

ETC-BOQ (MAIN QUANTITY)						
Sl. No.	Description	Unit	QTY	Rate	Amount	Remarks
1	2	3	4	5	6	7
I.	<u>220/132kV PITHORAGARH SUB-STATION</u>					
A	TRANSFORMERS					
A.1	Shunt Reactor					
	Dismantling at Dhauliganga Switchyard(NHPC),transportation to Pithoragarh (POWERGRID) substation including insurance,unloading,storage,erection with terminal connectors,testing and commissioning of 01Nos.,25MVAR,220kV Shunt Reactor alongwith associated protection panels.Max Transport weight (without oil) is 45 MT app.	No.	1			Shunt Reactor is being free issued by PGCIL
A.2	Auto Transformer					
	Receipt,unloading,storage,erection with terminal connectors,testing and commissioning of 06Nos.,33.3MVA,220/1.732/132/1.732 kV single phase Autotransformers being supplied as owner supplied materials under the supervision of manufacture's representative employed by owner.Weight of heaviest trnasported package with oil is 43.5MT(Tank with oil,widg,core etc.)	Nos.	6			Transformers are being free issued by PGCIL
A.3	LT Transformer					
	160 kVA, 11/0.433 kV complete with terminal connectors.	No.	2			
B	245 kV EQUIPMENT					
1.0	400kV (for 245kV application) Circuit Breakers (3 Ph.) with support structure					
(a)	400kV (for 245kV application) Circuit Breakers, 3 Ph., 1600A, 40 KA, without closing resistor alongwith Support Structure, Rigid / Expansion type terminal connectors for Al tube.	No.	6			
2.0	Current Transformer (1 Ph.)					
(a)	Current Transformer 245kV, (5 core) CT, 1000A, 40 KA with 120% extended current rating 1 Phase, complete with Rigid / Expansion type terminal connectors for Al tube / ACSR conductor	Nos.	18			
3.0	Capacitive Voltage Transformer (1 Ph.)					
(a)	Capacitive Voltage Transformer, 1 Ph., 245 kV, 4400 PF, complete with terminal connector	Nos.	9			
4.0	Isolators					
4.1	Isolators 245 kV, 3 phase double break, motor opearted (Standard - electrically/mechanically ganged) complete with 9 Nos. support insulators per Isolator, Rigid / Expansion type terminal connectors for Al tube / ACSR Moose conductor.					

ETC-BOQ (MAIN QUANTITY)						
Sl. No.	Description	Unit	QTY	Rate	Amount	Remarks
1	2	3	4	5	6	7
(a)	1600A, 40 KA, isolator with one E/S	Nos.	5			
(b)	1600A, 40KA, isolator with two E/S	Nos.	6			
4.2	Isolators 245 kV , 3 phase Pantograph, motor operated (Tandem, electrically/mechanically ganged) complete with 3 Nos. support insulators per Isolator, Rigid / Expansion type terminal connectors for Al tube / ACSR Moose conductor.					
(a)	1600A, 40 KA, isolator without E/S	Nos.	5			
(b)	1600A, 40KA, isolator with one E/S	Nos.	1			
5.0	216kV Surge Arrester (Gapless)	Nos.	15			
	Surge Arrester 216kV , Gapless, Metal Oxide, 1 Phase, complete with surge counter,leakage current meter, insulating base, connecting cable, Line terminal connector .					
C	145 kV EQUIPMENT					
1.0	145 kV Circuit Breakers , 3 Ph., 40 KA, without closing resistor alongwith Support Structure, Rigid / Expansion type terminal connectors for Al tube / ACSR Moose.					
a)	1250A, 31.5 kA	Nos.	7			
2.0	Current Transformer 145 kV , (5 core) CT, 1 Phase, complete with Rigid / Expansion type terminal connectors for Al tube / ACSR conductor					
(a)	600 A, 31.5KA with 120% extended current	No.	21			
3.0	Capacitive Voltage Transformer , 1 Ph.,145 kV, 4400 PF, complete with terminal connector	Nos.	15			
4.0	Isolators 145 kV , 3 phase horizontal center break, motor operated (Tandem / Standard - electrically/mechanically ganged) complete with 6 Nos. support insulators per Isolator, Rigid / Expansion type terminal connectors for Al tube / ACSR Moose conductor.					
(a)	1250A, 31.5 KA, Isolator with one E/S	Nos	6			
(b)	1250A, 31.5 KA, Isolator with two E/S	Nos	8			
(c)	1250A, 31.5 KA, Isolator without E/S (Tandem)	Nos.	6			
5.0	120 kV Surge Arrestors(gapless)(1ph)	No.	18			
	Surge Arrester 120 kV , Gapless, Metal Oxide, 1 Phase, complete with surge counter,leakage current meter, insulating base, connecting cable, Line terminal connector .					
6.0	Bus Bar Material					
a i)	220 kV Bus Post Insulators without corona ring and with terminal connectors	Nos.	35			
a ii)	132 kV Bus Post Insulators without corona ring and with terminal connectors	Nos.	22			
b)	Disc Insulators 120kN (to be installed with hardware below)	Nos.	3799			

