

**DETAILED SCOPE OF WORKS FOR PROPOSED CAPITAL OVERHAULING OF
UNIT-II AT USHP-II KANGAN**

	Description Of Scope	unit	Rate	Amount
1	Dismantling of Chequered Plates of Generator Floor and their stacking in the Power House Service Bay.	1 job		
2	Dismantling of Upper Dome assembly.	1 job		
3	Installation of Erection Devices (as supplied by the Turbine manufacturer at the time of erection) for dismantling/removing of Draft Tube cone (Upper and Lower)& Runner Assembly.	1 job		
4	Dismantling of Adjusting rings of Draft Tube Cone.	1 job		
5	Dismantling of Draft Tube Upper and the Lower Cone.	1 job		
6	Installation of Bulk Head on Draft Tube Opening. Bulk head to be provided by J&K PDCL.	1 job		
7	Dismantling of Permanent Magnetic Generator (PMG), disconnecting and opening of Excitation Leads. Extension Shaft, Slip Rings and the Bush Rocker Assembly.	1 job		
8	Opening of all Oil, Water and Air and Grease Pipe lines of Turbine and Generator.	1 job		
9	Jacking up of the Generator Rotor assembly and locking of all the Brake/ Jack units.	1 job		
10	Dismantling of bearing oil coolers of all bearings, stator air coolers, vapour seal, etc.	1 job		
11	Opening of Upper Guide Bearing (UGB) Pads followed by the dismantling of UGB cylinder as well.	1 job		
12	Dismantling of Thrust Collar assembly, Thrust Mirror Disc and all the Thrust Bearing Pads.	1 job		
13	Opening of the supporting plates of Regulating Rings after disengaging from the connecting rods of Guide Vane Servomotors.	1 job		
14	Dismantling of the existing damaged Shaft Sleeve assembly.	1 job		
15	Dismantling of Runner Cone Assembly.	1 job		
16	Dismantling of Runner Assembly.	1 job		
17	Installation of Erection devices (as supplied by the Turbine manufacturer at the time of erection) for resting of Runner Assembly after decoupling of Runner Assembly and Turbine Shaft.	1 job		
18	Lowering of Runner Assembly and carriage of same to service bay.	1 job		
19	Dismantling of Guide Vane Levers, Guide Vane Links etc.	1 job		

20	Dismantling of all the Turbine Guide Bearing Pads and storing them safely.	1 job		
21	Dismantling of Top Air Guide / Baffles assembly.	1 job		
22	Dismantling of Bottom Air Guide/ Baffles, Vapour Seal, etc.	1 job		
23	Dismantling of Radial Jacks of Upper Bracket Assembly followed by dismantling of the Upper Bracket Assembly.	1 job		
24	Decoupling of Turbine Shaft and the Generator Shaft assembly.	1 job		
25	Lifting of Generator Rotor assembly from the Generator pit along with its Generator Shaft and placing it securely in the Service Bay.	1 job		
26	Dismantling & Lifting of Lower Bracket assembly from the Unit pit followed by its placement in the Power House floor.	1 job		
27	Dismantling of all the Guide Vanes and Guide Vane Servomotors, etc.	1 job		
28	Dismantling of the Turbine Top Cover assembly including the Lower Fixed Labyrinth Ring.	1 job		
29	Dismantling of the Turbine Shaft assembly.	1 job		
30	Dismantling of the existing damaged Shaft Sleeve assembly.	1 job		
31	Dismantling of the Turbine Shaft assembly.			
32	Dismantling of PRV assembly complete along with PRV shaft	1 job		
33	Stacking and placement of dismantling parts at suitable safe place/service bay	1 job		

