

Name of Work :- Development Of Outreach Campus Of NU Rajgir.

S.No	DSR Item No.	Description of Work	Unit	Total rate with Index Cost and Labor Cess	Total Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
1		CHILLER				
1.0	MR 1	Supplying, installing, testing and commissioning of AHRI Certified SCREW WATER CHILLING UNITS of 110 TR capacity (actual) complete with twin screw design compressor with star-delta, squirrel cage induction motor, starter panel machine mounted, water cooled condenser, insulated chiller, flow switch at chiller and condenser, neoprene pads, integral refrigerant piping and wiring, BMS interface unit Modbus, counter flanges along with flanged connection for condenser and cooler water in/out connections, complete charge of refrigerant and oil, accessories as required and called for, automatic and safety controls mounted in central micro-processor based console panel and all mounted on a steel frame complete as per specifications. Motor shall be suitable for 415±10% 50 cycles. 3 phase AC supply and motor cable terminal box shall be suitable to connect copper Cabling. Refrigerant used shall be Ozone friendly HFC-134a/R410a as detailed in specifications. First chiller shall be factory tested at design conditions at 100%, 75%, 50% and 25% load.	Nos	46,62,273	2	93,24,546
		1 No: Matching shell and tube water cooled condenser of M.S. shell and integrally finned copper tubes.				
		1No.: Matching shell and tube flooded type chiller of MS shell an copper tubes.				
		1 No.: suitable capacity squirrel cage induction motor with class-F insulation suitable for operation on 415±10% volts, 50 Hz, A.C. supply				
		1No.: Automatic star-delta starter suitable for compressor motor complete with ammeter with over load protection, undervoltage protection, against phase reversal & Independent single phase preventors etc complete as required.				
		1 Lot- Refrigerant piping fittings, valves and accessories to inter connect compressor, condenser, chiller and expansion valve.				
		1 Lot- Water flow switches at outlet & inlet of condenser & chiller, water drain valve & air purge valves wherever required.				
		1Lot- Suction line and chiller insulation with minimum 19mm thick polyvinyl nitrile rubber insulation.				
		Location : Rajgir, Bihar , Design Ambient: 110 °F				
		Net Capacity : 110 TR (actual)				
	a	Chiller				
		Chilled Water IN 54°F (12.2°C)				
		Chilled Water OUT 44°F (6.6 °C)				
		Chilled Water Flow 264 USGPM (1200 LPM) Nominal				
		Fouling factor 0.0002 FPS				
	b	Condenser				
		Condenser Water IN : 31.1°C (88 F)				
		Condenser Water IN : 36.6°C (98 F)				
		Condenser Water Flow : 400 GPM (1818 LPM) Nominal				
		Fouling factor : 0.0005 FPS				
		Pressure Drop in Chiller : 20 Ft. Maximum				

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
		Maximum Power Consumed at full load and above conditions : Not greater than 0.65 kW/TR				
		Minimum NPLV -0.45 kW/TR				
		Minimum COP (At ARI conditions) : 6.4				
		Minimum IPLV (ARI 550/590)- 8.6				
		Shall be BMS Compatible				
2.0		PRIMARY WATER PUMP				
		Supplying , installation, testing and commissioning of mentioned capacity & head given below water circuit. The pumps shall be close coupled , single stage , centrifugal , end suction with backpull out design. Hence , the rotating unit can be removed and serviced without disconnecting the suction and discharge piping. The pump and base frame shall be factory assembled at the pump manufacturer's facility. Installation instructions shall be included with pump at time of shipment. The pump manufacturer shall have complete unit responsibility. The pump shall be balanced statically and dynamically. The pump are constant speed. The noise level shall not exceed 75 dbA at 2 m from the source. The pump shall be required to meet specification mentioned and per drawings and schedules. The Pumps shall be BMS compatible. The scope of work shall include Lifting, shifting & positioning of pump at location shown on drawing.				
		End suction type pump.				
		Suitable HP , TEFC squirrel cage induction motor with class 'F' insulations & efficiency class IE-3, 1450 rpm synchronous speed , operating on 415 +/-10% volts ,3 phase , 50 Hz A.C.supply.				
		Lot-Expanded polystrene (T.F.Quality) insulations of not less than 75mm thick duly clad between aluminium sheets of 0.5mm thickness and properly clamped to pump in two semicircular section as per specifications.				
		All external and exposed cast iron parts of pumps have an epoxy-based coating made in a cathodic electro-deposition (CED) process which is high-quality dip-painting process and which would prevent rusting and corrosion.The pump shaft shall not be painted.				
		Min. pump efficiency at duty conditions shall not be less than 75%				
		The Pump shall be capable to communicate effectively with BMS.				
		Lot: Mounting frame with Anti vibration pads.				
		Note - Total Head Loss given is minimum requirement for the system. Actual Head shall be calculated & confirmed by the vender at time of Bidding.				
2.1.1	MR 2	264 USGPM (1200 LPM) , 12 meter Head	Nos	75,973	2	1,51,946
3.0		SECONDARY WATER PUMP				

