d) Bus coupler bay	Α		
15	VT ratio, class and out			
	Ratio	kV		
	Burden	VA		
	Accuracy class			
16	Circuit Breaker Control Cubicle			
	Material			
	Material thickness	mm		
	Dimensions (depth/width/height)	mm		
	Total net weight	mm		
17	Separate Local Control Cubicle			
	Material			
	Material thickness	mm		
	Dimensions (depth/width/height)	mm		
	Total net weight	mm		

1.1B DHAMRAI 132/33kV OUTDOOR TYPE GIS SUBSTATION:

Sl.	Description	TT	Bidder's Data
No.		Unit	132 kV
1	Site Condition		
	Max. Altitude above sea level	m	
	Max. Ambient temperature outdoor	⁰ C	
	Min. Ambient temperature outdoor	⁰ C	
	Max. Ambient relative humidity	%	
	Max. Seismic acceleration at floor level:		
	- horizontal	g	
	- vertical	g	
2	Type Designation		
	Enclosure:		
	- busbar		
	- bay		
	Enclosure Material		
	Standards		
3	Electrical Data		
	Rated Voltage	kV	
	Rated Frequency	Hz	

Sl.	Decomintion	Unit	Bidder's Data
No.	Description	Umt	132 kV
	Insulation Level:		
	- lightning impulse withstand	kV	
	- 50 Hz withstand 1 minute	kV	
	Rated continuous current at 40 [°] C		
	ambient temperature:		
	- main busbar and bus coupler	А	
	- transformer bay	А	
	- line bay	Α	
	Rated short time withstand:		
	- current	kA	
	- duration	sec	
	Rated peak withstand current	kA	
4	Secondary Circuit		
	Auxiliary voltage:		
	- for control and signal	V dc	
	- for remote control	V dc	
	- for heating	V ac	
	- tolerances	%	
5	Solid Insulators		
	Type of solid insulators		
	Material of solid insulators		
	Discharge level at 110% of the		
	Rated voltage	pC	
	Gas tight disc type insulator:		
	- bursting pressure	Bar	
	- routine test pressure	Bar	
6	Insulation Medium		
	Insulation medium		
	Max. permissible moisture content	ppmv	
	Max. permissible air content	vol%	
7	Gas Compartments		
	No. of gas compartment per feeder		
	Max. gas losses per gas	0/	
	compartment and year	%	
	Material of filter employed for		
	Moisture absorption		
	Gas filling pressure at 20 [°] C	D	
	ambient temperature	Bar	

Sl.	Description	TI	Bidder's Data	
No.	Description	Unit	132 kV	
	Max. gas-service pressure at 40 [°] C	Bar		
	ambient temperature	Dai		
	Min. gas-service pressure at 25 [°] C ambient temperature	Bar		
	Type of gas monitoring			
	Signal: "Loss of SF6-Gas" at 20 ⁰ C ambient temperature	Bar		
	Signal: "Min. of SF6-Gas" at 20 ⁰ C ambient temperature	Bar		
	Type of pressure relief device			
	Material of pressure relied device			
	Setting of pressure relief device	Bar		
8	Enclosures			
	Mechanical strength of enclosures:			
	- design pressure	Bar		
	- min. bursting pressure	Bar		
	Temperature rise of enclosures at			
	Rated current:			
	- which have to be touched	IZ		
	during normal operation	K		
	- which need not to be touched	K		
	during normal operation	K		
	- which are not accessible	K		
	to the operation	K		
9	Circuit Breaker			
	Enclosure			
	Enclosure material			
	Material of contacts			
	No. of breaks per phase			
	Rated continuous current at 40 [°] C	•		
	ambient temperature	A		
	Rated short time breaking current	kA		
	Rated peak withstand current	kA		
	Percentage D.C component	%		
	First-pole-to-clear-factor			
	Rated breaking current, small capacitive currents	A		

Sl.	Decomintion	TI:4	Bidder's Data
No.	Description	Unit	132 kV
	Rated breaking current, small	А	
	inductive currents	A	
	Switching overvoltage	p.u.	
	Operating mechanism:		
	- for closing		
	- for opening		
	Making coil:		
	- no. per operating mechanism	pcs	
	- rated power each	W	
	Tripping coil:		
	- no. per operating mechanism	pcs	
	- rated power each	W	
	- voltage tolerances	%	
	Rated motor voltage	V dc	
	Rated motor power	W	
	No. of auxiliary contacts	nes	
	(NC/NO/wiping)	pcs	
	Rated operating sequence:		
	- t	sec	
	- t'	min	
	Max. closing time	ms	
	Max. dead time	ms	
	Max. break time	ms	
	Max. arcing time	ms	
10	Disconnector		
	Enclosure		
	Enclosure material		
	Rated continuous current at 40 [°] C	А	
	ambient temperature		
	Rated breaking current	А	
	Operating mechanism:		
	- for closing		
	- for opening		
	Max. operating time:		
	- for closing	S	
	- for opening	S	
	No. of auxiliary contacts	pcs	

Sl.	Description	Unit	Bidder's Data
No.	Description	Umt	132 kV
	(NC/NO/wiping)		
	Rated motor voltage	V dc	
	Rated motor power	W	
	Hand operating facilities		
11	Maintenance Earthing Switch		
	Enclosure		
	Enclosure material		
	Operating mechanism:		
	- for closing		
	- for opening		
	Max. operating time:		
	- for closing	S	
	- for opening	s	
	No. of auxiliary contacts		
	(NC/NO/wiping)	pcs	
	Rated motor voltage	V dc	
	Rated motor power	W	
	Hand operating facilities		
12	High Speed Earthing Switch		
	Enclosure		
	Enclosure material		
	Rated current	A	
	Rated capacitive breaking current	A	
	Rated inductive breaking current	A	
	Operating mechanism:		
	- for closing		
	- for opening		
	Max. operating time:		
	- for closing	s	
	- for opening	S	
	No. of auxiliary contacts		
	(NC/NO/wiping)	pcs	
	Rated motor voltage	V dc	
	Rated motor power	W	
	Hand operating facilities		
12			
13	Surge Arrester	1-3.7	
	Rated voltage	kV	

Sl.	Description	Unit	Bidder's Data
No.	Description	Umt	132 kV
	Nominal discharge current	kA	
	Steep current impulse residual voltage	kV	
		pk	
	Lightning impulse residual voltage	kV	
		pk	
	Duty class		
14	Discharge class		
14	CT ratio, class and output		
	(a) Line bay	A	
	(b) Deleted		
	(c) 132 kV Transformer bay	A	
	(d) Bus coupler bay	Α	
15	VT ratio, class and out		
	Ratio	kV	
	Burden	VA	
	Accuracy class		
16	Circuit Breaker Control Cubicle		
	Material		
	Material thickness	mm	
	Dimensions (depth/width/height)	mm	
	Total net weight	mm	
17	Separate Local Control Cubicle		
	Material		
	Material thickness	mm	
	Dimensions (depth/width/height)	mm	
	Total net weight	mm	

PART 2 – Outdoor Type Switchgear(AIS)

2.1A VACUUM CIRCUIT BREAKERS(VCB) for Dhamrai SS:

Sl. No.	Nominal System Voltage		33 kV
1	Manufacturer		
2	Type Reference (Manufacturer's designation)		

SI. No.	Nominal System Voltage		33 kV
3	Number of Poles		
4	Rated Voltage		
5	Rated frequency		
6	Rated normal current-	Α	
7	Rated breaking currents: Line charging Cable charging Small inductive	kA rms	
8	Rated short-circuit breaking current	kA,rms	
9	First pole to clear factor		
10	Rated transient recovery voltage for terminal faults if other than standard	kV	
11	Rated characteristics for short-line faults		
12	Rated short-circuit making current	kA	
13	Rated operating sequence		
14	Rated duration of short-circuit	S	
15	Rated out of phase breaking current	kA	
16	Rated opening time	ms	
17	Rated break time	ms	
18	Rated closing time	ms	
19	Maximum arcing time of any duty cycle to IEC 56	ms	
20	Is circuit-breaker re-strike free	Yes/No	
21	Test Authority		
22	Test Certificate ref.		
23	Rated short time withstand current	kA	
24	Rated duration of short-circuit	s	
25	Rated peak withstand current	kA	
26	Rated insulation levels:-		
26.1	Lightning impulse withstand to earth	kV pk	
	(waveshape 1.2/50µs)		

SI. No.	Nominal System Voltage		33 kV
26.2	Lightning impulse withstand across open	kV pk	
	contacts (waveshape 1.2/50µs)		
26.3	Power frequency voltage withstand to earth	kV rms	
26.4	Power frequency voltage withstand across open contacts	kV rms	
27	Frequency of operation	yr ⁻¹	
28	Operating mechanism Manufacturer		
29	Mechanism Type:		
30	Trip free/or fixed trip		
31	Is lockout facility fitted?		
32	Closing supply Volts max/min Amps	V A	
33	Rated supply voltage of shunt opening release	V	
34	Current required at rated supply voltage to open circuit-breaker Spring charging motor - Current - Voltage AC/DC	A A V	
35	Number of auxiliary switch contacts - normally open - normally closed - adjustable		
36	Other auxiliary loads: Voltage:		
37	Current:		
38	Degree of Protection for (a) auxiliary circuits (b) moving parts		
39	Minimum clearances in air:(a)between phases(b)phases to earth(c)across interrupters(d)live parts to ground level	mm mm mm mm	
40	Minimum creepage (a) to earth (b) across interrupter terminals	mm mm	

Sl. No.	Nominal System Voltage		33 kV
41	Radio interference voltage	μV	
42	Number of interrupters per pole		
43	Material of interrupter chamber		
44	Wall thickness of interrupter chamber	mm	
45	Material of contact surfaces primary arcing		
46	Length of each break	mm	
47	Length of stroke	mm	
48	Operating rod for moving contact(s) material		
49	DIMENSIONS, ETC.		
50	Weight of circuit-breaker unit complete	kg	
51	Maximum shock load imposed on floor or foundations when opening under fault conditions (state whether tension or compression)	kg	
52	Period of time equipment has been in commercial operation		
53	Number of the same type of circuit breakers supplied to date		

2.1B VACUUM CIRCUIT BREAKERS (VCB) for Shyampur SS:

Sl. No.	Nominal System Voltage		33 kV
1	Manufacturer		
2	Type Reference (Manufacturer's designation)		
3	Number of Poles		
4	Rated Voltage		
5	Rated frequency		
6	Rated normal current-	А	
7	Rated breaking currents: Line charging Cable charging	kA rms	

Sl. No.	Nominal System Voltage		33 kV
	Small inductive		
8	Rated short-circuit breaking current	kA,rms	
9	First pole to clear factor		
10	Rated transient recovery voltage for terminal faults if other than standard	kV	
11	Rated characteristics for short-line faults		
12	Rated short-circuit making current	kA	
13	Rated operating sequence		
14	Rated duration of short-circuit	S	
15	Rated out of phase breaking current	kA	
16	Rated opening time	ms	
17	Rated break time	ms	
18	Rated closing time	ms	
19	Maximum arcing time of any duty cycle to IEC 56	ms	
20	Is circuit-breaker re-strike free	Yes/No	
21	Test Authority		
22	Test Certificate ref.		
23	Rated short time withstand current	kA	
24	Rated duration of short-circuit	s	
25	Rated peak withstand current	kA	
26	Rated insulation levels:-		
26.1	Lightning impulse withstand to earth	kV pk	
	(waveshape 1.2/50µs)		
26.2	Lightning impulse withstand across open	kV pk	
	contacts (waveshape 1.2/50µs)		
26.3	Power frequency voltage withstand to earth	kV rms	
26.4	Power frequency voltage withstand across open contacts	kV rms	
27	Frequency of operation	yr ⁻¹	

SI. No.	Nominal System Voltage		33 kV
28	Operating mechanism Manufacturer		
29	Mechanism Type:		
30	Trip free/or fixed trip		
31	Is lockout facility fitted?		
32	Closing supply Volts max/min Amps	V A	
33	Rated supply voltage of shunt opening release	v	
34	Current required at rated supply voltage to open circuit-breaker Spring charging motor - Current	A	
	- Voltage AC/DC	V	
35	Number of auxiliary switch contacts - normally open - normally closed - adjustable		
36	Other auxiliary loads: Voltage:		
37	Current:		
38	Degree of Protection for (a) auxiliary circuits (b) moving parts		
39	Minimum clearances in air:(a)between phases(b)phases to earth(c)across interrupters(d)live parts to ground level	mm mm mm mm	
40	Minimum creepage (a) to earth (b) across interrupter terminals	mm mm	
41	Radio interference voltage	μV	
42	Number of interrupters per pole		
43	Material of interrupter chamber		
44	Wall thickness of interrupter chamber	mm	
45	Material of contact surfaces primary arcing		