ETC-BOQ (MAIN QUANTITY)						
Sl. No.	Description	Unit	QTY	Rate	Amount	Remarks
1	2	3	4	5	6	7
c)	220 kV Double Tension Double Anchoring Hardware with Turnbuckle suitable for Quad ACSR MOOSE Conductor with sub conductor spacing of 250mm suitable for 2 x 18 Discs	Nos.	6			
d)	220 kV Double Tension Double Anchoring Hardware without Turnbuckle suitable for Quad ACSR MOOSE Conductor with sub conductor spacing of 250mm suitable for 2 x 18 Discs	Nos.	6			
e)	220 kV Double Tension Double Anchoring Hardware with Turnbuckle suitable for Twin ACSR MOOSE Conductor with sub conductor spacing of 250mm suitable for 2 x 18 Discs	Nos.	15			
f)	220 kV Double Tension Double Anchoring Hardware without Turnbuckle suitable for Twin ACSR MOOSE Conductor with sub conductor spacing of 250mm suitable for 2 x 18 Discs	Nos.	15			
g)	220 kV Single Suspension Single Anchoring Hardware with Straight Clamp suitable for Twin ACSR MOOSE Conductor with sub conductor spacing of 250mm suitable for 1 x 17 Discs	Nos.	6			
h)	220 kV Single Suspension Single Anchoring Hardware with Drop Clamp suitable for Single ACSR MOOSE Conductor suitable for 1 x 17 Discs	Nos.	3			
g)	220 kV Single Suspension Single Anchoring Hardware with Drop Clamp suitable for Twin ACSR MOOSE Conductor with sub conductor spacing of 250mm suitable for 1 x 17 Discs	Nos.	2			
h)	132 kV Double Tension Double Anchoring Hardware with Turnbuckle suitable for Twin ACSR MOOSE Conductor with sub conductor spacing of 250mm suitable for 2 x 13 Discs	Nos.	24			
i)	132 kV Double Tension Double Anchoring Hardware without Turnbuckle suitable for Twin ACSR MOOSE Conductor with sub conductor spacing of 250mm suitable for 2 x 13 Discs	Nos.	24			
j)	132 kV Double Tension Double Anchoring Hardware with Turnbuckle suitable for Single ACSR MOOSE Conductor suitable for 2 x 13 Discs	Nos.	9			
k)	132 kV Double Tension Double Anchoring Hardware without Turnbuckle suitable for Single ACSR MOOSE Conductor suitable for 2 x 13 Discs	Nos.	9			
l)	132 kV Single Suspension Single Anchoring Hardware with Straight Clamp suitable for Twin ACSR MOOSE Conductor with sub conductor spacing of 250mm suitable for 1 x 12 Discs	Nos.	15			
m)	132 kV Single Suspension Single Anchoring Hardware with Straight Clamp suitable for Single ACSR MOOSE Conductor suitable for 1 x 12 Discs	Nos.	6			
l)	132 kV Single Suspension Single Anchoring Hardware with Drop Clamp suitable for Single ACSR MOOSE Conductor suitable for 1 x 12 Discs	Nos.	11			
m)	ACSR Conductor MOOSE along with spacers, Tee connectors, PG Clamps etc.	M	6700			