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
		Supplying , installation, testing and commissioning of mentioned capacity & head secondary water circuit pump with VFD. The pumps shall be single-stage, close-coupled, in-line suction and discharge ports of identical diameter with top-pull-out design with dedicated microprocessor based pump controller with parallel pumping software duly downloaded, suitable to run on variable frequency drives as required and multiple differential pressure sensor / transmitters as necessary and as described in the specifications. Hence , the rotating unit can be removed and serviced without disconnecting the suction and discharge piping. The pump and base frame shall be factory assembled at the pump manufacturer's facility. Installation instructions shall be included with pump at time of shipment. The pump manufacturer shall have complete unit responsibility.The Unit shall be complete in all respect and it should meet the specification, Drawing & Schedule. The scope of work shall include Lifting, shifting & positioning of pump at location shown on drawing.				
		1 No. Vertical In-line close coupled type pump.				
		1 No.- Suitable HP, TEFC squirrel cage induction motor with class 'F' insulations & efficiency class IE-3, 2900 rpm synchronous speed , operating on 415 +10% volts ,3 phase , 50 Hz A.C. supply.				
		The total sound intensity with all pumps in operation should not exceed 75 dB at a distance of 2 meters. The Pumps to be capable of providing 10% higher flow rate. All rotating parts are to be covered with an encasing. The duty point of the pump shall be defined in the pump curve.				
		Variable secondary Panel should have One dedicated multi pump processor based pump controller with parallel pumping software duly installed. The pump selected for variable speed drive shall be capable of performing satisfactorily over a wide range of speed, allowing a speed variation from 20 % to 100 %. The pump logic controller assembly shall be listed and approved by Underwriter's Laboratory, Inc. (UL). The controller shall be specifically designed for variable speed pumping applications.				
		Microprocessor based control panel shall have suitable hardware & software so that it can be integrated directly to IBMS with standard communication open protocol using backnet / Modbus as well as open IP.				
		(All the Pump set will have their control panel with respect to the motor rating).				
		All pumps to be provided with separate IP 54 rated variable frequency drives with integrated input disconnect switch. Control panel should also consist of cooling fan.				
		VFD - The variable frequency drive(s) shall be pulse width modulation (PWM) type, microprocessor controlled design. VFD shall be capable of operating in voltage ranges of 240V or 415 V +/- 10% AC, three phase; at frequencies of 48 to 63 Hz. VFD shall be factory fitted and unit mounted.				
		Min. pump efficiency at duty conditions shall not be less than minimum ECBC standards				
		Lot-Expanded polystyrene (T.F. Quality) insulations of not less than 75mm thick duly clad between aluminium sheets of 0.5mm thickness and properly clamped to pump in two semicircular section as per specifications.				
		Lot- Mounting frame work with anti vibration pads.				
		All external and exposed cast iron parts of pumps have an epoxy-based coating made in a cathodic electro-deposition (CED) process which is high-quality dip-painting process and which would prevent rusting and corrosion. The pump shaft shall not be painted.				