Sl. No.	Nominal System Voltage		33 kV
46	Length of each break	mm	
47	Length of stroke	mm	
48	Operating rod for moving contact(s) material		
49	DIMENSIONS, ETC.		
50	Weight of circuit-breaker unit complete	kg	
51	Maximum shock load imposed on floor or foundations when opening under fault conditions (state whether tension or compression)	kg	
52	Period of time equipment has been in commercial operation		
53	Number of the same type of circuit breakers supplied to date		

2.2 DISCONNECTORS AND EARTHING SWITCHES

Sl. No.	Nominal System Voltage		33 kV
1	Manufacturer		
2	Type Number		
3	Operating type		
	(a) horizontal/vertical break		
	(b) Series/parallel		
	(c) Number of support insulator for pole		
	(d) Number of breaks per pole (SingleBreak/CenterBreak/DoubleBreak)		
	(e) Material of contact surfaces		
	(f) Type of Contacts		
4	Rated normal current	A	
5	Rated short time withstand current	kA, rms	
6	Rated duration of short time current	S	

SI. No.	Nominal System Voltage		33 kV
7	Rated peak withstand current	kA pk	
8	Rated insulation levels:		
8.1	Lightning impulse withstand to earth (waveshape: 1.2/50µs)	kV pk	
8.2	Lightning impulse withstand across open contacts (waveshape: 1.2/50µs)	kV pk	
8.3	Power frequency voltage withstand to earth	kV rms	
8.4	Power frequency voltage withstand across open contacts	kV rms	
9	Method of operation		
10	Type of operating mechanism manual/power		
11	Operating power		
12	Voltage/pressure rated max min	V/MPa(g) V/MPa(g) V/MPa(g)	
13	Consumption electric	A	
14	Operating time: open max min	ms ms	
15	Operating time: close max min	ms ms	
16	Manual operating torque	kNm	
17	Load switching capability	А	
18	Mechanical Terminal Load	Ν	
19	Insulator Creepage	mm	
20	Radio interference voltage	mV	
21	Number of auxiliary switches - normally open - normally closed - adjustable		
22	Other auxiliary loads - voltage - current		
23	Mechanical endurance:		
	Number of operations carried out for		

Sl. No.	Nominal System Voltage		33 kV
	mechanical operation test		
24	Degree of protection for 1) auxiliary circuits 2) moving parts		
25	Total weight of three pole disconnector complete	kg	
26	Type test certificate date/reference		
27	Period of time equipment has been in commercial operation		
28	Number of the same type of disconnectors supplied to date		

2.3 CURRENT TRANSFORMERS (for Dhamrai SS)

Sl. No.	Nominal System Voltage		33 kV
1	Manufacturer/type		
2	Rated primary current	A rms	
3	Rated secondary current	A rms	
4	Rated frequency	Hz	
5	Highest voltage for equipment	kV	
6	Rated insulation level - primary winding	kV	
7	Lightning impulse withstand	kV pk	
8	(a) Power frequency withstand (dry)(b) Power frequency withstand (wet)	kV rms kV rms	
9	Insulator creepage (phase to earth)	mm	
10	Electrical dissipation factor at power frequency test voltage		
11	Radio influence voltage measured at $U/\sqrt{3}$ 1 MHz	μV	
12 13	Rated short term thermal current for 1s Rated short term thermal current for 3s	A rms A rms	
14	Rated dynamic current	kA pk	
15	Insulation class		
16	Number of secondary windings		

Sl. No.	Nominal System Voltage	33 kV
	Location of core	
	Core 1 Rated output Accuracy class Accuracy limit factor	
	Core 2 Rated output Accuracy class Accuracy limit factor	
	Core 3 Rated output Accuracy class Accuracy limit factor	
	Core 4 Rated output Accuracy class Accuracy limit factor	
17	Is earth screen fitted between primary and secondary windings	
18	Type test certificate ref/date	

2.4 Inductive Voltage Transformer

SI. No.	Nominal System Voltage	33 kV	
1	Manufacturer	-	
2	Type No.	-	
3			
	Transformer type	-	
4			
	Rated primary voltage	kV rms	
5	Rated secondary voltage for each secondary winding	kV rms	
6	Accuracy class for each winding	VA	
	Rated output for each winding	VA	
	Rated volt-ampere rating for each winding		
7	Rated voltage factor		
8	Type of Insulation		
9	Maximum temperature rise	oC	
10	Short-circuit withstand capability	kA rms	
11	Primary insulation		
11.1	Lightning impulse withstand dry	kV pk	
11.2	(a) Power frequency withstand wet	kV rms	
	(b) Power frequency withstand dry	kV rms	
12	Partial discharge magnitude	pC	
13	Total external creepage distance	mm	
14	Radio influence voltage measured at	μV	
	11 Um/ 3 at 1 MHz		
15	Total installed weight	kg	
17	Open circuit intermediate voltage	kV	

SI. No.	Nominal System Voltage		33 kV
18	Rated open-circuit intermediate voltage	kV	
19	Reference range of frequency	+/- Hz	
20	Reference range of temperature	oC	
21	Protective device to limit overvoltage		

2.5 SURGE ARRESTERS

Sl. No.	Nominal System Voltage		230kV	132kV	33 kV
1	Manufacturer				
2	Model Number				
3	Туре:				
4	Continuous operating voltage	kV rms			
5	Rated voltage	kV rms			
6	Standard nominal discharge current	kA			
7	Reference current at ambient temperature	mA			
8	Reference voltage for above	kV rms			
9	Steep current impulse residual voltage	kV pk			
10	Lightning impulse residual voltage at 5kA 10kA 20kA	kV pk kV pk kV pk			
11	Duty Class				
12	Discharge class				
13	Pressure relief class				
14	Nominal diameter of resistor blocks	mm			
15	Number of resistor blocks connected electrically in parallel				
16	Number of separately housed units per phase				
17	Overall height of arrester (without supporting structure)	m			
L			1		

18	Overall height of arrester including grading ring if applicable	mm
19	Clearances: phase to earth (from centre line) phase to phase (centre line to centre line)	mm mm
20	Overall Weight of arrester (without supporting structure)	kg
21	Maximum cantilever strength	Nm
22	Maximum force due to wind (at maximum specified gust speed)	Nm
23	Minimum creepage distance over insulator housing	mm
24	Insulator shed profile - Reference Document	
25	Terminal palm details - Drawing No.	
26	Earthing terminal - Drawing No.	
27	Type & Description of surge monitoring device	
28	Type test certificate ref/date	
29	Number of the same type of surge arresters supplied to date	

2.6 INSULATOR STRINGS

Sl. No.	Nominal System Voltage		230 kV	132 kV	33 kV
1	Manufacturer				
2	Insulator type (normal) and manufacturer's reference				
3	Insulation material				
4	Number of units per string				
5	Outside diameter	mm			
6	Distance between centres	mm			
7	Length of string overall	mm			

8	Maximum working load	kN
9	Minimum failing load per unit	kN
10	Mechanical routine load test	kN
11	Electro-mechanical failing load	kN
12	Mechanical failing load	kN
13	Electrostatic capacity	pF
14	Weight of complete string	kg
15	50 Hz 1 minute withstand voltage of unit (dry)	kV
16	50 Hz 1 minute withstand voltage of unit (wet)	kV
17	Minimum 50 Hz puncture voltage	kV
18	Dry lightning impulse withstand voltage of string1.2/50 micro sec. wave	kV
19	Minimum creepage distance per unit: (a) Specified, subject to acceptable shed profile (b) Guaranteed	mm mm
20	Protected creepage distance per unit	mm
21	Radio influence voltage measured at Um/ $\sqrt{3}$ at 1 MHz	μV

2.7 BUSBAR/JUMPER CONDUCTORS AND CONNECTIONS

Sl. No.	Nominal System Voltage	23kV	132 kV	33 kV
А.	FLEXIBLE CONDUCTORS			
1	Manufacturer			
2	Conductor material			
3	Material specification aluminium alloy			
4	Minimum use of grease			
5	Number of sub conductor per			

6	Nominal diameter of conductor			
7	Rated current (site rating)			
8	Temperature rise at rated current			
9	Short time withstand current for	~		
10	Peak withstand current			
11	Conductor spacer type			
12	Creep period of conductor	years		
В.	SHIELD WIRES			
1	Manufacturer			
2	Conductor material			
3	Material specification			
	aluminium alloy			
C.	CLAMPS AND FITTINGS			
	Manufacturer			
	Types			
	Maximum working stresses			
D	STEEL STRUCTURES			
1	Manufacturer			
2	Proposed standards for steel			

PART 3 – TRANSFORMERS

3.1 230/138/33 kV, 225/300 MVA, 3-PHASE AUTO TRANSFORMER

Sl. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type/Model		
3	Continuous rating - ONAN/ONAF	MVA	
4	Voltage ratio no load - HV/LV/TV	kV	
5	Tap changer:		
	- tapping range		
	- size of tapping step		
	- no. of steps		
6	Vector group		
7	On-load voltage control equipment:		
	- type		
	- manufacturer		

Sl. No.	Description	Unit	Bidder's Data
	- range	%	
	- size of steps	%	
	 power frequency withstand test voltage between: first and last contacts of the selector switch between any two adjacent contacts of the selector between open diverter switch contacts type test certificate reference 		
8	Type of cooling		
9	Winding temperature rise at CMR under service conditions stated in Schedule of Technical Requirement	⁰ C	
10	Top oil temperature under service conditions stated in Schedule of Technical Requirement:	0	
	- CMR	⁰ C	
	- ONAN rating	⁰ C	
11	Maximum hot spot temperature rise in core at rated power	⁰ C	
12	Maximum hot spot temperature rise in copper at rated power	⁰ C	
13	Temperature gradient at rating specified	⁰ C	
14	Flux density in iron at normal voltage and frequency and at normal ratio – no load:		
	- cores	Tesla	
	- yokes	Tesla	
	- Volts/turn	V	
15	Magnetising current (approx.) at nominal ratio:		
	- at 0.9 x nominal voltage	%	
	- at 1.0 x nominal voltage	%	
	- at 1.1 x nominal voltage	%	
	- at 1.2 x nominal voltage	%	
16	Harmonic component of magnetising current		
	at rated voltage as percentage of fundamental:		
	- fifth harmonic	%	
	- seven harmonic	%	
17*	No-load loss (excluding cooling plant losses)		
	at rated voltage, ratio and frequency	kW	
18*	Copper loss (excluding cooling plant losses) at 75° C and at rated voltage, ratio(nominal tap),	kW	

Sl. No.	Description	Unit	Bidder's Data
	frequency and 300 MVA		
19*	Auxiliary loss at 300 MVA (total power input to fans for operation of total installed cooling	kW	
20	capacity) Total loss at 75 [°] C and normal ratio and	kW	
21	300 MVA (Sl. No. 17+18+19) Regulation at 75 ^o C and normal ratio:		
	- at unity power factor	%	
22	- at 0.8 lagging power factor Impedance voltage at 75 [°] C and CMR between	%	
	HV & LV windings		
	- at extreme minus tap, normal tap and extreme plus tap	%	
	 maximum impedance over tapping range. Corresponding tap 	%	
	 minimum impedance over tapping range. Corresponding tap 	%	
23	Equivalent circuit zero sequence impedance: HV-LV	%	
24	Maximum current density in windings at CMR		
	- HV winding	A/mm ²	
	- LV winding	A/mm ²	
	- TV winding	A/mm ²	
25	Noise level	dB	
26	Type of transformer (shell or core)		
27	Core steel:		
	- type		
	- grade		
28	Type of winding:		
	- HV		
	- LV		
	- TV		
29	Insulation of winding:		
	- HV		
	- LV		
20	- TV		
30	Insulation of:		
	- yoke bolts		

Sl. No.	Description	Unit	Bidder's Data
	- side plates		
31	Safe working temperature of core plate	⁰ C	
	insulation	C	
32	Winding connections (brazed or crimped)		
33	For fault with zero impedance external to the		
	transformer and infinite system		
	- maximum axial force	kN	
	- maximum tensile stress in winding	N/m ²	
34	Is facility provided for adjustment of axial	Yes/No	
	pressure on windings	1 65/100	
35	Thickness of transformer tank:		
	- sides	mm	
	- bottom	mm	
36	Material used for gaskets for oil tight joints		
	Radiators, Valves, Fans		
37	Thickness of radiator plates	mm	
38	Valve type/material:		
	- 100mm and below		
	- above 100mm		
39	Equipment for ONAF + cooling state	Radiators	
		on main tank	
40	No. of coolers/radiators or cooler banks		
41	No. of air blowers		
42	Speed of air blowers	rpm	
43	Rating of each air blower motor	kW	
44	Starting current of each air blower motor	A	
	Oil Volumes and Weight		
45	Total oil required including cooler system	litres	
46	Volume of oil to fill transformer above the top	litres	
	yoke	nues	
47	Total volume of conservator	litres	
48	Weight of active copper	tonnes	
49	Weight of active iron in core	tonnes	
50	Weight of core and winding assembly	tonnes	
51	Weight of each cooler bank complete with oil	tonros	
	if mounted separately from transformer	tonnes	
52	Total weight of complete transformer including	tonnes	
	attached coolers, voltage regulating equipment,	tonnes	