ETC-BOQ (MAIN QUANTITY)						
Sl. No.	Description	Unit	QTY	Rate	Amount	Remarks
1	2	3	4	5	6	7
n)	3" IPS Al Tube ETC of Aluminium tubes include Aluminium Welding. Welding Sleeve tube will be supplied by BHEL. Electrodes, Welding machines and any other equipment will be in ETC Contractor scope.	M	1000			
o)	Overhead shielding wire alongwith Shield wire connectors etc.	M	400			
7.0	Station Earthing					
a)	40mm 3 m long Pipe Electrode	Nos.	12			
b)	75x12 mm GI Flat	Metres	5300			
c)	50x6 mm GI Flat	Metres	3300			
d)	25X3 mm GI Flat	Metres	100			
Note for Earthing: The earthing includes earthing of all switchyard equipment, towers and LM's, pipe structures, transformer neutrals, cable trenches, fence and Control room equipments using necessary Connectors for earthing flats.						
8.0	Trench Material					
	Cable Trench Material - Consisting of cable rack assemblies eg., 1/2/3/4 tiers normal or under hung type in various combinations at an interval of 750mm whereevr cables are to be supported without the use of cable trays, such as in trenches, while at all other places these will be at an interval of 2000mm and as per specification and drawing .	MT				Cable Rack material shall be fabricated at site from 50x50x6mm MS Angle free issued by BHEL.
	Perforated cable trays	m	20			
9.0	11 kV EQUIPMENT					
9.1	11kV Isolator (For 160KVA LT Transformer)					
	Isolators 11kV, 3 phase double break, manual opearted (Standard - mechanically ganged) complete with 9 Nos. support insulators per Isolator, terminal connectors for ACSR Moose conductor.		2			
9.2	11kV Horn Gap fuse (For 160kVA LT Transformer) complete with terminal connectors	Nos.	2			
9.3	9kV Surge Arrestors (For 160KVA LT Transformer)complete with terminal connectors	Nos.	6			
10.0	CONTROL & RELAY PANELS					
10.1	220 kV					
10.1.1	Control Panel for					
a)	Two bays(For SMT Scheme)	Nos.	3			
10.1.2	Circuit Breaker Relay Panel					
a)	With Auto Reclose	Nos.	3			
b)	With out Auto Reclose	Nos.	3			

ETC-BOQ (MAIN QUANTITY)						
Sl. No.	Description	Unit	QTY	Rate	Amount	Remarks
1	2	3	4	5	6	7
10.1.3	Line Protection Panel	Nos.	2			Testing and commissioning of numerical relays by respective suppliers.
10.1.4	Transformer Protection Panel (For both HV & MV side)	Sets	2			
10.1.5	Bus Bar Protection Panel					
(a)	220kV (single bus bar protection)	Set	1			
10.2	132 kV					
10.2.1	Control Panel for					
a)	Two bays(For SMT Scheme)	Nos.	4			
10.2.2	Circuit Breaker Relay Panel					
a)	With Auto Reclose	Nos.	5			
b)	With out Auto Reclose	Nos.	2			
10.2.3	Line Protection Panel	Nos.	4			Testing and commissioning of numerical relays by respective suppliers.
10.2.4	Bus Bar Protection Panel					
(a)	132kV (single bus bar protection)	Set	1			
10.3	Other/common equipments pertaining to C&R system					
(a)	Time Synchronisation equipment	No.	1			
(b)	Comman equipment (Voltage Frequency recorder etc.)	Set	1			
(c)	Synchronisation Trolly/Panel	Nos.	2			
(d)	Event Logger	No.	1			
10.4	RTU and LDMS	Nos.	1			
11.0	PLCC					
11.1.1	Line Traps for Pithoragarh S/S					
(a)	1600A , 40kA Wave Traps 1 ph complete with support insulators (3 nos per wave trap), Rigid / Expansion type terminal connectors for Aluminium tube/ ACSR Moose and	Nos.	4			
(b)	1250A , 31.5kA Wave Traps 1 ph , Rigid / Expansion type terminal connectors for Aluminium tube/ ACSR Moose and	Nos.	4			
11.1.2	Coupling device with HF cable (220kV)	Nos.	2			
11.1.3	Carrier Equipment (for speech+protection and for speech+Data) (220kV)	Nos.	7			
11.1.4	Protection Coupler (220kV)	Sets	4			
11.1.5	EPAX (24/8) with 24 telephones, cables etc.	Set	1			
11.1.6	Testing & Maintenance equipment	Set	1			Only storing and handing over