B.	POST-DISMANTLING INSPECTION & TESTING/ MEASUREMENTS:			
1	Non-Destructive Testing of the various dismantled unit assemblies including the welded portions on the Bracket arms& Turbine Top Cover.	1 job		
2	Liquid Penetrant tests shall be undertaken on the welded portions of the Generator Stator Frame to assess their healthiness.	1 job		
3	Ultrasonic Testing of all the bearing pads of:			
a	➤ Thrust Bearing assembly	1 job		
B.	➤ Upper Guide Bearing assembly	1 job		
c	➤ Lower Guide Bearing assembly	1 job		
d	➤ Turbine Guide Bearing assembly	1 job		
4	Inspection of the secondary grouting and its bonding with the primary civil foundation at the Lower Bracket sole plates.	1 job		
5	Inspection of the secondary grouting and its bonding with the primary civil foundation under all the Stator Sole Plates.	1 job		
6	Inspection of all the dismantled Studs, Dowels, Bolts/ Nuts, Pins to identify their replacement by new ones.	1 job		
7	Measurement of Runner diameters at the Labyrinth Rings on both Suction side as well as the Discharge side to check/ determine the ovality/ eccentricity besides the extent of erosion.	1 job		
8	General Check-up of the profile of all the Runner Blades.	1 job		
9	Measurement of the Diameters of both the Stationary Labyrinths engaged with Pivot Ring as well as the Turbine Top cover assemblies to check/ determine the ovality/ eccentricity besides the extent of erosion.	1 job		
10	Measurement of the dimensions including its top/ bottom Trunnion diameters as well as the feather heights of all the dismantled Guide Vanes.	1 job		
11	Dismantling of all the Guide Vane bushes from the Pivot Ring assembly. However before their dismantling, diameters of all the pivot bushes shall be measured and recorded.	1 job		
12	Dismantling of all the Guide Vane bushes from the Top Cover Bush Housings. However before their dismantling, diameters of all the pivot bushes shall be measured and recorded.	1 job		
13	Carrying out physical inspection of MIV along with the seal and check list the works to be carried out at workshop	1 Job		

14	Checklist of all parts to be replaced/repared.	1 job		
C REPAIR OF THE DISMANTLED ASSEMBLIES AT WORKSHOP:				
1	➤ Transportation of below mentioned assemblies from the powerhouse to workshop for essential repairs.			
	a) All the dismantled 24 No. Guide Vanes.	1 job		
	b) Dismantled Upper Draft Tube Cone assembly along with Bottom Stationary Labyrinth Ring assembly.	1 job		
	c) Dismantled Turbine Top Cover assembly along with Top Stationary Labyrinth Ring assembly.	1 job		
	d) Dismantled Spare Turbine Runner assembly along with its top as well as bottom moving labyrinth assembly.	1 job		
	e) Dismantled Pivot Ring assembly.	1 job		
	f) Overhauling of runner blade	1 Job		
	g) All the dismantled Guide vane bush housings.	1 job		
	h) Replacement of upper and lower labyrinth by new one	1 Job.		
	i) Pressure Relief Valve assembly.	1 job		
	J) MIV assembly complete	1 Job		
2	Bearing Bodies			
	a. Overhauling of all the Guide vane bush housings, as required. In case of damaged, arrangement of new bushes.	1 job		
	b. General refurbishment of all Guide Vane Bearing Bodies by polishing etc. and assembly of Guide Vane Bushes in the Bearing Body Housing assemblies using proper fit including the new Cup Seals and 'O'-Rings.	1 job		
3	➤ <u>Pivot Ring assembly:</u>			
	a. Manufacture of Fixed Lower Stationary Labyrinth Ring with Stainless Steel (13%-Cr; 4%-Ni) with machining to the designed tolerance limits.	1 job		
	b. General cleaning & polishing of liner surface of the Pivot ring assembly.	1 job		
	c. Repair of M.S. portion, Stainless Steel Liner and eroded holes of the Pivot Ring assembly by welding and grinding.	1 job		
	d. Procurement and Replacement of all Cup Seals	1 job		
	e. Replacement of 24 no. brass bushes by new one	1 Job		