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A.		HIGH SIDE EQUIPMENT				
		Note- Total Head Loss given is minimum requirement for the system. Actual Head shall be calculated & confirmed by the vender at time of Bidding.				
3.1.1	MR 3	264 USGPM , 35 meter Head	Nos	5,77,730	2	11,55,460
4.0		CONDENSOR WATER PUMP				
		Supplying , installation, testing and commissioning of mentioned capacity & head condensor water pump. The pumps shall be close coupled , single stage , centrifugal , end suction with backpull out design. Hence , the rotating unit can be removed and serviced without disconnecting the suction and discharge piping. The pump and base frame shall be factory assembled at the pump manufacturer's facility. Installation instructions shall be included with pump at time of shipment. The pump manufacturer shall have complete unit responsibility. The pump shall be balanced statically and dynamically. The pump are constant speed. The noise level shall not exceed 75 dbA at 2 m from the source. The pump shall be required to meet specification mentioned and per drawings and schedules. The Pump Shall be BMS Compatible.				
		End suction type pump.				
		Suitable HP , TEFC squirrel cage induction motor with class 'F' insulations & efficiency class IE-3 , 1450 rpm synchronous speed , operating on 415 +/-10% volts ,3 phase , 50 Hz A.C.supply.				
		Min. pump efficiency at duty conditions shall not be less than 75%				
		The Pump shall be capable to communicate effectively with BMS.				
		Mounting frame with Anti vibration pads.				
		Note- Total Head Loss given is minimum requirement for the system. Actual Head shall be calculated & confirmed by the vender at time of Bidding.				
4.1	MR 4	412 USGPM , 22 meter head	Nos	1,56,704	2	3,13,408
5.0		Hot water pump for (DEVAP)				
		Supplying , installation, testing and commissioning of mentioned capacity & head hot water pump with VFD. The pumps shall be close coupled , single stage , centrifugal , end suction with back-pull out design with dedicated microprocessor based pump controller with parallel pumping software duly downloaded, suitable to run on variable frequency drives as required and multiple differential pressure sensor / transmitters as necessary and as described in the specifications. Hence , the rotating unit can be removed and serviced without disconnecting the suction and discharge piping. The pump and base frame shall be factory assembled at the pump manufacturer's facility. Installation instructions shall be included with pump at time of shipment. The pump manufacturer shall have complete unit responsibility.The Unit shall be complete in all respect and it should meet the specification,Drawing & Schedule. The scope of work shall include Lifting, shifting & positioning of pump at location shown on drawing.				
		1 No. End suction type pump.				
		1 No.- Suitable HP, TEFC squirrel cage induction motor with class 'F' insulations & efficiency class IE-3, 1450 rpm synchronous speed , operating on 415 +10% volts ,3 phase , 50 Hz A.C.supply.				
		The total sound intensity with all pumps in operation should not exceed 75 dB at a distance of 2 meters. The Pumps to be capable of providing 10% higher flow rate. All rotating parts are to be covered with an encasing. The duty point of the pump shall be defined in the pump curve.				