ETC-BOQ (MAIN QUANTITY)						
Sl. No.	Description	Unit	QTY	Rate	Amount	Remarks
1	2	3	4	5	6	7
11.2.1	PLCC Equipment for Dhauliganga S/S					
	PLCC Dhauliganga(Existing) NHPC S/S					
	Line Traps					
(a)	1600A , 40kA Wave Traps 1 ph complete with support insulators (3 nos per wave trap), Rigid / Expansion type terminal connectors for Aluminium tube/ ACSR Moose and	Nos.	2			
11.2.2	Coupling device with HF cable (220kV)	Nos.	1			
11.2.3	Carrier Equipment (for speech+protection and for speech+Data) (220kV)	Nos.	3			
11.2.4	Protection Coupler (220kV)	Nos.	2			
11.3.1	PLCC Equipment for Bareilly S/S					
	PLCC for Bareilly(Existing) UPPCLS/S					
	Line Traps					
(a)	1600A , 40kA Wave Traps 1 ph complete with support insulators (3 nos per wave trap), Rigid / Expansion type terminal connectors for Aluminium tube/ ACSR Moose and	Nos.	2			
11.3.2	Coupling device with HF cable (220kV)	Nos.	1			
11.3.3	Carrier Equipment (for speech+protection and for speech+Data) (220kV)	Nos.	4			
11.3.4	Protection Coupler (220kV)	Nos.	2			
12.0	LT SWITCHGEAR					
12.1	415V Main switchboard	Set	1			
12.2	415V ACDB	Set	1			
12.3	415V MLDB	Set	1			
12.4	415V Emergency LDB	Set	1			
12.5	220V DCDB	Sets	2			
12.6	50V DCDB	Sets	2			
13.0	Batteries					
13.1	220V, 400 AH	Nos.	2			
13.2	50V , 400 AH	Nos.	2			
14.0	Battery Charger					
14.1	220V ,30/40A FCBC	Nos.	2			
14.2	50V ,50/40A FCBC	Nos.	2			
15.0	DG Set along with control panel (50 kVA)	Set	1			Testing and commisioning shall be done under the supervision of DG Set supplier.

ETC-BOQ (MAIN QUANTITY)						
Sl. No.	Description	Unit	QTY	Rate	Amount	Remarks
1	2	3	4	5	6	7
17.0	CABLES					
	LAYING, GLANDING AND TERMINATION OF AUXILIARY POWER AND CONTROL CABLES in trenches/PVC Pipes/Burried Cable (Ferrules and Lugs to be included in ETC contractor supply, Glands will be supplied by BHEL)					
17.1	Power Cables (1100 V grade)					
a)	1C x 150 sqmm	Meters	460			Cable in Trenches with trefoil clamps
b)	1C x 70 sqmm	Meters	1000			Cable in Trenches with trefoil clamps
c)	3.5C x 70 sqmm	Meters	200			Cable in Trenches
d)	3.5C x 35 sqmm	Meters	2200			Cable in Trenches
e)	4C x 16 sqmm	Meters	810			Cable in Trenches
f)	4C x 6 sqmm	Meters	3000			Cable in Trenches
g)	4C x 10 sqmm	Meters	500			Cable in Trenches
h)	2C x 6 sqmm	Meters	2850			Cable in Trenches
i)	2C x 4 sqmm	Meters	500			Cable in Trenches
	NOTE : The above lengths are subject to change at contract stage. Also these lengths will be laid in various part lengths may be from 15 metres to 500 metres with termination at both ends complete with glands etc.					
17.2	Power Cables (XLPE) (1100 V grade)					
a)	1CX630 sqmm	Meters	500			Burried Cable
b)	1CX300 sqmm	Meters	3100			
c)	3.5C x 150 sqmm	Meters	850			
d)	3.5C x 300 sqmm	Meters	300			
	NOTE : The above lengths are subject to change at contract stage. Also these lengths will be laid in various part lengths may be from 15 metres to 500 metres with termination at both ends complete with glands etc.					Burried Trench shall be under ETC contractor's scope.
17.3	Control Cables (PVC)					
a)	2Cx2.5 sqmm	Meters	2000			Cable in Trenches
b)	3Cx2.5 sqmm	Meters	500			Cable in Trenches
c)	5Cx2.5 sqmm	Meters	21430			Cable in Trenches
d)	7Cx2.5 sqmm	Meters	290			Cable in Trenches
e)	10Cx2.5 sqmm	Meters	39190			Cable in Trenches