	f. Checking the bolt tightness of bottom liner plates as well as the bottom stationary labyrinth ring of Pivot Ring assembly.	1 job		
4	➤ <u>Turbine Top Cover assembly:</u>			
	a. Manufacture of Fixed Upper Stationary Labyrinth Ring with Stainless Steel (13%-Cr; 4%-Ni) with machining to the designed tolerance limits.	1 job		
	b. Testing of Turbine Top Cover assembly and identifying the areas for repairs.	1 job		
	c. Providing of new turbine top cover along with carrying out the repairs of the Dismantled Turbine Top Cover assembly including its Liner surface, Bearing Body holes and Taper Ring by welding and grinding as a standby .	1 job		
	d. Checking the tightening of all the holding fasteners of the Top Cover Liner Plates.	1 job		
	e. Installation of newly manufactured Top Stationary Labyrinth on the Turbine Top Cover assembly.	1 job		
	f. Any cracks observed (during the DP Testing) in the Blocks & Welding Joints of the Turbine Guide Bearing housing shall be repaired by welding & grinding.	1 job		
5	➤ <u>Guide Vanes:</u>			
	a. Repair of top ,middle and bottom journals by welding and machining to achieve original size of guide vanes	1 job		
	b. Repair of feather portion of the guide vanes by welding, one layer of final welding to be done with hard facing electrode before grinding in order to achieve original profile as far as possible. Height of the feather shall be made as per requirement based on the distance of top and bottom liners or as per drawings.	1 job		
	c. Weld build up sealing surface of each guide vane throughout the length is required to be carried out followed by their machining on planer machine. Sealing strips should be parallel to the guide vanes axis and horizontal feather surface should be perpendicular to the guide vane axis.	1 job		
	d. Replacement of 48 no. brass bushes by new one	1 Job		
	e. Weld repair of collar to be done with Stainless Steel 309 electrodes and its machining on suitable lathe for maintaining the seat for bush.	1 job		
6	Ø <u>Draft Tube Cone assembly:</u>			
	Carrying out the repairs of the Draft Tube Cone as per standard procedure that includes welding and precision machining.	1 job		

7	Ø Turbine Shaft Sealing assembly:			
	Manufacture of new Shaft Seal system (Rotating Sleeve & Stationary Bracket assembly). Installation of a new Shaft Sleeve on the Turbine Shaft assembly	1 job		
8	➤ Pressure Relief Valve assembly:			
	a. Repairing of all the eroded portions of the moving & stationary Seals by welding, grinding, machining and lapping. All bushes, Springs, 'O'-Rings, Gaskets, Packing, Gland pack, Cup Seal required for repair shall be replaced by new ones.	1 job		
	b. Replacing of damaged PRV rod (shaft) as per sample	1 Job		
	c. Painting of PRV body with two coats of synthetic enamel paint (Berger)	1 job		
9	MIV			
	Complete overhauling of MIV along with repairs of moving and stationary parts			
	a. Dismantling of expansion joint ,overhauling / repairing of S.S. sealing ring (metal to metal).maintenance sealing ring (metal to metal) and fixed sealing ring , valve body drainage and air vent and rotor seal for term tightness	1 Job		
	b. Overhauling / repairing of locking bolt of maintenance sealing ring along with cleaning of piston cylinder of servo motor and replacement of damaged cup seals	1 Job		
	c. Overhauling / repairing of sliding bearing sleeve of shaft (rubber seal)	1 Job		
	d. Replacement of stem seal between valve shaft and body	1 Job		
	e. Replacement of MIV operating mech. Bushes linking servomotor	1 Job		
	f. Overhauling of MIV operating mechanism including reconditioning of piston cylinder	1 Job		
	g. Painting of MIV complete	1 Job		

10	Rebabitating of all Pads			
a.	Thrust bearing pads	8 no.		
b.	Lower guide bearing pads	8 no.		
c.	Upper guide bearing pads	8 no.		
d.	Turbine guide bearing pads	6 no.		