Sl. No.	Description	Unit	Bidder's Data
	all fittings and oil		
53	Weight of transformer arranged for transport	tonnes	
54	Manufacture, type and class of oil to IEC 296		
	Transformer Parts Subject to		
	Short-Circuit Test		
55	Brief description of transformer or parts thereof		
	subjected to short-circuit test		
	Bushing insulators		
56	Terminations of terminals:		
	- HV		
	- LV		
	- TV		
	- Neutral		
57	Manufacturer		
58	Rated voltage		
59	Rated current		
60	BCT particulars		
	- HV side:		
	no. of cores per phase		
	rated primary current		
	rated secondary current		
	accuracy class		
	- LV side:		
	no. of cores per phase		
	rated primary current		
	rated secondary current		
	accuracy class		
	- TV side:		
	no. of cores per phase		
	rated primary current		
	rated secondary current		
	accuracy class		
	- Neutral side:		
	no. of cores per phase		
	rated primary current		
	rated secondary current		
	accuracy class		
61	Porcelain Bushing Insulators		

Sl. No.	Description	Unit	Bidder's Data
	- manufacturer		
	- overall length of insulator	mm	
	- weight of insulator	kg	
	- electrostatic capacity of complete bushings	pF	
	- dry lightning impulse voltage withstand	kV	
	- total creepage distance of outdoor shedding	mm	
	- protected creepage distance of shedding	mm	

* Guaranteed values subject to deduction from Contract Price

3.2 132/33kV, 50/75 MVA, 3-PHASE POWER TRANSFORMER:

Sl. No.	Description	B	idder's data
1.1	Name of the Manufacturer		
1.2	Type/Model		
2.1	Continuous Rating - ONAN ONAF		
2.2	Voltage ratio at no-load HV/LV	kV	
3	Tap Changer		
3.1	HV Tap Changer (On load type) Tapping Range		
	Size of tapping step		
	No. of Steps		
4	Vector Group		
5	On-load voltage control equipment:		
	 (A) Type. (B) Manufacturer (C) Range (D) Size of steps (E) Power frequency withstand test voltage (BS.4571) between: first and last contacts of the selector switch between any two adjacent contacts of the selector 	% %	

Sl. No.	Description	Bidder's data
	between open diverter switch contacts (F) Type test certificate reference	
6	Type of cooling	
7	Winding temperature rise at CMR under service conditions stated in Schedule of Technical Requirement	°C
8	 Top oil temperature under service conditions stated in Schedule of Technical Requirement (A) CMR (B) ONAN rating 	°C °C
9	Maximum hot spot temperature rise in core at rated power	°C
10	Maximum hot spot temperature rise in copper at rated power	°C
11	Temperature gradient at rating specified	°C
12	Flux density in iron at normal voltage and frequency and at normal ratio - (no load) (A) Cores (B) Yokes (C) Volts/turn	Tesla Tesla V
13	Magnetising current (approx) at nominal ratio and at 0.9 x nominal voltage at 1.0 x nominal voltage at 1.1 x nominal voltage at 1.2 x nominal voltage	0/0 0/0 0/0 0/0
14	Harmonic component of magnetising current at rated voltage as percentage of fundamental (A) Fifth harmonic	0/0

Sl. No.	Description		Bidder's data
	(B) Seven harmonic	%	
15*	No-load loss (excluding cooling plant losses) at rated voltage, ratio and frequency	kW	
16*	Copper loss (excluding cooling plant losses)at 75°C and at rated voltage, ratio (nominal tap),frequency & 75 MVA	kW	
17*	Auxiliary loss at 75 MVA (Total power input to fans for operation of total installed cooling capacity)	kW	

Sl. No.	Description		Bidder's data
18	Total loss at 75°C and normal ratio and 75 MVA (Sl. No.15+16+17)	kW	
19	Regulation at 75°C and normal ratio - (A) At unity power factor % (B) At 0.8 lagging power factor	% %	
20	(i) Impedance voltage at 75°C and CMR between HV & LV windings		
	(A) at extreme minus tap normal tap extreme plus tap	0/0 0/0 0/0	
	(B) Maximum Impedance over tapping range.Corresponding tap	%	
	(C) Minimum Impedance over tapping range.Corresponding tap	%	
	Impedance voltage at 75°C and CMR(75MVA) between HV & LV at normal tap.		
21	Equivalent circuit zero sequence impedance: HV-LV	%	
22	Maximum current density in windings at C.M.R. (A) HV winding (B) LV winding (C) SV winding	A/mm2 A/mm2 A/mm2	
24	Noise level	dB	
25	Types of transformers (shell or core)		

SI. No.	Description		Bidder's data
26	Core steel (a) Type (b) Grade		
27	Types of winding - (A) HV (B) LV		
28	Insulation of (a) HV windings (b) LV windings		
29	Insulation of - (A) Yoke bolts (B) Side plates		
31	Safe working temperature of core plate insulation	°C	
32	Winding connections brazed or crimped		
33	For fault with zero impedance external to the transformer and infinite system (a) Maximum axial force (b) Maximum tensile stress in winding	kN N/m²	
34	Is facility provided for adjustment of axial pressure on windings	Yes/No	
35	Thickness of transformer tank (A) Sides (B) Bottom	mm mm	
36	Material used for gaskets for oil tight joints		
	Radiators, Valves, Fans		
37	Thickness of radiator plates	mm	
38.	Valve type/material: (A) 100mm and below (B) Above 100mm		
39	Equipment for ONAF + cooling state -	Radiator s on main tank	

SI. No.	Description		Bidder's data
40	Number of coolers/radiators or cooler banks per transformer		
41	Number of air blowers per transformer		
42	Speed of air blowers	rpm	
43	Rating of each air blower motor	kW	
44	Starting current of each air blower motor	А	
	Oil Volumes and Weights		
45	Total oil required including cooler system	litres	
46	Volume of oil to fill transformer to above the top yoke	litres	
47	Total volume of conservator	litres	
48	Weight of active copper	tonnes	
49	Weight of active iron in core	tonnes	
50	Weight of core and winding assembly	tonnes	
51	Weight of each cooler bank complete with oil if mounted separately from transformer	tonnes	
52	Total weights of complete transformers, including attached coolers, voltage regulating equipment, all fittings and oil	tonnes	
53	Weight of transformer arranged for transport	tonnes	
54	Manufacture, type and class of oil to IEC 296		
55	Transformer Parts Subject To Short-Circuit Test		
56	Brief description of transformer or parts thereof		

Sl. No.	Description	Bidder's data
	subjected to short-circuit test	

Sl. No.	Description				
	Transformer Bushing Insulators		132 kV	33 kV	Neutral
57	Maker				
58	Insulator material (solid, oil-paper etc)				
59	Maker's type reference and rated voltage				
60	Rated current				
61	BCT particulars				
	 i) HV Side: Core 1,2: Core 3: ii) LV Side: Core 1,2: Core 3: Core 4: iii) Neutral: Core 1: Core 2: 				
62	Manufacturer of porcelain				
63	Length of insulator (overall)	mm			
64	Weight of insulator	kg			
65	Electrostatic capacity of complete bushings	pF			
66	Dry lightning impulse voltage withstand (1.2/50 wave)	kV			
67	50Hz wet withstand voltage without arcing horns	kV			
	Total creepage distance of				

68	outdoor shedding	mm		
69	Protected creepage distance of shedding	mm		

*Guaranteed values subject to deduction from Contract Price

3.3 33/0.415 kV EARTHING/AUXILARY TRANSFORMERS

3.3A EARTHING TRANSFORMER :

Sl. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Туре		
3	Maximum flux density in core iron at normal voltage and frequency	Tesla	
4	CMR of lower voltage star winding	kVA	
5	No load losses	kW	
6	Load losses at 75 [°] C at CMR of lower voltage winding	kW	
7	Impedance voltage at CMR of lower voltage winding between HV and LV winding	%	
8	Total range of variation of off load:		
	- ratio	%	
	- size of step		
9	Resistance of higher voltage winding at 75 ^o C	ohms/	
		phase	
10	Zero phase sequence impedance at 75 [°] C with	ohms/	
	LV windings open circuited	phase	
11	Total oil required	litres	
12	Weight of complete transformer including oil	tonnes	
13	Height from base to bottom of neutral bushing insulator	mm	

3.3B	AUXILIARY TRANSFORMER:		
Sl. No.	Description		
1	Manufacturer		
2	Туре		
3	Current density in the interconnected star winding at rated short time current	A/mm ²	
4	Current density in the interconnected star winding -at CMR and -5 second fault rating simultaneously	A/mm ² A/mm ²	
5	Maximum flux density in core iron at normal voltage and frequency	Tesla	
6	CMR of lower voltage star winding	kVA	
7	No load losses	kW	
8	Load losses at 75°C at CMR(200KVA) of lower voltage winding	kW	
9	Impedance voltage at CMR(200KVA) of lower voltage winding between HV and LV winding	%	
10	Total range of variation of off load ratio ratio Size of step	plus % plus %	5 5 2.5
11	Resistance of higher voltage winding at 75°C	ohms per phase	
12	Zero phase sequence impedance at 75°C with LV windings open circuited	ohms per phase	
13	Total oil required	litres	
14	Weight of complete transformer (including oil)	tonnes	
15	Height from base to bottom of neutral bushing insulator	mm	

3.3B AUXILIARY TRANSFORMER:

PART 4 – AUXILIARY POWER AND MULTICORE CONTROL CABLES (Schedule to be completed if manufacture not to BS 6346)

Item		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Number of core		4	4	4	4	4	2	2	2	2	4	7	12	19	27	37
Core section	mm^2															
Core diameter	mm															
Conductor insulation	mm															
Type of filler																
Type of tape																
Sheath thickness	mm															
Sheath outer diameter	mm															
Armour wires	no.															
Armour wires diameter	mm															
Outer covering	type															
Outer covering thickness	mm															
Complete cable:																
Diameter	mm															
Weight per metre	kg															
Maximum drum length	m															
Minimum installed bending radius	mm															
Maximum conductor temperature	⁰ C															

PART 5 - DC EQUIPMENT 110 V BATTERIES AND CHARGERS

Sl. No.	Description	Unit	Bidder's Data
	Battery		
1	Manufacturer		
2	Туре		
3	Electrolyte		
4	Nominal voltage	V	
5	Capacity at 5 hour rate	Ah	
6	Number of cells		
7	Float voltage per cell	V	
8	Battery voltage at end of the duty cycle	V	
9	Normal charging rate	A	
10	Maximum charging rate	A	
11	Ampere-hour efficiency at ten hour rate	%	
12	Ampere-hour efficiency at one hour rate	%	
13	Dimensions of cells	mm	
14	Dimensions of battery complete	mm	
15	Weight of cell complete with electrolyte	kg	
16	Internal resistance per cell when fully charged	ohms	
17	Material of battery case		
	Charger		
18	Manufacturer		
19	Туре		
20	AC input voltage and range	kVA	
21	DC output of charger	kW	
22	Type of DC voltage control		
23	Range of DC voltage	V	
24	Output current sharing facility		
25	(for parallel operation of chargers) Regulation	%	
23	Charger Cubicle Complete	/0	
26	Manufacturer		
20	Overall dimensions	mm	
27	Total weight	mm Ka	
20	DC Switchboard	Kg	
29	Manufacturer		
30	Type		
31	Busbars:		

Sl. No.	Description	Unit	Bidder's Data
	- maximum current rating	A	
	- dimensions	mm	
32	Boost charge contactors:		
	- manufacturer		
	- maximum current rating		
	- coil rating		
	- method of interlocking		
33	Alarm relays:		
	- manufacturer		
	- type and reference		
	- power consumption:		
	a) quiescent	Α	
	b) operated	mA	
34	Number and rating of distribution circuits		
35	Overall dimensions	mm	
36	Total weight	kg	

110V/48V DC/DC CONVERTER:

Sl. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Туре		
3	Input voltage and range		
4	DC output		
5	Type of DC voltage control		
6	Range of DC voltage		
7	Output current sharing facility (for parallel operation of chargers)		
8	DC Switchboard		
9	Manufacturer		
10	Туре		
11	Busbars:		
	- maximum current rating	A	
	- dimensions	mm	
15	Alarm relays:		
19	Overall dimensions	mm	
20	Total weight	kg	

Sl. No.	Description	Unit	Bidder's Data
	Distribution Board		
1	Manufacturer		
2	Manufacturer's type designation		
3	Rating	A	
4	Fault rating for 1 sec	kA	
5	Voltage	V	
	Miniature Circuit Breakers		
6	Manufacturer		
7	Туре		
8	Rating	A	
9	Fault rating for 1 sec	kA	