ETC-BOQ (MAIN QUANTITY)						
Sl. No.	Description	Unit	QTY	Rate	Amount	Remarks
1	2	3	4	5	6	7
f)	14Cx2.5 sqmm	Meters	16670			Cable in Trenches
g)	19Cx2.5 sqmm	Meters	9820			Cable in Trenches
h)	27Cx2.5 sqmm	Meters	500			Cable in Trenches
	NOTE : The above lengths are subject to change at contract stage. Also these lengths will be laid in various part lengths may be from 15 metres to 500 metres with termination at both ends complete with glands etc.					
17.4	HT Power Cables (XLPE) (11kV grade)					
	1CX185sqmm(Al.conductor) or 1Cx120sqmm(Cu.conductor)	Meters	1000			Burried Cable
18	Steel Structures for 220kV S/S					
a)	Lattice Structure (excluding CB support structure)	MT	248			
b)	Pipe Structure	MT	113			
c)	Hardware for above	MT	7.5			
19	Steel Structures for 132kV S/S					
a)	Lattice Structure (excluding CB support structure)	MT	Included in 220 kV above			
b)	Pipe Structure	MT				
c)	Hardware for above	MT				
20	Clamps and connectors (Shield wire clamps, Clamps for earthing flats, Trefoil Clamps, and Corona Bells)	Nos.	2000			
21	Other Switchyard Items					
	Danger Plates, labels and phase coloured discs	Nos.	100			
	Marshalling Kiosk	Nos.	13			
	Junction boxes	Nos.	21			
	TOTAL					
Notes for ETC works :						
1	Loading / Unloading, handling, shifting to & from stores, proper storage, assembly, installation, pre-commissioning test and commissioning tests are included in the scope.					
2	MS welding - apply red lead paint then aluminium paint then bitumen after welding.					
3	GI welding - apply 2 coats of cold galvanising anti corrosive paint after welding.					
4	10% welding joints in Aluminum tube shall be tested for dye penetration test.					
5	Quoted rates are deemed to be inclusive of miscellaneous works, viz.. Erection of clamps and connectors, phase colour discs etc.					
6	Lot quantity may vary from 1% to 20% of the main equipment supply.					
7	ALL SURGE ARRESTERS / LIGHTNING ARRESTERS SHALL BE COMPLETE WITH COUNTERS					
8	NOTE for PLCC: Testing and commissioning shall be done under the supervision of respective PLCC panel suppliers.					
9	Note for Earthing: The earthing includes earthing of all switchyard equipment, towers and LM's, pipe structures, transformer neutrals, cable trenches, fence and gates.					

B MANDATORY SPARES TO BE HANDLED & STORED

Sl. No.	Description	UNIT	QTY	RATE	AMOUNT
1	2	3	4	5	6
I	245 kV , SF6 Circuit Breaker	LOT	1		
II	245 kV HDB Isolators	LOT	1		
III	245 kV Pentagraph Isolators	LOT	1		
IV	245 kV Current Transformers	LOT	1		
V	245 kV Capacitor Voltage Transformers	LOT	1		
VI	216 kV Surge Arresters	LOT	1		
VII	145 kV , SF6 Circuit Breaker	LOT	1		
VIII	145 kV HCB Isolators	LOT	1		
IX	145 kV Current Transformers	LOT	1		
X	145 kV Capacitor Voltage Transformers	LOT	1		
XI	120 kV Surge Arresters	LOT	1		
XII	11kV Isolator	LOT	1		
XIII	Control & Relay Panel	LOT	1		
XIV	PLCC Equipments	LOT	1		
XV	LT Switchgear	LOT	1		
XVI	Batteries (220V)	LOT	1		
XVII	Batteries (50V)	LOT	1		
XVIII	Battery Charger (220V)	LOT	1		
XIX	Battery Charger (50V)	LOT	1		
XX	DG Set	LOT	1		
XXI	Erection Hardware Items				
	5% spares of the actual quantities for Insulator , hardwares, clamps & connectors, spacers, corona bell, Al. tube,welding sleeves etc.	LOT	1		
XXII	Spares for illumination system				
	5% of each type of lighting fixture supplied	LOT	1		
XXIII	LT Transformer	LOT	1		
XXIV	Spares for remote terminal unit card/module	LOT	1		
	TOTAL AMOUNT				

Notes for ETC works :

- 1 Loading / Unloading, handling, shifting to & from stores, proper storage,assembly, installation, pre-commissioning test and commissioning tests are included in the scope.
- 2 MS welding - apply red lead paint then aluminium paint then bitumen after welding.
- 3 GI welding - apply 2 coats of cold galvanising anti corrosive paint after welding.
- 4 10% welding joints in Aluminum tube shall be tested for dye penetration test.
- 5 Quoted rates are deemed to be inclusive of miscellaneous works, viz.. Erection of clamps and connectors, phase colour discs etc.
- 6 Lot quantity may vary from 1% to 20% of the main equipment supply.
- 7 ALL SURGE ARRESTERS / LIGHTNING ARRESTERS SHALL BE COMPLETE WITH COUNTERS
- 8 NOTE for PLCC: Testing and commissioning shall be done under the supervision of respective PLCC panel suppliers.
- 9 Note for Earthing: The earthing includes earthing of all switchyard equipment, towers and LM's, pipe structures, transformer neutrals, cable trenches, fence and gates.