D	REPAIR OF THE DISMANTLED ASSEMBLIES AT POWERHOUSE:			
1	➤ <u>Thrust Bearing assembly:</u>			
	a. Blue-matching of rebabitated pads for checking quality of rebabitating with a surface plate.	1 job		
	b. Blue matching of the thrust collar bottom surface with the top insulation surface of thrust runner disc in the Service bay.	1 job		
	c. Thorough cleaning of all Thrust Bearing Oil Coolers and pressure testing of the same and assembly.	1 job		
	d. All gaskets and damaged fasteners required for the assembly	1 job		
	2 Ø Upper Guide Bearing assembly:			
	Blue-matching of rebabitated pads with the corresponding journal surface on the Thrust Collar assembly.	1 job		
	3 ➤ <u>Lower Guide Bearing assembly:</u>			
	a. Blue-matching of rebabitated pads with the corresponding journal surface on the Lower Bearing Journal on the Generator Shaft assembly.	1 job		
	b. Thorough cleaning of all Lower Guide Bearing Oil Coolers and pressure testing of the same and assembly.	1 job		
	c. All gaskets and damaged fasteners required for the assembly	1 job		
	4 ➤ <u>Turbine Guide Bearing assembly:</u>			
	a. Polishing of all the Turbine Guide Bearing Pads and blue-matching them with the corresponding journal surface on the Turbine Bearing Journal on the Turbine Shaft assembly.	1 job		
	b. Thorough cleaning of all Turbine Guide Bearing Oil Coolers and pressure testing of the same and assembly.	1 job		
	c. All gaskets and damaged fasteners required for the assembly	1 job		
	5 ➤ <u>Guide Vane Servomotors & Regulating Ring assembly:</u>			
	a. Replacement of regulating rings of guide vanes and Overhauling/ Repairing of existing Regulating Ring assembly.	1 job		
	b. Replacement of guide vane servomotor and repairing /overhauling of existing guide vane servomotor.			
	c. Replacement of ‘O’-Rings and Cup Seals.	1 job		

	d. Replacement of eroded brass and bottom Pads by new ones.	1 job		
	e. Replacement of all Teflon Bushes by new ones.	1 job		
6	➤ <u>Brake/ Jack assembly:</u>	1 job		
	a. Overhauling of Brake Jack assembly and its Pressure testing.	1 job		
	b. Any Cup-Seal observed to have been damaged shall be replaced.	1 job		
7	<u>Pressurining Unit</u>			
	a.Replacement of all NRV's of pipelines	1 job		
	b. Replacement of edler valves	1 job		
	c. Replacement of air controlling valves of pressure tank.	1 job		
	d. Replacement of Oil Pump Cartridges.	1 job		
8	➤ <u>Generator Stator assembly:</u>			
	a. Thorough cleaning of the complete Generator Stator Core all along its periphery both inside as well as from its outside surface using a suitable cleaning agent viz MTO.	1 job		
	b. Thorough cleaning of the complete Generator Stator Winding overhang portions all along its periphery on both its connection-end side as well as from its non-connection end side using a suitable cleaning agent viz MTO.	1 job		
	c. Checking of Stator Slot Wedge tightening and its rectification. Checking for any looseness of whole top as well as bottom overhang insulation including packers and retightening of the same. Spare wedges and packers as available in the powerhouse stores shall be used for this work.	1 job		
	d. Carrying out computerised digital ELCID testing of the Generator Stator core assembly and minor repair, if required.	1 job		
	e. Application of Loctite-290 compound on the two top-most as well as bottom-most stator core packets all around the periphery of the generator core.	1 job		
	f. Spray painting of Generator Stator Winding top as well as bottom overhang portion by Epoxy Red Gel paint using oxygen gas to avoid any ingress of moisture in the winding.	1 job		

	g. Spray painting of Generator Stator Core surface by Grey Bectol insulation paint using oxygen gas to avoid any ingress of moisture in the Generator.	1 job		
	h. Conducting the Dry-Out of the Generator Stator Winding assembly.	1 job		
	i. Carrying out Tan delta /power factor and capacitance measurement testing of stator core	1 job		
	j. High Voltage testing of stator bars	1 job		
	k. Installation ,testing and commissioning of latest state of the art dust collector system complete in place of defunct one with all accessories .			
	l. Carrying out ultrasonic testing of stator core	1 Job		
	m. Carrying out X-Ray testing ,Ultra voilent testing , dye penetration test , IR and PI tests of stator core.	1 job		
9	➤ <u>Generator Rotor assembly:</u>			
	a. Dismantling of all the 10 No. Rotor Poles from the Rotor assembly.	1 job		
	b. Dismantling of all the Rotor Pole Coils from their respective Pole assemblies.	1 job		
	c. Thorough cleaning of all the dismantled Pole Coils as well as their Pole Shoe assemblies using a suitable cleaning agent viz MTO.	1 job		
	d. Spray Painting of all the cleaned Pole Coils by Epoxy Based Red Gel Paint using oxygen gas to avoid ingress of moisture.	1 job		
	e. Spray painting of all the pole shoe assemblies by Bectol Red insulation paint.	1 job		
	f. Reassembly of all the cleaned Pole Coils on their respective Pole Shoe assemblies and their packing up properly.	1 job		
	g. Carrying out electrical testing of all the assembled Generator Rotor Poles viz IR value, Impedance measurement, etc.	1 job		
	h. Reassembly of all the 10 No. Rotor Poles in their respective positions on the Rotor Rim assembly after driving their Pole Keys to the proper tightness.	1 job		
	i. Conducting the Impedance measurement of all the Rotor Pole Coils followed by their Polarity testing.	1 job		
	j. Completing the jointing of all the assembled/ tested Rotor Poles involving soldering and proper insulation.	1 job		
	k. Measurement of the Insulation Resistance of the Rotor Pole winding to check its final healthiness.	1 job		