PART- 7 SUBSTATION AUTOMATION SYSTEM

Sl. No.	Description	Unit	Bidder's Data			
1	General Requirement:					
	Standards to be complied with Substation Automation system					
	Test Ca. Damp heat steady state					
	Test Db and guidance; Damp heat cyclic					
	Digital I/O, Analogue I/O dielectric Tests					
	Digital I/O, Surge withstand test					
	Radio interference test					
	Transient fast burst test					
	Static Discharge					
	Electromagnetic fields					
	Temperature range (min/max)	⁰ C				
	Relative humidity	%				
	Intelligent Electronic Devices (IED's)					
	- serial communication interface included?					
	- Protection & Control IED's connected same bus?					
	- self monitoring					
	- display of measured values					
	- remote parameterization					
	- disturbance record upload and analysis					
	Availability Calculation shall be furnished for each equipments as well as for the entire system					
---	---	-------------	--	--	--	
	Main system, HMI, Gateway, IEC have dual communication port					
	SNTP server provide GPS time synchronization to HMI, Gateway, IED					
	System topology					
2	Detailed Requirements:					
	Manufacturer of Substation Automation System					
	Name and type of product in supplier's catalogue					
	Origin of manufacturer					
	Number of years of proven field experience of offered system.	Yrs				
	(Note: proof of experience should be furnished. The					
	components used in the offered system and those with					
	field experience should be the same)					
	Design life of substation Automation System	Yrs				
	Manufacturers quality assurance system					
	Dimensions of cubicle:					
	- Width	mm				
	- Depth	mm				
	- Height	mm				
	- Floor load	N/m^2				
3	Station Level Equipment:					
	Station Controller					
	MTBF (Mean time between Failures)					
	MTTR (Mean time to repair)					
	MTTR (Mean time to repair) Station computer dual connection to Ethernet					
		inch				
	Station computer dual connection to Ethernet	inch				
	Station computer dual connection to Ethernet Dual wide screen monitor	inch				
	Station computer dual connection to Ethernet Dual wide screen monitor Dual Station Computers Provided in redundant hot	inch				
	Station computer dual connection to Ethernet Dual wide screen monitor Dual Station Computers Provided in redundant hot Standby	inch				
	Station computer dual connection to Ethernet Dual wide screen monitor Dual Station Computers Provided in redundant hot Standby Hot standby take over time					
	Station computer dual connection to Ethernet Dual wide screen monitor Dual Station Computers Provided in redundant hot Standby Hot standby take over time Annunciator for Station PC system software	inch Yrs				
	Station computer dual connection to Ethernet Dual wide screen monitor Dual Station Computers Provided in redundant hot Standby Hot standby take over time Annunciator for Station PC system software Number of years of proven field experience of offered					
	Station computer dual connection to Ethernet Dual wide screen monitor Dual Station Computers Provided in redundant hot Standby Hot standby take over time Annunciator for Station PC system software Number of years of proven field experience of offered software					
	Station computer dual connection to Ethernet Dual wide screen monitor Dual Station Computers Provided in redundant hot Standby Hot standby take over time Annunciator for Station PC system software Number of years of proven field experience of offered software Operating System					
	Station computer dual connection to Ethernet Dual wide screen monitor Dual Station Computers Provided in redundant hot Standby Hot standby take over time Annunciator for Station PC system software Number of years of proven field experience of offered software Operating System All standard picture as per spec included in HMI					
	Station computer dual connection to EthernetDual wide screen monitorDual Station Computers Provided in redundant hotStandbyHot standby take over timeAnnunciator for Station PC system softwareNumber of years of proven field experience of offeredsoftwareOperating SystemAll standard picture as per spec included in HMIProcess Status Display & Command Procedures					
	Station computer dual connection to EthernetDual wide screen monitorDual Station Computers Provided in redundant hotStandbyHot standby take over timeAnnunciator for Station PC system softwareNumber of years of proven field experience of offeredsoftwareOperating SystemAll standard picture as per spec included in HMIProcess Status Display & Command ProceduresEvent processing as per spec					
	Station computer dual connection to EthernetDual wide screen monitorDual Station Computers Provided in redundant hotStandbyHot standby take over timeAnnunciator for Station PC system softwareNumber of years of proven field experience of offeredsoftwareOperating SystemAll standard picture as per spec included in HMIProcess Status Display & Command ProceduresEvent processing as per specAlarm processing as per spec					

	Disturbance & Fault recording and analysis with graphical format				
	User Authority levels as per spec				
	System supervision & monitoring as per spec				
	Automatic sequence control as per spec				
4	Gateway to National Load dispatch Center	1 1			
	Manufacturer				
	Name and type of product in supplier's catalogue				
	Origin of manufacturer				
	Number of years of proven filed experience of offered unit	Yrs			
	Insulation tests				
	Fast disturbance tests				
	Industrial environment				
	Industrial grade hardware with no moving parts				
	(PC based gateway is not accepted)				
	Design life of offered equipment	Yrs			
	Redundant communication channel				
	Redundant CPU				
	Redundant DC/DC Supply				
	MTBF (Mean time between Failures)				
	MTTR (Mean time to repair)				
	Dual connection to Ethernet				
5	Station Bus:	н н			
	Type of bus/protocol				
	Physical Medium				
	Dual connection				
	Transfer rate/bus speed				
6	Interbay Bus				
	Type of bus/protocol				
	51 1				
	Physical Medium				
7	Physical Medium				
7	Physical Medium Transfer rate/bus speed				
7	Physical Medium Transfer rate/bus speed Printer server				
7	Physical Medium Transfer rate/bus speed Printer server Manufacturer				
7	Physical Medium Transfer rate/bus speed Printer server Manufacturer Name and type of product in supplier's catalogue				
7	Physical Medium Transfer rate/bus speed Printer server Manufacturer Name and type of product in supplier's catalogue Origin of manufacturer				
	Physical Medium Transfer rate/bus speed Printer server Manufacturer Name and type of product in supplier's catalogue Origin of manufacturer MTBF				
	Physical MediumTransfer rate/bus speedPrinter serverManufacturerName and type of product in supplier's catalogueOrigin of manufacturerMTBFEvent Printer				
	Physical MediumTransfer rate/bus speedPrinter serverManufacturerName and type of product in supplier's catalogueOrigin of manufacturerMTBFEvent PrinterManufacturer				

	Paper feed/width		
	Character set		
	MTBF		
9	Hard Copy colour Printer		
-	Manufacturer		
	Name and type of product in supplier's catalogue		
	Origin of manufacturer		
	Print speed		
	Colours		
	Resolution		
	Character set		
	MTBF		
10			
10	Master Clock GPS (Global Positioning System) Receiver: Manufacturer		
	Name and type of product in supplier's catalogue		
	Origin of manufacturer		
	Stability		
	MTBF		
11			
11	Bay control Unit - HV Manufacturer		
	Name and type of product in supplier's catalogue		
	Origin of manufacturer	Var	
	Number of years of proven field experience of offered unit	Yrs	
	Separate Bay controller unit provided for each bay & feeder		
	Type of bay controller offered HV/MV		
	Select Before Operate with Open Execute & Close Execute		
	Single bit dependence		
	Interlocking, bay & Station wide		
	Dual connection to Ethernet sw		
	Synchrocheck function:		
	- Maximum Voltage difference		
	- Maximum Frequency difference		
	- Maximum Phase difference		
	Double command blocking		
	Independent settable parameter groups		
	Local Display Unit		
	Sequence of event recorder:		
	- Events		
	- Time resolution		
	Disturbance recorder function		

	Disturbance record transfer function				
	Comtrde file generation				
	Comprehensive self-supervision				
	Battery free backup of events and disturbance records				
	Insulation tests				
	Fast disturbance tests				
	MTBF				
	MTTR				
	Temperature range: IED's				
	- Operation	⁰ C			
	- Transport and storage	⁰ C			
	Relative humidity:				
	- Operating max./min.	%			
	- Transport and storage	%			
12	Back up control mimic -HV				
	Manufacturer				
	Name and type of product in supplier's catalogue				
	Origin of manufacturer				
	Control functionality:				
	Control of breaker as well as all isolators/earthing switch				
	(Control functionality should not be affected if bay controller fails)				
	Key-Locked				
	Interlock override function				
	Separate backup control mimic provided for each bay & feeder				
15	Bay Control Unit - LV				
	Manufacturer				
	Name and type of product in supplier's catalogue				
	Origin of manufacturer				
	Number of years of proven field experience of offered unit	Yrs			
	Separate Bay controller unit provided for each bay & feeder				
	Control functionality implementation in software:				
	Select before Operate with Open Execute & Close Execute				
	Interlocking, Bay & Station Wide				
	Dual connection to Ethernet sw				
	Synchrocheck function				
	- Maximum Voltage difference				
	- Maximum Frequency difference				
	- Maximum Phase difference				
	Local Display Unit				
	Sequence of event recorder				
	- Events				

	- Time resolution	ms	
	Disturbance recorder function		
	Disturbance record transfer function		
	Comtrde file generation		
	Comprehensive self-supervision		
	Insulation tests		
	Fast disturbance tests		
	MTBF		
	MTTR		
	Temperature range: IED's		
	- Operation	⁰ C	
	- Transport and storage	⁰ C	
	Relative humidity:		
	- Operating max./min.	%	
	- Transport and storage	%	
16	Back up control mimic - LV		
	Manufacturer		
	Name and type of product in supplier's catalogue		
	Origin of manufacturer		
	Control functionality:		
	Control of breaker as well as all isolators/earthing switches		
	Separate backup control mimic provided for each bay & feeder		
17	System Performance:		
	Exchange of display (First reaction)	S	
	Presentation of a binary change in the process display	S	
	Presentation of an analogue change in the process display	S	
	From order to process output	S	
	From order to updated of display	S	
18	Deviations	1	
	Please state all deviations from specification		

SL. No.	Description	Unit	Bidder's Data
1	GENERAL:		
-	Manufacturer		
	Model No.		
	Туре		
	Type of multiplexer		
	Complying to ITU-T rec.		
	Transmission Capacity	Mbit/s	
	Access capacity on 64 kbit/s	channels	
	Access capacity on 2 Mbit/s	channels	
	Redundant central processor		
	Digital cross connect function		
2	Available AGGREGATES:		
	Optical aggregates (ITU-T G.957)		
3	Available TRUNK INTERFACES:		
	HDB3, 2 Mbit/s interfaces per module	No.	
	Complying to ITU-T rec.		
	HDSL, 2Mbit/s interface: no of copper wires	No.	
	- Capacity on 2Mbit/s or on 1Mbit/s	ch	
	- Capacity selectable	ch / pair of wire	
4	Available USER INTERFACES		
5	Voice interfaces for trunk lines:		
	1 + 1 com path protection, available for all		
	Analogue, 4wire with E&M: Input level	dBr	
	Output level	dBr	
	Analogue, 2wire with E&M: Input level	dBr	
	Output level	dBr	
	Digital, 2Mbit/s CAS or PRI		
6	Voice interfaces for remote Subscriber:		
	2wire, subscriber side	dBr	
	2wire, PABX side	dBr	
7	Integrated teleprotection		
8	Interface for Commands:		
	Number of independent commands	No.	
	Transmission time max.	ms	
	Signal voltage	Vpeak	
	1 + 1 com path protection		
9	Interface(s) for Distance Protection:		
	Electrical interface: G.703	kbit/s	
10	Optical Interface	kbit/s	
10	Data: channels per module		
	1 + 1 com path protection, available for all		
	V.24/V.28 (RS-232): up to 38.4kbit/s	No.	
	V.11/X.24 (RS-422): 64kbit/s	No.	
	V.35: 64kbit/s	No.	
	V.36 (RS-449): 64kbit/s	No.	

PART 8 - FIBRE OPTIC MULTIPLEXER EQUIPMENT

SL. No.	Description	Unit	Bidder's Data
	G.703: 64kbit/s	No.	
	Ethernet: 10/100 BaseT WAN capacity Protocols	No. Mbit/s Mbit/s	
11	Integrated alarm gathering module:		
	Number of external alarms per module	No.	
	Auxiliary power supply for ext. contacts		
12	Network Management System		
	Type/Name of configuration tool		
	For fault / configuration management		
	For local / remote operation		
	Data communication network (DCN)		
13	Ambient Conditions:		
	Storage: ETS 300 019-1-1, class 1.2	°C / % hum	
	Transport: ETS 300 019-1-2, class 2.2	°C / % hum	
	Operation: ETS 300 019-1-3, class 3.1E	°C / % hum	
14	Power Supply		
	Operation	VDC	
	Fully redundant power supply		

Bidder shall provide all necessary information which deem to be necessary to complete the project in all respects.