	l Installation of new H.S.Motor pump set for the unit and overhauling of existing H.S. Pump and necessary repairs to motor assembly and cleaning of its filters and replacement of its wornout gaskets of pipe line so as to keep it as a standby.	1 job		
	m. Conducting of DC winding resistance and AC impedance measurement tests for generator rotor.	1 Job		
	o. Conducting the IR and PI tests of the Generator Rotor assembly.	1 Job		
	p.Replacement of all sixteen no. damaged baffle plates .	1 Job		
	p. Conducting the Dry-Out of the Generator Rotor assembly.	1 job		
	q. Installation ,testing and commissioning of state of the art on line vibration monitoring system complete with all accessories	1 Job		
10	➤ Stator Coolers:			
	a. Thorough cleaning of all Thrust Bearing Oil Coolers and pressure testing of the same and assembly.	1 job		
	b. All gaskets and damaged fasteners required for the assembly including its piping & Valves joints	1 job		
	c. Replacement of all inlet and outlet valves and overhauling of existing Inlet & Outlet Valves 16 no' 4 " Valves as a standby.	1 job		
	d. Modification of stator coolers inlet side 8 no. valves for flushing purposes during running operation	1 Job		
	f. Painting of all Stator Air Coolers using smoke grey Berger make synthetic super enamel paint.	1 job		
11	Ø Slip Ring assembly:			
	Machining of slip ring for removing of grooves and making surface smooth with thorough polishing of Slip Ring surface and spraying with insulation paint	1 job		
12	EOC Coolers			
	a. Thorough cleaning of all Oil Coolers along with water tubes and pressure testing of the same with assembly.	1 job		

	b. Replacement of all gaskets and damaged fasteners required for the assembly including its piping & Valves joints	1 job		
	c. Replacement of all NRV's of EOC pipelines and overhauling of existing NRV's so as to keep them as standby..	1 job		
	c. Replacement of wornout inlet and outlet eight water valves and overhauling of other oil Inlet & Outlet Valves.	1 job		
	d Thorough cleaning of oil tank inside and outside along with its cleaning of oil filters and its replacement , painting using smoke grey berger make synthetic super enamel paint.	1 Job		
	e. Retubing of damaged EOC coolers app. 200 no.	1 Job		
	f. Painting of all EOC Coolers using smoke grey Berger make synthetic super enamel paint.	1 job		
13	Power Transformer Coolers			
	a. Thorough cleaning of all Oil Coolers along with water tubes and pressure testing of the same with assembly.	1 job		
	b. Replacement of all gaskets and damaged fasteners required for the assembly including its piping & Valves joints	1 job		
	c. Replacement of all inlet and outlet valves and overhauling of existing oil Inlet & Outlet Valves for standby .	1 job		
	d Replacement of damaged PRV for three power transformers of Unit-II .	1 Job		
14	Power Transformer Testing			
a.	.Tan Delta, power factor and Capacitance testing of all the three units of 15 MVA, 11/132 KV power transformers of Unit-II.	1 job		
b.	Carrying out DC winding Resistance measurement and short circuit impedance test.			
c.	Carrying out IR and PI tests on all the units.			