PART 9 – PROTECTION

9.1 230 kV Line Distance Protection for Meghnaghat 1 & 2 and Hasnabad 1&2 at Shyampur (Main 1 & Main 2):

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Phase switched		
4	Zone switched		
5	Number of zones		
6	Shape of impedance characteristic: Zone 1/Zone 2/Zone 3		
7	Reverse looking element (blocking signal initiation)		
8	Sensitivity:		
8.1	Minimum operation current: Earth faults/Phase faults	А	
8.2	Minimum necessary voltage for fault at Zone 1 reach point (if applicable): Earth faults/Phase faults	V	
8.3	Minimum Zone 1 ohmic impedance to which relay can be set	ohms	
8.4	Maximum Zone 1 ohmic impedance to which relay can be set and maintain accuracy	ohms	
8.5	Minimum Zone 2 ohmic impedance to which	ohms	

	relay can be set		
8.6	Maximum Zone 2 ohmic impedance to which relay can be set and maintain accuracy	ohms	
8.7	Maximum Xone 3 ohmic reach: Forward reach/Reverse reach	ohms	
9	Arc forward and reverse reach setting independent of each other?	Yes/No	
10	Can resistance and reactance reaches be set independent of each other	Yes/No	
11	Directional sensitivity	V	
12	Current transformer requirements		
13	Voltage transformer requirements		
14	Back up Zone time ranges: Zone 2/ Zone 3	sec.	
15	Method used to clear close-in faults:		
	which occur when line is already energized in		
	service		
	which exist upon line energisation		
	Has distance protection previously been used in		
	the type of blocking scheme offered for this		
16	contract?	Yes/No	
	If yes:		
	number of scheme in service/year first in service		
	Approximate number of years distance relay in		
17	service (A complete reference list should be		
	submitted stating client, system voltage and		
10	year of going into service).		
18	Zone 1 operating times on fault position:		
	Earth faults: 0, 50, 90% of relay setting	ms (min./max.)	
	Phase to phase faults: 0, 50, 90% of relay	ms (min./max.)	
	setting	ma (min /max)	
	Three phase faults: 0, 50, 90% of relay setting	ms (min./max.)	

9.2 230 kV Line Directional Earth Fault Protection for Meghnaghat 1 & 2 and Hasnabad 1&2 at Shyampur (Back up):

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Current setting range: Forward element/Reverse element	А	
4	Minimum polarizing quantity required for correct directional decision:		
	Voltage: Forward element/Reverse element	V	
	Current: Forward element/Reverse element	V	
5	Characteristic angle	Degree	
6	Time ranges: Blocking scheme/Back up	sec	
7	Has protection previously been used in the blocking scheme offered for this contract?	Yes/No	
8	Current transformer requirements		

9.3 132 kV Line Distance Relay (21)

SL.	Description	Unit	Bidder's Data
No.	Description	Unit	Diudei S Data

1	Manufacturer		
2	Type designations		
3	Phase switched		
4	Zone switched		
5	Number of zones		
5			
6	Shape of impedance characteristic:		
	Zone 1/Zone 2/Zone 3		
7	Reverse looking element		
0	(blocking signal initiation)		
8	Sensitivity:		
8.1	Minimum operation current:	А	
	Earth faults/Phase faults		
	Minimum necessary voltage for fault at Zone 1		
8.2	reach point (if applicable):	V	
	Earth faults/Phase faults		
8.3	Minimum Zone 1 ohmic impedance to which	ohms	
	relay can be set		
8.4	Maximum Zone 1 ohmic impedance to which	ohms	
0.1	relay can be set and maintain accuracy	omno	
8.5	Minimum Zone 2 ohmic impedance to which	ohms	
0.5	relay can be set	011115	
8.6	Maximum Zone 2 ohmic impedance to which	ohms	
0.0	relay can be set and maintain accuracy	011115	
8.7	Maximum Xone 3 ohmic reach:	ohms	
0.7	Forward reach/Reverse reach	UIIIIS	
9	Arc forward and reverse reach setting	Yes/No	
9	independent of each other?	105/100	
10	Can resistance and reactance reaches be set	Yes/No	
10	independent of each other	105/100	
11	Directional sensitivity	V	
12	Current transformer requirements		
13	Voltage transformer requirements		
14	Back up Zone time ranges: Zone 2/ Zone 3	sec.	
15	Method used to clear close-in faults:		
	which occur when line is already energized in		
	service		
	which exist upon line energisation		
	Has distance protection previously been used in		
	the type of blocking scheme offered for this		
16	contract?	Yes/No	
10	If yes:	105/100	
	number of scheme in service/year first in service		
	Approximate number of years distance relay in		
	service (A complete reference list should be		
17	submitted stating client, system voltage and		
	year of going into service).		
18	Zone 1 operating times on fault position:		
10		ma (min /mar)	
	Earth faults: 0, 50, 90% of relay setting	ms (min./max.)	
	Phase to phase faults: 0, 50, 90% of relay	ms (min./max.)	
	setting	ma (min /may)	
L	Three phase faults: 0, 50, 90% of relay setting	ms (min./max.)	

9.4 Directional over current and Earth Fault Protection

SL. Description	Unit	Bidder's Data
-----------------	------	---------------

No.			
1	Manufacturer		
2	Type designations		
3	Current setting range: Forward element/Reverse element	А	
4	Minimum polarizing quantity required for correct directional decision:		
	Voltage: Forward element/Reverse element	V	
	Current: Forward element/Reverse element	V	
5	Characteristic angle	Degree	
6	Time ranges: Blocking scheme/Back up	sec	
7	Has protection previously been used in the blocking scheme offered for this contract?	Yes/No	
8	Current transformer requirements		

9.5 Inversed Time Overcurrent and Earth Fault Protection

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Inversed time element		
	Range of current settings: Overcurrent/Earth Fault	А	
	Range of operating times at highest timing setting at ten times current setting	sec.	
	Range of operating times at highest timing setting at twice current setting	sec.	
4	High set instantaneous element range of settings: Overcurrent/Earth Fault	А	
5	Transient overreach at X/R=10		
6	Operating time with Maximum offset current at five times current setting	ms	
7	Burden of relay on minimum inverse time element current setting at a current ten times setting: Overcurrent/Earth fault	VA	

9.6	230 kV	Busbar	Protection
-----	--------	---------------	------------

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Operating principle, e.g. high impedance		
4	Minimum relay setting	А	
5	Sensitivity of scheme (allowing for CT magnetizing current, etc.)		
6	Maximum through fault current at which protection is stable	А	
7	Current transformer requirements		
8	Estimated magnetizing current at relay setting	А	
9	Operating time at twice relay minimum setting	ms	
10	Operating time at ten times relay minimum	ms	

aatting	
setting	

9.7 132 kV Busbar Protection

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Operating principle, e.g. high impedance		
4	Minimum relay setting	А	
5	Sensitivity of scheme (allowing for CT magnetizing current, etc.)		
6	Maximum through fault current at which protection is stable	А	
7	Current transformer requirements		
8	Estimated magnetizing current at relay setting	А	
9	Operating time at twice relay minimum setting	ms	
10	Operating time at ten times relay minimum setting	ms	

9.8 230/138/33 kV Transformer Biased Differential Protection

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Range of operating coil settings	% of CT rating	
4	Range of bias coil settings	% of CT rating	
5	Recommended operating coil setting	% of CT rating	
6	Recommended bias coil setting	% of CT rating	
7	Number of bias coils		
8	Minimum sensitivity: Earth faults/Phase faults	% of CT rating	
9	Maximum through fault at which the protective equipment is stable with recommended settings: Earth faults/Phase faults	% of CT rating	
10	Maximum time delay between initiation of fault and emerging of breaker trip circuit	ms	
11	Current transformer requirements		

9.9 230/138/33 kV Transformer Restricted Earth Fault Protection

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Operating principle, e.g. high impedance		
4	Minimum relay setting	А	
5	Sensitivity of scheme (allowing for CT magnetizing current, etc.)		
6	Maximum through fault current at which protection is stable	А	
7	Current transformer requirements		
8	Estimated magnetizing current at relay setting	А	
9	Operating time at twice relay minimum setting	ms	
10	Operating time at ten times relay minimum setting	ms	

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Range of operating coil settings	% of CT rating	
4	Range of bias coil settings	% of CT rating	
5	Recommended operating coil setting	% of CT rating	
6	Recommended bias coil setting	% of CT rating	
7	Number of bias coils		
8	Minimum sensitivity: Earth faults/Phase faults	% of CT rating	
9	Maximum through fault at which the protective equipment is stable with recommended settings: Earth faults/Phase faults	% of CT rating	
10	Maximum time delay between initiation of fault and emerging of breaker trip circuit	ms	
11	Current transformer requirements		

9.10 132/33 kV Transformer Biased Differential Protection

9.11 132/33 kV Transformer Restricted Earth Fault Protection

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Operating principle, e.g. high impedance		
4	Minimum relay setting	А	
5	Sensitivity of scheme (allowing for CT magnetizing current, etc.)		
6	Maximum through fault current at which protection is stable	А	
7	Current transformer requirements		
8	Estimated magnetizing current at relay setting	А	
9	Operating time at twice relay minimum setting	ms	
10	Operating time at ten times relay minimum setting	ms	

9.12	Breaker Failure Protection

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Setting of current elements: Phase faults/Earth faults	А	
4	Timer setting range	sec.	
5	Burden of relay at minimum current setting at ten times CT secondary rated current during: Phase faults/Earth faults	VA	
6	Operating time/Reset time	ms	

9.13 Tripping Relays

SL.	Description	Unit	Bidder's Data
No.	Description	Omt	Diudei S Data

1	Manufacturer		
2	Type designations		
3	Nominal operating voltage	V	
4	Minimum operating voltage	V	
5	Operation indicator		
6	Operating time at nominal voltage	ms	
	Contact rating:		
	Make and carry continuously	VA	
7	Make and carry for 3 sec.	VA	
	Break: resistive	W	
	inductive	VA	

9.14 JJKV Over current and Earth Fault Protection	9.14	er current and Earth Fault Protection
---	------	---------------------------------------

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Inversed time element		
	Range of current settings: Overcurrent/Earth Fault	А	
	Range of operating times at highest timing setting at ten times current setting	sec.	
	Range of operating times at highest timing setting at twice current setting	sec.	
4	High set instantaneous element range of settings: Overcurrent/Earth Fault	А	
5	Transient overreach at X/R=10		
6	Operating time with Maximum offset current at five times current setting	ms	
7	Burden of relay on minimum inverse time element current setting at a current ten times setting: Overcurrent/Earth fault	VA	

9.15 Overall Fault Clearance Times

SL. No.	Description	Unit	Bidder's Data
1	230 kV Busbar Faults:		
	Main protection relay operating time	ms	
	Auxiliary and tripping relay time (where used)	ms	
	Circuit breaker time	ms	
	Total	ms	
2	132 kV Busbar Faults:		
	Main protection relay operating time	ms	
	Auxiliary and tripping relay time (where used)	ms	
	Circuit breaker time	ms	
	Total	ms	
3	230/138/33 kV Transformer Faults:		
	Main protection relay operating time	ms	
	Auxiliary and tripping relay time	ms	
	Circuit breaker time	ms	
	Total	ms	

4	132/33 kV Transformer Faults:		
	Main protection relay operating time	ms	
	Auxiliary and tripping relay time	ms	
	Circuit breaker time	ms	
	Total	ms	
	Total	ms	

PART 10 – Digital Fault and Disturbance Recorder (DFDR).

6.11	Digital Fault and Disturbance Recorder [DFDR]	UNITS	BIDDER'S DATA
(A)	GENERAL		
1	Manufacturer's name & address		
2	Туре		
3	Power Supply	VDC	
	-power Supply for printer	VAC	
(B)	ANALOGUE INPUTS		
1	Number of Channel -Expandability		
2	Nominal Current	Amp	
3	Nominal voltage	Vac/Vdc	
	- Current	mA/Amp	
4	Frequency response		
5	Cut-off frequency		
	(a) Bandwidth	dB	
	(b) Attenuation at	dB	
	(c) Auto adjusted anti-aliasing filters for chosen sampling rate	Yes/No	
d	Simultaneously programmable sampling rate for all feeders/inputs -Locally Changeable -Remotely Changeable	Yes/No Yes/No	
e	Possible sampling rates	Samples/sec Samples/sec Samples/sec	
6	DC coupled inputs	Yes/No	
7	Resolution	bits	
8	Accuracy	%	
9	Burden 1. Current Circuit at IN 2. Voltage Circuit	VA VA	
10	Over load 1. Current 2. Voltage circuit	% In % Vn	
(C)	DIGITAL INPUTS		
1	Number of Channel -Expandability (Without and time skew)		
2	Selectable input level	Vdc	
3	Туре		
4	Resolution	ms	

10.1 DFDR for New Shyampur 230/132kV SS.

(D)	MEMORY		
1	Size	MB	
2	Туре		
3	Pre-fault time (fast scanning rate)	sec	
4	Post-fault (fast scanning rate	sec	
5	Pre and Post-fault time (slow scanning	sec	
-	rate)		
6	In-Built hard disk (auto-maintained	GB	
(E)	SENSORS/ TRIGERRING CRITERIA		
	All sensors/trigerrs are preferable	Yes/No	
	Programmable and Virtually recordable		
1.	Logical combination sensor	Yes/No	
2.	Three phase over or under Voltage /	Yes/No	
	Current		
3.	Mono phase over or under Voltage /	Yes/No	
	Current		
4.	*du/dt, dp/dt, dq/dt, [Single/3 Phases],	Yes/No	
	df/dt. etc.		
5.	RMS [Voltage / Current]	Yes/No	
6.	Zero Sequence	Yes/No	
7.	Negative, Positive Sequence	Yes/No	
8.	Frequency	Yes/No	
9.	DC Step	Yes/No	
10.	Pendling / Swing	Yes/No	
11.	Digital level and edge	Yes/No	
12.	Sensor trigger	Yes/No	
13.	Event Trigger	Yes/No	
13.	Manual Trigger	Yes/No	
14.	Remote Trigger	Yes/No	
15.	Keniole Higgel	I CS/INO	
(F)	CLOCK SYSTEM		
1.	Internal Clock	Yes/No	
2.	Accuracy		
3.	External Synchronization	Yes/No	
4.	Time resolution between 2 synchronized	105/110	
	pulses		
(G)	OUTPUT ALARM RELAY CONTACT		
1.	Max. operation Voltage DC/AC	Vac / Vdc	
2.	Make and carry for 0.5 sec	А	
3.	Carry Continuously	А	
4.	Break (DC) – resistive	W	
(H)	INTERFACE FOR DATA		
. /	COMMUNICATION		
1.	Full definition compression	Yes/No	
2.	Maximum transmission rate	bits / Sec	
3.	Standard serial port (EIA-232-D)	Yes / No	
4.	Printer Port	Yes/No	
5.	Dedicated serial port for modem	Yes/No	
(I)	PRINTER DATA		
1.	Printer amplitude (scaling peak to peak)		
2.	Time Scal (mm / s)		
3.	Printer resolution	mm	

4.	Auto printing	Yes/No	
(J)	Fault Priority transmission	Yes/No	
(K)	Fault location (distance calculation)	Yes/No	
(L)	Test certificates from internationally recognized Laboratories	Yes/No	
(M)	COMMUNICATION AND REMOTE ANALYZING UNIT		
	1. Processor Pentium	(MHz) Yes/No	
	2. Co-Processor pentium	Yes/No	
	3. Main memory capacity	(Mb)	
		Yes/No	
	4. Color graphics board S-VGA	Yes/No	
	5. Screen S-VGA	Yes/No	
J	6. Hard disk unit	Yes/No	
I	7. Printer	Yes/No	
I	8. Modem	Yes/No	
*Note: du	/dt=Change of voltage, dp/dt=Change of active power,	dq/dt=change of react	tive power, df/dt=Change of frequency.

10.2 DFDR for Existing Tongi 230/132kV SS.

6.11	Digital Fault and Disturbance	UNITS	BIDDER'S DATA
	Recorder [DFDR]		
(A)	GENERAL		
1	Manufacturer's name & address		
2	Туре		
3	Power Supply	VDC	
	-power Supply for printer	VAC	
(B)	ANALOGUE INPUTS		
1	Number of Channel		
	-Expandability		
2	Nominal Current	Amp	
3	Nominal voltage	Vac/Vdc	
	- Current	mA/Amp	
4	Frequency response		
5	Cut-off frequency		
	(a) Bandwidth	dB	
	(b) Attenuation at	dB	
	(c) Auto adjusted anti-aliasing filters for	Yes/No	
	chosen sampling rate		
d	Simultaneously programmable sampling		
	rate for all feeders/inputs		
	-Locally Changeable	Yes/No	
	-Remotely Changeable	Yes/No	
e	Possible sampling rates		
		Samples/sec	
		Samples/sec	
		Samples/sec	
6	DC coupled inputs	Yes/No	
7	Resolution	bits	
8	Accuracy	%	
9	Burden		
	1. Current Circuit at IN	VA	
	2. Voltage Circuit	VA	

10	Over load		
10	1. Current	% In	
	2. Voltage circuit	% Vn	
(C)	DIGITĂL INPUTS		
1	Number of Channel		
	-Expandability (Without and time skew)		
2	Selectable input level	Vdc	
3	Туре		
4	Resolution	ms	
(D)	MEMORY		
1	Size	MB	
2	Туре		
3	Pre-fault time (fast scanning rate)	sec	
4	Post-fault (fast scanning rate	sec	
5	Pre and Post-fault time (slow scanning rate)	sec	
6	In-Built hard disk (auto-maintained	GB	
(E)	SENSORS/ TRIGERRING CRITERIA		
	All sensors/trigerrs are preferable	Yes/No	
	Programmable and Virtually recordable	2 05/110	
1.	Logical combination sensor	Yes/No	
2.	Three phase over or under Voltage /	Yes/No	
	Current		
3.	Mono phase over or under Voltage / Current	Yes/No	
4.	*du/dt, dp/dt, dq/dt, [Single/3 Phases],	Yes/No	
٦.	df/dt. etc.	105/100	
5.	RMS [Voltage / Current]	Yes/No	
6.	Zero Sequence	Yes/No	
7.	Negative, Positive Sequence	Yes/No	
8.	Frequency	Yes/No	
<u> </u>	DC Step	Yes/No	
10.	Pendling / Swing	Yes/No	
11.	Digital level and edge	Yes/No	
12.	Sensor trigger	Yes/No	
13.	Event Trigger	Yes/No	
13.	Manual Trigger	Yes/No	
15.	Remote Trigger	Yes/No	
15.		105/100	
(F)	CLOCK SYSTEM		
1.	Internal Clock	Yes/No	
2.	Accuracy		
3.	External Synchronization	Yes/No	
4.	Time resolution between 2 synchronized pulses		
(G)	OUTPUT ALARM RELAY CONTACT		
1.	Max. operation Voltage DC/AC	Vac / Vdc	
2.	Make and carry for 0.5 sec	А	
3.	Carry Continuously	Α	
4.	Break (DC) – resistive	W	
(H)	INTERFACE FOR DATA COMMUNICATION		
1.	Full definition compression	Yes/No	

2.	Maximum transmission rate	bits / Sec	
3.	Standard serial port (EIA-232-D)	Yes / No	
4.	Printer Port	Yes/No	
5.	Dedicated serial port for modem	Yes/No	
(I)	PRINTER DATA		
1.	Printer amplitude (scaling peak to peak)		
2.	Time Scal (mm / s)		
3.	Printer resolution	mm	
4.	Auto printing	Yes/No	
(J)	Fault Priority transmission	Yes/No	
(K)	Fault location (distance calculation)	Yes/No	
(L)	Test certificates from internationally recognized Laboratories	Yes/No	
(M)	COMMUNICATION AND REMOTE ANALYZING UNIT		
	1. Processor Pentium	(MHz) Yes/No	
	2. Co-Processor pentium	Yes/No	
	3. Main memory capacity	(Mb)	
		Yes/No	
	4. Color graphics board S-VGA	Yes/No	
	5. Screen S-VGA	Yes/No	
	6. Hard disk unit	Yes/No	
	7. Printer	Yes/No	
	8. Modem	Yes/No	
*Note: du/	/dt=Change of voltage, dp/dt=Change of active power, c	lq/dt=change of rea	ctive power, df/dt=Change of frequency.

10.3 DFDR for Existing Old Airport 230/132kV SS.

6.11	Digital Fault and Disturbance	UNITS	BIDDER'S DATA
	Recorder [DFDR]		
(A)	GENERAL		
1	Manufacturer's name & address		
2	Туре		
3	Power Supply	VDC	
	-power Supply for printer	VAC	
(B)	ANALOGUE INPUTS		
1	Number of Channel -Expandability		
2	Nominal Current	Amp	
3	Nominal voltage	Vac/Vdc	
	- Current	mA/Amp	
4	Frequency response		
5	Cut-off frequency		
	(a) Bandwidth	dB	
	(b) Attenuation at	dB	
	(c) Auto adjusted anti-aliasing filters for	Yes/No	
	chosen sampling rate		
d	Simultaneously programmable sampling		
	rate for all feeders/inputs		
	-Locally Changeable	Yes/No	
	-Remotely Changeable	Yes/No	

	Describle sometime notes		
e	Possible sampling rates	G	
		Samples/sec	
		Samples/sec	
-	2.2.1.1	Samples/sec	
6	DC coupled inputs	Yes/No	
7	Resolution	bits	
8	Accuracy	%	
9	Burden		
	1. Current Circuit at IN	VA	
	2. Voltage Circuit	VA	
10	Over load		
	1. Current	% In	
	2. Voltage circuit	% Vn	
(C)	DIGITAL INPUTS		
1	Number of Channel		
	-Expandability (Without and time skew)		
2	Selectable input level	Vdc	
3	Туре		
4	Resolution	ms	
<u> </u>			
(D)	MEMORY		
1	Size	MB	
2	Туре	IVID	
-	71		
3	Pre-fault time (fast scanning rate)	sec	
4	Post-fault (fast scanning rate	sec	
5	Pre and Post-fault time (slow scanning rate)	sec	
6	In-Built hard disk (auto-maintained	GB	
(E)	SENSORS/ TRIGERRING CRITERIA		
	All sensors/trigerrs are preferable	Yes/No	
	Programmable and Virtually recordable		
1.	Logical combination sensor	Yes/No	
2.	Three phase over or under Voltage / Current	Yes/No	
3.	Mono phase over or under Voltage / Current	Yes/No	
4.	*du/dt, dp/dt, dq/dt, [Single/3 Phases], df/dt.	Yes/No	
	etc.		
5.	RMS [Voltage / Current]	Yes/No	
6.	Zero Sequence	Yes/No	
7.	Negative, Positive Sequence	Yes/No	
8.	Frequency	Yes/No	
<u>9.</u>	DC Step	Yes/No	
10.	Pendling / Swing	Yes/No	
10.	Digital level and edge	Yes/No	
11.	Sensor trigger	Yes/No	
12.	Event Trigger	Yes/No	
14.	Manual Trigger	Yes/No	
15.	Remote Trigger	Yes/No	
(F)	CLOCK SYSTEM		
<u> </u>		X7 AT	
1.	Internal Clock	Yes/No	
2.	Accuracy		
3.	External Synchronization	Yes/No	
4.	Time resolution between 2 synchronized		
	pulses		
(G)	OUTPUT ALARM RELAY CONTACT		
1.	Max. operation Voltage DC/AC	Vac / Vdc	
2.	Make and carry for 0.5 sec	Α	
"			

3.	Carry Continuously	Α	
4.	Break (DC) – resistive	W	
(H)	INTERFACE FOR DATA		
~ /	COMMUNICATION		
1.	Full definition compression	Yes/No	
2.	Maximum transmission rate	bits / Sec	
3.	Standard serial port (EIA-232-D)	Yes / No	
4.	Printer Port	Yes/No	
5.	Dedicated serial port for modem	Yes/No	
(I)	PRINTER DATA		
1.	Printer amplitude (scaling peak to peak)		
2.	Time Scal (mm / s)		
3.	Printer resolution	mm	
4.	Auto printing	Yes/No	
(J)	Fault Priority transmission	Yes/No	
(17)			
(K)	Fault location (distance calculation)	Yes/No	
(L)	Test certificates from internationally	Yes/No	
(L)	recognized Laboratories	105/100	
(M)	COMMUNICATION AND REMOTE		
~ /	ANALYZING UNIT		
	1. Processor Pentium	(MHz)	
		Yes/No	
	2. Co-Processor pentium	Yes/No	
	3. Main memory capacity	(Mb)	
		Yes/No	
	4. Color graphics board S-VGA	Yes/No	
	5. Screen S-VGA	Yes/No	
	6. Hard disk unit	Yes/No	
	7. Printer	Yes/No	
	8. Modem	Yes/No	
*Note:	: du/dt=Change of voltage, dp/dt=Change of active pov	ver, dq/dt=change of rea	ctive power, df/dt=Change of frequency.