d	Dissolved Gas analysis (DGA) Testing of the transformer oil of all the three units of 15 MVA , 11/132 KV power transformers of Unit-II	1 job		
15	➤ <u>Spiral Casing and Stay Vanes:</u>			
	a. Repair of Stay Vanes by welding & grinding.	1 job		
	b. Cleaning of Spiral casing, Stay Vanes, PRV branch and Discharge pipe with scrappers in order to remove rusting & other deposits to the maximum possible extent.	1 job		
	c. Carrying out cleaning of already Painted surface of inside spiral casing and stay vanes complete and making minor repairs of damaged portion with brushable ceramic beat of reputed make (Loctite) for protection .	1 Job		
	d. Carrying out cleaning of inside surface of PRV and turbine parts already painted with Pneu-Wear and making necessary repairs of damaged portion .	1 Job		
	e. Painting of Spiral casing on its outer surface with one coat of primer and two coats of synthetic enamel paint of Berger make.	1 job		
16	➤ <u>Draft Tube Cones and Guide Plates:</u>			
	a. Cleaning of both the Draft Tube Cones as well as the Guide Plates with scrappers in order to remove rusting & other deposits to the maximum possible extent.	1 job		
	b. Painting of both the Draft Tube Cones as well as the Guide Plates with first coat of Epilux-4 followed by two coats of Epilux-5 paint.	1 job		
	c. Replacement of 8mm Rubber Cord by a new one.	1 job		
17	Ø Painting Works:			
	Cleaning and Painting of Thrust Bearing housing, Upper Bracket assembly, Radial Jacks, Chequered Plates of the Stator & Rotor, Bus bar protection tubes with color coding .	1 job		
18	Trail Assembling			
a	➤ Trial assembly of Runner with Pivot ring and measurement of bottom labyrinths clearances.	1 job		
b	➤ Trial assembly of Runner with Turbine Top Cover and measurement of top labyrinth clearances.	1 job		
	E. REASSEMBLING & RE-COMMISSIONING OF THE UNIT AT SITE:			
1	Transportation of below mentioned repaired assemblies from workshop to the powerhouse for reassembly of the unit at site:			

	➤ All the dismantled 24 No. Guide Vanes.	1 job		
	➤ Dismantled Upper Draft Tube Cone assembly along with Bottom Stationary Labyrinth Ring assembly.	1 job		
	➤ Dismantled Turbine Top Cover assembly along with Top Stationary Labyrinth Ring assembly.	1 job		
	➤ Dismantled Spare Turbine Runner assembly along with its top as well as bottom moving labyrinth assembly.	1 job		
	➤ Dismantled Pivot Ring assembly.	1 job		
	➤ All the dismantled Guide vane bush housings.	1 job		
	➤ Pressure Relief Valve assembly.	1 job		
2	Checking of stationary level of Turbine Speed Ring assembly.	1 job		
3	Re-assembly of Pivot Ring assembly in position.	1 job		
4	Re-assembly of all Guide Vanes in the Pivot Ring assembly.	1 job		
5	Lowering of Turbine Shaft assembly in the turbine pit using the erection device.	1 job		
6	Assemblies of the repaired Top Cover assembly in position with replacement of all its old fasteners by new ones which are to be procured.	1 job		
7	Re-assembly of all the Guide Vane Bush Housings in the top cover and replacement of its damaged fasteners by new ones which are to be procured	1 job		
8	Assembly of Regulating Ring alongwith Connecting Rods of the Guide Vane Servomotors in the unit.	1 job		
9	Lowering of Lower Bracket assembly along with Brake Jack assembly in position with all its fasteners duly tightened.	1 job		
10	Lowering of Generator Rotor assembly in the generator pit supporting on the jacking pads.	1 job		
11	Lowering of Upper Bracket assembly in position with all its fasteners duly tightened.	1 job		
12	Re-assembly of Thrust Collar assembly on the Generator Shaft by shrunk fitting method. Checking the vertical movement of Thrust Collar assembly.	1 job		
13	Reassembly of Thrust Runner Disc assembly, Thrust Pads, H.S. Lubrication system, etc.	1 job		
14	Checking of rotational level of Generator Shaft and correcting the same	1 job		
15	Coupling of Generator and Turbine shaft flanges.	1 job		
16	Re-assembly of the Francis Runner assembly and its coupling with Turbine Shaft using new Coupling Bolts & Nuts.	1 job		
17	Assemblies of all associated turbine components viz Guide Vane Servomotors, Guide Vane Lever & Link Mechanism.	1 job		
18	Carrying out the combined rotational checks of the Turbine & Generator Shafts and correcting the alignment, leveling & equal load sharing of the Thrust Pads.	1 job		

19	Centering of the shaft and setting of Bearing clearances in UGB, LGB & TGB in a concentric manner.	1 job		
20	Checking of all oil pipe lines & charging of Governor.	1 job		
21	Bedding & setting of all Guide Vanes with respect to steel liner of Top Cover and Lower Ring to achieve proper clearances.	1 job		
22	Boxing up all Bearings including their oil & water pipe lines.	1 job		
23	Complete assembly of Draft Tube Upper Cone including full tightening of all bolts.	1 job		
24	Complete assembly of Lower Cone with full tightening of bolts.	1 job		
25	Complete assembly of Adjusting Ring with full tightening of all the bolts.	1 job		
26	Complete assembly of Shaft Sealing system including assembly of water pipelines.	1 job		
27	Assembly of grease pipeline of Upper Bushes and Lower Bushes and assembly of water pipe line of Lower Bushes.	1 job		
28	Complete assembly of oil bath of Thrust Bearing with full tightening of bolts.	1 job		
29	Measurement of Insulation Resistance value of Stator and Rotor winding.	1 job		
30	Rendering assistance for spinning of the machine, dry out and then synchronizing/ loading of the unit.	1 job		
31	Rendering assistance for carrying out the Dry-out of the Generator with windage loss method till the satisfactory levels of IR & the PI values is achieved.	1 job		
32	Rendering assistance for Voltage build-up and subsequent synchronization of the unit followed by loading in steps and checking the unit vibrations at every step till the unit reached the rated load. Carrying out the balancing of the unit at load, if & as required.	1 job		
33	Carrying out the measurement of unit vibrations & balancing of the unit as required.	1 job		

F MATERIALS REQUIRED (SPARES AND FASTENERS):				
1	All general purpose consumables, D&H make Mo-309 SS welding electrodes, O-rings, general purpose fasteners, stainless steel shims, insulation paints, etc. required during the capital maintenance.	1 job		
2	Turbine Oil Servo-57	50 Barrels		

3	Below mentioned new spares are required during the major overhauling of Unit-III			
	i. Carbon Brushes and Brush Holders:	120no.		
	ii. RTDs and TSDs:	30 no.each		
	iii. Brass Bush of Servomotor (Drg. No: 42030259023):	10 no.		
	iv. Limit switches for Guide Vanes:	26 no.		
	v. Brass Bushes for Bearing Bodies (Drg. No: 42030159002):	48 no		
	vi. Fixed Ring (Lower) Fixed Labyrinth-pivot Ring) (Drg. No: 22040859001):	1 no.		
	vii. Fixed Ring (Upper) Upper stationary Labyrinth-Top Cover)- (Drg. No: 22040859004):	1 no.		
	viii. Brass Bushes of Pivot Ring IT-09 (Drg. No: 32030159002):	24 no.		
	ix. Coupling Bolts (Runner) Bolt M 64×4 (Drg. No: 32030159001):	12 no.		
	x. Nut M64×4 (Drg. No: 42050159001):	12 no.		
	xi. Nut M64×4 or M52×3 (Drg. No: 42050159003):	12 no.		
	xii. Bottom Column Rings SS for Guide Vanes (Drg. No: 42050159004):	24 no.		
	xiii. Locking Keys-(2 Sets=24 No Each)-(Drg. No: 42050159005): .	2 sets		
	xiv. Bolt & Nut M12×50:	15 kgs		
	xv. Bolt & Nut M16×50:	20 kgs		
	xvi. Bolt & Nut M20×50:	20 kgs		
	xvii. Bolt & Nut M20×75:	20 kgs		
	xviii. Studs with Nut M24×75:	20 kgs		
	xix. Shear Pins (Drg. No: 32030159004):	6 no.		
	xx. Sealing Bracket(in 4 Parts) Drg No: 12060259004:	1 set		
	xxi. S.S.Bolt Hex, M16x60 Drg No: 02060259001/9:	22 no.		
	xxii. S.S.Bolt Hex, M16 Drg No: 02060259001/10:	22 no.		
	xxiii. Washer Spring, M16 Drg No: 02060259001/11:	22 no.		
	xxiv. Taper Pin, Dia-10 Drg No: 42060251005:	8 no.		
	xxv. Shaft Seal Complete Drg No: 2060259001:	1 set		