PART-11: HV Power Cables and Accessories

11.1 230kV XLPE CABLE

Item	Description	Requirement	Manufacturer's Particulars
1	Voltage		
	Rated Voltage	230kV	
	Maximum System Voltage	245kV	
2	Cores		
	Number of cores	1 (one)	
3	Conductor		
	Cross sectional area	1000mm ²	
	Material	Copper	
	Design (standard of segmental)	Milliken (4 segment)	
4	Conductor Screen		
	Material	Semi conducting tape	

		& extruded semi	
		conducting compound	
	Thickness (approx)		
5	Insulation	XLPE	
	Type of curing (dry)	Dry Curing (MDCV/CCV/VCV)	
	Thickness (Minimum)	23 mm	
6	Insulation screen		
	Material	Extruded semi conducting compound	
	Thickness approx.	1.5 mm	
7	Material Screen		
	Туре	Corrugated Aluminium Sheath /Corrugated Seamless Aluminium Sheath /Lead Sheath	
	Thickness (nominal)	3.2 mm approx.	
8	Water Swellable Tape		
	Туре	Non Conducting	
	Thickness (nominal)		
9	Protection Tapes		
2	Material	Semi-conducting water blocking tapes under aluminium sheath	
	Nominal thickness and width approx	.05/120	
10	Outer Covering		
10	Material	MDPE	
	Minimum average thickness	5 mm	
	Type of termite repellent	MDPE is Anti Termite	
11	Completed Cable		
	Overall diameter (approx)		
	Weight per meter (approx)		
	Maximum drum length (approx.)	300 m	
12	Cable Drums		
	Overall diameter (approx)		
	Width (approx)		
	Weight loaded (approx)		
13	Continuous Current carrying capacity based on the conditions special laid in the ground.	SPB * & Trefoil	
	One circuit		
	Two circuit		
	Three circuit		
	Drawing into ducts		
	One circuit		
	Two circuit	Same as mentioned above provided the length of into the duct shall not exceed 5% of route	
	Three circuit		
		62	

	In air		
14	Permissible overload in service	29%	
11	conditions for a period of	2 hrs in a day 100 hrs	
		in a month 500 hrs in	
		total life	
15	Max Conductor temperature		
	Laid direct ground	°C	
	Draw into ducts	°C	
	Elected in air	°C	
16	Conductor short circuit current cable loaded	280 kA/1sec	
	Carrying capacity for three second cable loaded		
	As above prior to short circuit		
	Final conductor temperature	°C	
17	Sheath Earth Fault Current Carrying		
	capacity for three second cable		
	loaded as above prior to each fault	25000	
10	Final Conductor temperature	250°C	
18	Max. Dielectric stress all the		
19	conductor screen (assumed smooth) Minimum radius of bend around		
19	which cable can be laid		
	Laid direct	20 x overall diameter	
		of cable in meters	
	In ducts		
	In air		
	Ducts		
20	Nominal Internal diameter of pipes		
	on ducts through which cable may be		
	pulled		
21	Maximum DC resistance per km of	0.009 ohm/km	
	cable at 20°C		
22	Of conductor		
	Of metallic layer		
	Maximum ac resistance per km of	0.0138 ohm/km	
	cable at maximum conductor		
22	temperature		
23	Insulation Resistance per km of cable		
24	per core At 20°C	mega ohm. Km	
24	At maximum rated temperature	mega ohm. Km	
	Equivalent star Reactance per meter		
	of 1- phase circuit at nominal		
	frequency		
25	Maximum electrostatic capacitance	0.24 µm/km	
	per meter of cable approx	4 ⁻	
26	Maximum charging current per core	9.7A/km	
	per meter pf cable at nominal voltage		
	Uo		
27	Maximum dielectric loss cable per		
	uncle of 3 phase circuit when laid		
	direct in the ground ay nominal		
	voltage Uo, normal sequence at		
	maximum conductor temperature.	-63	

20		
28	Maximum induced voltage on metal	
	sheath under fault condition (single	
	core only)	
29	Maximum dielectric Dissipation	
	factor of charging of cable when laid	
	direct in the ground at nominal	
	voltage Uo, normal piquancy at	
	Conductor temperature of 20°C	
	Maximum conductor temperature	
	(90deg. C)	
30	Sheath loss of cable per meter of	
	phase circuit at nominal voltage Uo,	
	normal frequency.	
31	Cree page	6250 mm (approx)
	Total creepage distance of outdoor	
	sealing approx. mm and porcelain.	
32	Earth continuity copper Conductor	400 mm^2
	(IF REQD)	
33	Condition upon which current	
	carrying capacity are based	
	Soil thermal resistivity	°C. cm/W
	Ground temperature	°C
	Air temperature	°C
	Burial depth	M
	Axial spacing between phase cables	mm
	Axial spacing between circuits	mm
	Type of earth bonding.	

- * SPB Single point bonding: in such a system the metallic sheath screen connected and earthed at one end of the route.
- * DPB Double point bonding: in such a system the metallic sheath/ screen connected and earthed at both ends of the route.

11.1A Outdoor Cable Sealing End

Item	Description	Unit	Requirement	Manufacturer's Particulars
			23	30kV
1	Voltage rating	kV	230	
2	Current rating	amp	As per cable	
3	Туре		Elastomeric stress cone with porcelain insulator.	
4	Insulator material		Porcelain	
5	Pitch circle diameter	mm		
6	Overall length of insulator	mm		
7	Weight of bushing including sealing compound	kg		
8	Total creepage distance of shedding	mm	6250mm (approx)	
9	Impulse withstand voltage (External) (a) Positive			

		kV	1050	
	(b) negative	kV	1050	
10	Standards		IEC 62067	
11	Height of steel mounting	mm	2500 (min.)	
	Structure over the finished			
	switchyard level			

11.2 132kV XLPE CABLE

Item	Description	Requirement	Manufacturer's Particulars
1	Voltage		
	Rated Voltage	132kV	
	Maximum System Voltage	145kV	
2	Cores		
	Number of cores	1 (one)	
3	Conductor		
	Cross sectional area	1000mm ²	
	Material	Copper	
	Design (standard of segmental)	Milliken (4 segment)	
4	Conductor Screen		
	Material	Semi conducting tape & extruded semi conducting compound	
	Thickness (approx)		
5	Insulation	XLPE	
	Type of curing (dry)	Dry Curing (MDCV/CCV/VCV)	
	Thickness (Minimum)	17 mm	
6	Insulation screen		
	Material	Extruded semi conducting compound	
	Thickness approx.	1.5 mm	
7	Material Screen		
	Туре	Corrugated Aluminium Sheath /Corrugated Seamless Aluminium Sheath /Lead Sheath	
	Thickness (nominal)		
8	Water Swellable Tape		
	Туре	Non Conducting	
	Thickness (nominal)		
9	Protection Tapes		
	Material	Semi-conducting water blocking tapes under aluminium sheath	
	Nominal thickness and width approx		
10	Outer Covering		
10	Material	MDPE	
	Minimum average thickness		

	Type of termite repellent	MDPE is Anti Termite	
11	Completed Cable		
11	Overall diameter (approx)		
	Weight per meter (approx)		
	Maximum drum length (approx.)	300 m	
12	Cable Drums	500 m	
12	Overall diameter (approx)		
	Width (approx)		
	Weight loaded (approx)		
13	Continuous Current carrying	SPB * & Trefoil	
15	capacity based on the conditions		
	special laid in the ground.		
	One circuit		
	Two circuit		
	Three circuit		
	Drawing into ducts		
	One circuit		
	Two circuit	Same as mentioned	
		above provided the	
		length of into the duct	
		shall not exceed 5% of	
	Three circuit	route	
1.4	In air	200/	
14	Permissible overload in service conditions for a period of	29% 2 hrs in a day 100 hrs	
	conditions for a period of	in a month 500 hrs in	
		total life	
15	Max Conductor temperature		
	Laid direct ground	°C	
	Draw into ducts	°C	
	Elected in air	°C	
16	Conductor short circuit current cable loaded	kA/1sec	
	Carrying capacity for three second		
	cable loaded		
	As above prior to short circuit		
	Final conductor temperature	°C	
17	Sheath Earth Fault Current Carrying		
	capacity for three second cable		
	loaded as above prior to each fault	25090	
18	Final Conductor temperature Max. Dielectric stress all the	250°C	
10	conductor screen (assumed smooth)		
19	Minimum radius of bend around		
17	which cable can be laid		
	Laid direct	15 x overall diameter	
		of cable in meters	
	In ducts		
	In air		
	Ducts		
20	Nominal Internal diameter of pipes		
	on ducts through which cable may be		

	pulled	
21	Maximum DC resistance per km of	
-	cable at 20°C	
22	Of conductor	
	Of metallic layer	
	Maximum ac resistance per km of	
	cable at maximum conductor	
	temperature	
23	Insulation Resistance per km of cable	
	per core	
24	At 20°C	mega ohm. Km
	At maximum rated temperature	mega ohm. Km
	Equivalent star Reactance per meter	
	of 1- phase circuit at nominal	
	frequency	
25	Maximum electrostatic capacitance	μm/km
26	per meter of cable approx	A /1
26	Maximum charging current per core	A/km
	per meter pf cable at nominal voltage Uo	
27	Maximum dielectric loss cable per	
21	uncle of 3 phase circuit when laid	
	direct in the ground ay nominal	
	voltage Uo, normal sequence at	
	maximum conductor temperature.	
28	Maximum induced voltage on metal	
	sheath under fault condition (single	
	core only)	
29	Maximum dielectric Dissipation	
	factor of charging of cable when laid	
	direct in the ground at nominal	
	voltage Uo, normal piquancy at	
	Conductor temperature of 20°C	
	Maximum conductor temperature	
20	(90deg. C) Sheath loss of cable per meter of	
30	phase circuit at nominal voltage Uo,	
	normal frequency.	
31	Cree page	mm
51	Total creepage distance of outdoor	
	sealing approx. mm and porcelain.	
32	Earth continuity copper Conductor	mm2
-	(IF REQD)	
33	Condition upon which current	
	carrying capacity are based	
	Soil thermal resistivity	°C. cm/W
	Ground temperature	°C
	Air temperature	°C
	Burial depth	М
	Axial spacing between phase cables	mm
	Axial spacing between circuits	mm
	Type of earth bonding.	
		I

^{*} SPB - Single point bonding: in such a system the metallic sheath screen connected and

earthed at one end of the route.

* DPB – Double point bonding: in such a system the metallic sheath/ screen connected and earthed at both ends of the route.

11.2A Outdoor Cable Sealing End

Item	Description	Unit	Requirement	Manufacturer's Particulars
			13	32kV
1	Voltage rating	kV	132	
2	Current rating	amp	As per cable	
3	Туре		Elastomeric stress cone with porcelain insulator.	
4	Insulator material		Porcelain	
5	Pitch circle diameter	mm		
6	Overall length of insulator	mm		
7	Weight of bushing including sealing compound	kg		
8	Total creepage distance of shedding	mm	3625mm (approx)	
9	Impulse withstand voltage (External)			
	(a) Positive			
		kV	650	
	(b) negative	kV	650	
10	Standards		IEC 62067	
11	Height of steel mounting Structure over the finished switchyard level	mm	1500 (min.)	

Bidder shall provide all necessary information which deem to be necessary to complete the project in all respects.

11.3 33kV XLPE CABLE

Item	Description	Requirement	Manufacturer's Particulars
1	Voltage		
	Rated Voltage	33kV	
	Maximum System Voltage	36kV	
2	Cores		
	Number of cores	1 (one)	
3	Conductor		
	Cross sectional area	185mm ²	
	Material	Copper	
	Design (standard of segmental)		
4	Conductor Screen		
	Material	Semi conducting tape & extruded semi conducting compound	
	Thickness (approx)		
5	Insulation	XLPE	
	Type of curing (dry)	Dry Curing (MDCV/CCV/VCV)	

	Thickness (Minimum)		
6	Insulation screen		
	Material	Extruded semi	
		conducting compound	
_	Thickness approx.		
7	Material Screen		
	Туре	Corrugated Aluminium Sheath /Corrugated Seamless Aluminium Sheath /Lead Sheath	
	Thickness (nominal)		
8	Water Swellable Tape		
	Туре	Non Conducting	
	Thickness (nominal)		
9	Protection Tapes		
	Material	Semi-conducting water blocking tapes under aluminium sheath	
	Nominal thickness and width approx		
10	Outer Covering		
	Material	MDPE	
	Minimum average thickness		
	Type of termite repellent	MDPE is Anti Termite	
11	Completed Cable		
	Overall diameter (approx)		
	Weight per meter (approx)		
	Maximum drum length (approx.)		
12	Cable Drums		
12	Overall diameter (approx)		
	Width (approx)		
	Weight loaded (approx)		
13	Continuous Current carrying capacity based on the conditions special laid in the ground.	SPB * & Trefoil	
	One circuit		
	Two circuit		
	Three circuit		
	Drawing into ducts		
	One circuit		
	Two circuit	Same as mentioned above provided the length of into the duct shall not exceed 5% of route	
	Three circuit		
	In air		
14	Permissible overload in service	29%	
17	conditions for a period of	2 hrs in a day 100 hrs in a month 500 hrs in total life	
15	Max Conductor temperature		

	Laid direct ground	°C	
	Draw into ducts	°C	
	Elected in air	°C	
16	Conductor short circuit current cable	kA/1sec	
10	loaded		
	Carrying capacity for three second		
	cable loaded		
	As above prior to short circuit		
	Final conductor temperature	°C	
17	Sheath Earth Fault Current Carrying		
	capacity for three second cable		
	loaded as above prior to each fault		
	Final Conductor temperature	250°C	
18	Max. Dielectric stress all the		
	conductor screen (assumed smooth)		
19	Minimum radius of bend around		
	which cable can be laid		
	Laid direct	15 x overall diameter	
		of cable in meters	
	In ducts		
	In air		
	Ducts		
20	Nominal Internal diameter of pipes		
	on ducts through which cable may be		
01	pulled		
21	Maximum DC resistance per km of cable at 20°C		
22	Of conductor		
	Of metallic layer		
	Maximum ac resistance per km of		
	cable at maximum conductor		
	temperature		
23	Insulation Resistance per km of cable		
	per core		
24	At 20°C	mega ohm. Km	
	At maximum rated temperature	mega ohm. Km	
	Equivalent star Reactance per meter		
	of 1- phase circuit at nominal		
	frequency		
25	Maximum electrostatic capacitance per meter of cable approx	μm/km	
26	Maximum charging current per core	A/km	
20	per meter pf cable at nominal voltage		
	Uo		
27	Maximum dielectric loss cable per		
	uncle of 3 phase circuit when laid		
	direct in the ground ay nominal		
	voltage Uo, normal sequence at		
	maximum conductor temperature.		
28	Maximum induced voltage on metal		
	sheath under fault condition (single		
	core only)		
29	Maximum dielectric Dissipation		
	factor of charging of cable when laid		
	direct in the ground at nominal		

Conductor temperature of 20°C	
Maximum conductor temperature	
(90deg. C)	
Sheath loss of cable per meter of	
Cree page	mm
Total creepage distance of outdoor	
sealing approx. mm and porcelain.	
Earth continuity copper Conductor	mm2
(IF REQD)	
Soil thermal resistivity	°C. cm/W
Ground temperature	°C
Air temperature	°C
Burial depth	М
Axial spacing between phase cables	mm
Axial spacing between circuits	mm
Type of earth bonding.	
	 (90deg. C) Sheath loss of cable per meter of phase circuit at nominal voltage Uo, normal frequency. Cree page Total creepage distance of outdoor sealing approx. mm and porcelain. Earth continuity copper Conductor (IF REQD) Condition upon which current carrying capacity are based Soil thermal resistivity Ground temperature Air temperature Burial depth Axial spacing between phase cables Axial spacing between circuits

* SPB - Single point bonding: in such a system the metallic sheath screen connected and earthed at one end of the route.