	xxvi. Sealing Drg No: 32040719030:	1 no.		
	xxvii. Rubber Ring (Drg No: 32040719029):	1 no.		
	xxviii. Rubber Ring in two parts (Drg No: 42040719023):	2 no.		
	xxix. S.S. Stud 20/75 for Shaft Sleeve: Drg No: 02040719001/1	12 no.		
	xxx. S.S. Nut, M20 Drg No: 02040719001/16:	12 no.		
	xxxi. Brush Rocker Assy: Drg. No: 12561076000C:	50 no.		
4	In addition to above, below mentioned spares shall be required for overhauling of the Pressure relief Valve assembly that needs to be arranged.			
	i. Rings in two parts(DRG No. 42070159001):	4 no.		
	ii. Piston Rings (DRG No. 22070159006):	4 no.		
	iii. Cup Seal (DRG No. 42070159014):	12 no.		
	iv. Leakage Ring (DRG No. 32070159006):	6 no.		
	v. Sealing Ring (DRG No. 32070159005):	02 no.		
	vi. Sealing Ring (DRG No. 32070159002):	01 no.		
	vii. Screw SLTC HS APM 12×25-48:	36 no.		
	viii. Screw GRB.SLT CP M8×16-6-6:	42 no.		
	ix. Rubber Cord 04 mm:	20 mts		
	x. Rubber Cord 08 mm:	20 mts		
	xi. ASB ATM Packing (SQ Cord 20×20):	12 mts		

G Supply of Spares for smooth operation of Power House				
1	Supply for Turbine oil servo-57	48 barrels		
2	Supply of Temperature sensing device (TSD) reputed make	30 no.		
3	Supply of resistance temperature device (RTD) reputed make	30 no.		
4	Portable welding machine single phase 20 -250 Amps	2 no.		
5	Digital Meggar 5 KV (Meggar make)	one no		
6	Supply of Digital motorised oil testing machine	1 no.		
7	Infra red thermometers (industrial Type)	6 no.		
8	Supply of various types of bearings for motors, pumps ,gates etc viz a viz 22214 E,3314 A, N6219, N 219 3304 ,6215, 6409 , N215,1205-K , Plummer block bearings part no 315 etc	12 No Each		

9	Supply of spanners of sizes (Rings and Dees)	20 no. each		
10	Supply of tool kit to be used for turbine and generator works	01 set		
11	Supply of 210 LPM OPU cartridge pump alongwith bushings and coupling	02 No.		
10	Supply of rubber shaft seal	3 sets		

H. Allied Works to be executed for Unit-II

S.no.	Description of Works	Unit	Rate	Amount
1	Supply ,installation ,testing and commissioning of 60 hp induction motor along with 60 cusec pump	1 no.		
2	Supply ,installation ,testing and commissioning of additional 200 hp cooling motor along with 700 cusec pump along with pipe lines , Valves and foundation	1 no.		
3	Supply ,Installation ,Testing and Commissioning of two no. Footvalves for cooling water pipelines at tailrace.	1 Job		
4	Supply ,Installation ,Testing and Commissioning of twevle no. 12 " Valves for cooling water system including necessary repairs of oil and water lines .	1 Job		
5	Supply ,Installation ,Testing and Commissioning of one no 0.5 HP oil leakage pumps.	1 Job		
6	Overhauling and repairing of grease lubrication system of unit-II	1 Job		
7	Overhauling and repairing of idler Valves of unit-II	1 Job		
8	SITC of 1000 Amps MCCB Tie breaker	1 job		
8	SITC of 200 Amps MCCB Tie breaker	1 job		
10	SITC of 400 Amps MCCB LT breaker	1 job		
11	Overhauling and repairing of Piezo ring assembly meant for pressure mointering of spiral ring of unit-III	1 Job.		
12	Overhauling and repairing of draft tube drain valve of unit-III	1 Job		

Signature with seal of Bidder