* DPB – Double point bonding: in such a system the metallic sheath/ screen connected and earthed at both ends of the route.

PART-12: TRANSMISSION LINE

SCHEDULE E

TECHNICAL PARTICULARS AND GUARANTEES

A. OVERHEAD PORTION

A.1 TOWER

NOT USED

A.2 PILED FOUNDATION DETAILS

A2.1 230kV Portion

A2.1.1 Double Circuit

Tower Type	2DL	2D1	2D25	2DT6
Particulars	(Standard)	(Standard)	(Standard)	(Standard)
Type of piled foundation				
No. of piles per leg [*]				
Length of pile [*] (mm)				
Diameter of pile (mm)				

* The final figures shall be attained during detailed design of tower foundations and their approval thereof, after award of contract and the foundations shall be supplied accordingly within the contract price.

A2.1.2 Four Circuit

Tower Type	2QL	2Q15	2Q30	2QT6
Particulars	(Standard)	(Standard)	(Standard)	(Standard)
Type of piled foundation				
No. of piles per leg [*]				
Length of pile [*] (mm)				
Diameter of pile (mm)				

* The final figures shall be attained during detailed design of tower foundations and their approval thereof, after award of contract and the foundations shall be supplied accordingly within the contract price.

A2.2 132kV Portion

A2.2.1 132kV Double Circuit Portion

Tower Type	1DL	1D1	1D25	1DT6
Particulars	(Standard)	(Standard)	(Standard)	(Standard)
Type of piled foundation				
No. of piles per leg [*]				
Length of pile [*] (mm)				
Diameter of pile (mm)				

* The final figures shall be attained during detailed design of tower foundations and their approval thereof, after award of contract and the foundations shall be supplied accordingly within the contract price.

A2.2.1 132kV Four Circuit Portion

Tower Type	1QL	1Q15	1Q30	1QT6
Particulars	(Standard)	(Standard)	(Standard)	(Standard)
Type of piled foundation				
No. of piles per leg [*]				
Length of pile [*] (mm)				
Diameter of pile (mm)				

* The final figures shall be attained during detailed design of tower foundations and their approval thereof, after award of contract and the foundations shall be supplied accordingly within the contract price.

A.3 CONDUCTOR & EARTHWIRE

A3.1 230kV Overland Portion

Parameter	Unit	Conductor	Earthwire
Conductor Designation & Type		ACSR Mallard	(Not used)
Reference standard		ASTM B232	
Number & Diameter of strands	No. x mm		
Overall Diameter	mm		
Guaranteed Ultimate Tensile Strength	kN		
Final Modulus of elasticity	N/mm ²		
Coefficient of Linear Expansion	1/degree		
D.C. Resistance at 20°C	ohm/km		
Standard Weight	kg/km		
Weight of grease	Kg/km		
Drop point of grease	°C		
Standard length on drum	m		
Lay Direction			
Weight of complete drum	Kg		
Percentage of random short drum lengths(not more than 4 percent)	%		

A3.2 132kV Portion

Parameter	Unit	Conductor	Earthwire
Conductor Designation & Type		ACSR Grosbeak	(Not Used)
Reference standard		ASTM B232	
Number & Diameter of strands	No. x mm		
Overall Diameter	mm		
Guaranteed Ultimate Tensile Strength	kN		
Final Modulus of elasticity	N/mm ²		
Coefficient of Linear Expansion	1/degree		
D.C. Resistance at 20°C	ohm/Km		
Standard Weight	Kg/Km		
Weight of grease	Kg/Km		
Drop point of grease	°C		
Standard length on drum	m		
Lay Direction			
Weight of complete drum	kg		
Percentage of random short drum lengths(not more than 4 percent)	%		

A.4 OPGW & FITTINGS

A4.1 230kV Line

Parameter	Unit		
	C IIIV	7×4.00 S Earthwire equivalent	
		OPGW	
OPGW Designation & Type			
Number of fiber		48	
Reference standard			
Number and Diameter of Aluminium strands	mm		
Number and Diameter of Steel strands	mm		
Corrosion Protection of Steel Strands			
Internal Fibre tube diameter	mm		
Overall diameter	mm		
Guaranteed Ultimate Tensile strength	kN		
Final Modulus of Elasticity	N/mm ²		
Co-efficient of linear Expansion	1/degree		
DC Resistance at 20°C	ohms/m		
Maximum short circuit current capacity	kA ² sec	25	
Assumed temperature rise	°C		
Standard Weight	kg/m		
Weight of grease	kg/m		
Standard length on drum *	m		
Weight of complete drum	kg		
Maximum drum length	m		
Installation minimum bending radius	m		
OPTICAL CHARACTERISTICS:			
Cut off Wave length	nm		
Attenuation at Nm	dB/km		
Zero dispersion wave length	nm		
Chromatic dispersion at nm	ps/km		
Individual splice loss	dB		
Bit error rate			
OPGW FITTINGS:			
Guaranteed Ultimate Tensile strength			
Suspension set	kN		
Tension set	kN		
Overall length of set			
Suspension set	mm		
Tension set	mm		
Mass of set			
Suspension set	kg		
Tension set	kg		
Drawing Numbers :			
Cross section of OPGW			
Cross section of Non metallic cable			
Joint box			
Fixing Clamps			
OPGW Suspension set			
OPGW Tension set			
OPGW Vibration Damper			

* Drum length to be finalized after finalization of tower locations as per check survey.

A4.2 132kV Line

Parameter	Unit	
OPGW Designation & Type		
Reference standard		
Number and Diameter of Aluminium strands	mm	
Number and Diameter of Steel strands	mm	
Corrosion Protection of Steel Strands	111111	
Internal Fibre tube diameter	mm	
Overall diameter	mm	
Guaranteed Ultimate Tensile strength	kN	
Final Modulus of Elasticity	N/mm ²	
Co-efficient of linear Expansion	1/degree	
DC Resistance at 20°C	ohms/m	
Maximum short circuit current capacity	kA ² sec	
Assumed temperature rise	°C	
Standard Weight	kg/m	
Weight of grease	kg/m	
Standard length on drum *	m m	
Weight of complete drum	kg	
Maximum drum length	m Kg	
Installation minimum bending radius		
OPTICAL CHARACTERISTICS:	m	
Cut off Wave length		
Attenuation at Nm	nm dB/km	
Zero dispersion wave length		
Chromatic dispersion at nm	nm ng/lym	
	ps/km dB	
Individual splice loss	ůВ	
Bit error rate		
OPGW FITTINGS:		
Guaranteed Ultimate Tensile strength	1-NI	
Suspension set	<u>kN</u>	
Tension set	kN	
Overall length of set		
Suspension set	mm	
Tension set	mm	
Mass of set	1	
Suspension set	kg	
Tension set	kg	
Drawing Numbers :		
Cross section of OPGW		
Cross section of Non metallic cable		
Joint box		
Fixing Clamps		
OPGW Suspension set		
OPGW Tension set		
OPGW Vibration Damper * Drum length to be finalized after finalization of tower locations	<u> </u>	

* Drum length to be finalized after finalization of tower locations as per check survey.
A.5 INSULATOR SETS & FITTINGS

A5.1 230kV Line

Parameter	Unit	Insulator Set Type				
		Suspension/ Jumper Suspension	Heavy Suspension	Tension	Upright Low Duty	Inverted Low Duty
Insulator Unit Type No.		U120B	U210B	U210B	U120B	U120B
Dielectric Material Total creepage per unit	(mm)	{	·	Porcelain		·}
Spacing	(mm)					
Overall shed diameter	(mm)					
Puncture Voltage of unit	(kV)					
Electro Mechanical Failing Load of unit	(kN)					
Drawing No. of Unit						
Type test Certificate No. of Unit						
Number of units per string						
Total creepage of string	(mm)					
Overall length of set	(mm)					
Sag adjuster type and step	(mm)					
Ultimate strength of set	(kN)					
Mass of set	(kg)					
Anticipated -Lightning impulse withstand Voltage -Power Frequency withstand Voltage	(kV) (kV)					
-Corona extinction level	(kV)					

A5.1 132kV Line

Parameter	Unit	Insulator Set Type				
		Suspension/ Jumper Suspension	Heavy Suspension	Tension	Upright Low Duty	Inverted Low Duty
Insulator Unit Type No.		U70B	U120B	U120B	U70B	U70B
Dielectric Material Total creepage per unit	(mm)	{	· · · · · · · · · · · · · · · · · · ·	Porcelain	·	}
Spacing	(mm)					
Overall shed diameter	(mm)					
Puncture Voltage of unit	(kV)					
Electro Mechanical Failing Load of unit	(kN)					
Drawing No. of Unit						
Type test Certificate No. of Unit						
Number of units per string						
Total creepage of string	(mm)					
Overall length of set	(mm)					
Sag adjuster type and step	(mm)					
Ultimate strength of set	(kN)					
Mass of set	(kg)					
Anticipated -Lightning impulse withstand Voltage -Power Frequency withstand Voltage	(kV)					
-Corona extinction level	(kV) (kV)					

A.6 SPACER DAMPERS

Unit	
kg	
-	
nos.	
nos.	
	kg - nos.

• These quantities shall be based on the design of the proposed spacer dampers. The quantities mentioned above may increase at the contractor's cost, if during design approval such increase is necessary.

A.7 VIBRATION DAMPERS

Parameter	Unit	
Unit Weight of vibration dampers -for 7 x 4.0 S earthwire	kg	
- for 7 x 4.0 S earthwire equivalent OPGW	kg	
- for 7/3.25 S earthwire equivalent OPGW	kg	
- for ACSR Grosbeak	kg	

* These quantities shall be based on the design of the proposed vibration dampers. The quantities mentioned above may increase at the contractor's cost, if during design approval such increase is necessary.

BIDDING DOCUMENT

FOR

CONSTRUCTION AND COMPLETION OF 132/33KV GIS SUBSTATION AT DHAMRAI, 230/132KV GIS SUBSTATION AT SHYAMPUR AND ASSOCIATED TRANSMISSION LINES ON TURNKEY BASIS.

SCHEDULE F

PROPOSED SUBCONTRACTORS

BIDDING DOCUMENT

Construction and completion of 132/33kV GIS substation at Dhamrai, 230/132kV GIS substation at Shyampur and associated transmission lines on turnkey basis.

SCHEDULE F

PROPOSED SUBCONTRACTORS

The bidder shall propose a list of the Sub-contractors in the following table as per sub-clause 2.6, Item 8 & 9, Subcontractors, Section-3, Evaluation and Qualification Criteria, Volume 1 of 3 of the Bidding Document.

Sl. No.	Name and Address of the Subcontractor			

Signature	
Date	

BIDDING DOCUMENT

FOR

CONSTRUCTION AND COMPLETION OF 132/33KV GIS SUBSTATION AT DHAMRAI, 230/132KV GIS SUBSTATION AT SHYAMPUR AND ASSOCIATED TRANSMISSION LINES ON TURNKEY BASIS.

SCHEDULE G

COEFFICIENT AND INDICES FOR PRICE ADJUSTMENT

BIDDING DOCUMENT FOR

Construction and completion of 132/33kV GIS substation at Dhamrai, 230/132kV GIS substation at Shyampur and associated transmission lines on turnkey basis.

SCHEDULE G

COEFFICIENT AND INDICES FOR PRICE ADJUSTMENT

Coefficient Scope of Index	Country of Origin; Currency of Index	Source of Index; Title/Definition	Value on Stated Dates		
			Value	Date	
For Transformer:					
a=0.15					
b=0.22					
c=0.25					
d=0.15					
e=0.03					
f=0.2					