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
		Variable secondary Panel should have One dedicated multi pump processor based pump controller with parallel pumping software duly installed.The pump selected for variable speed drive shall be capable of performing satisfactorily over a wide range of speed, allowing a speed variation from 20 % to 100 %.The pump logic controller assembly shall be listed and approved by Underwriter's Laboratory, Inc. (UL). The controller shall be specifically designed for variable speed pumping applications.				
		Microprocessor based control panel shall have suitable hardware & software so that it can be integrated directly to IBMS with standard communicationopen protocol using backnet / Modbus as well as open IP.				
		(All the Pump set will have their control panel with respect to the motor rating).				
		All pumps to be provided with separate IP 54 rated variable frequency drives with integrated input disconnect switch. Control panel should also consist of cooling fan.				
		VFD - The variable frequency drive(s) shall be pulse width modulation (PWM) type, microprocessor controlled design. VFD shall be capable of operating in voltage ranges of 240V or 415 V +/- 10% AC, three phase; at frequencies of 48 to 63 Hz. VFD shall be factory fitted and unit mounted.				
		Min. pump efficiency at duty conditions shall not be less than 75%				
		Lot-Expanded polystyrene (T.F.Quality) insulations of not less than 75mm thick duly cladded between aluminium sheets of 0.5mm thickness and properly clamped to pump in two semicircular section as per specifications.				
		Lot- Mounting frame work with anti vibration pads.				
		Note- Total Head Loss given is minimum requirement for the system. Actual Head shall be calculated & confirmed by the vender at time of Bidding.				
5.1	MR 5	50 USGPM , 25 meter Head	Nos	4,34,866	2	8,69,731
6.0		COOLING TOWER				
		Supply, Installation, testing and commissioning of Induced Draft (Counter Flow Type) cooling Towers, in accordance with the specifications and schedules.The Cooling Tower shall be of Galvanised steel/FRP Construction with direct driven/ belt driven fans ,VFD,Galvanised hardware complete with sump and drain connection with suitable valve, PVC fill, louvers, drift eliminator complete with spray nozle having self rotating sprinklers, steel ladder, isolating switch and other accessories to make it fully operational and maintainable & positioning of cooling t ower at location as shown on drawings.				
		Type of Fan : Propeller ,Type of motor: 960 RPM fan, weather proof IP 55. Direct driven.				
		The Cooling tower shall be capable to communicate effectively with BMS.				
		VFD - The variable frequency drive(s) shall be pulse width modulation (PWM) type, microprocessor controlled design. VFD shall be capable of operating in voltage ranges of 240V or 415 V +/- 10% AC, three phase; at frequencies of 48 to 63 Hz.				
		CDW In- 98 ⁰ F				
		CDW Out- 88 ⁰ F				
		Range of CT: 10 ⁰ F				
		Wet bulb approach: 5 ⁰ F				

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
		WBT- 83 ° F				
		Drift loss < 0.05%				
6.1	MR 6	CHILLED WATER FLOW: 412 USGPM HEAT REJECTION : 591125 Kcal/hr	Nos	18,42,720	2	36,85,440
7.0		CLOSED EXPANSION TANK WITH PRESSURISATION PUMP				
		Supply, installation, testing, balancing and commissioning of PRESSURISED CHILLED WATER EXPANSION TANK along with necessary accessories such as air vents, Safety Valves, Pressurisation pumps and its panel , with required Support & Foundation etc. in order to keep chilled water system under pressure and to prevent entrapment of air in the system. The tank shall be precharged M.S expansion tank with replaceable heavy duty butyl rubber bladder. The tank shall have 20 mm drain and charging valve connection to facilitate the onsite charging of the tank to meet system requirement. The tank shall be fabricated as per Indian standard code for “non-fired pressure vessels” and the flanges shall be as per IS 6392-1971. For chilled/hot water application, it will be insulated with 50mm thick insulation to the specifications and clad with 26 G-aluminium cladding. The expansion tank shall be supplied along with pressurization unit. Install Expansion tank in accordance with manufacturer’s written instructions. The drawing, schedules and specification shall be referred. The tank shall be designed to absorb the expansion forces of cooling/heating system water while maintaining proper system pressurization under varying operating conditions. The heavy duty bladder should contain system water thereby eliminating tank corrosion and water logging problems. The system should include airvent and complete as per technical specification. Tank shall be selected for 125 psi				
		Supply, Installing, Testing and commissioning of The pressurization unit shall consist of two nos. (1 working + 1 stand-by) high pressure pumps of suitable pressure rating mounted on M.S. frame, complete with interconnecting piping, isolation valves, NRV, Y-strainer, pressure gauge, pressure transmitter, auto-logic panel (IP 55) with dry-run protection, electrical MCB and interconnecting wiring. The unit shall be housed in powder-painted canopy suitable for external installation conforming to the specifications. The Pump Shall be BMS Compatible.				
7.1	MR 7	200 liters	Nos	76,578	2	1,53,156
		Hot Water Boiler Supplying , Installation , Testing and Commissioning of Electric type hot water boiler. Hot Water Generator made of 10 mm thick MS sheet, complete with all accessories and components, copper tube chrome plated , internally factory wired complete with electrical panel with 50 mm thick resin bonded fiber glass wool clad with 0.6 mm Aluminium sheet on MS frame welded to generator body as per specifications and drawings.The Unit shall be complete in all respect and shall be factory tested with reports submitted and it should meet the specification,Drawing & Schedule. The unit shall be BMS compatible.				
		Hot Water IN 40°C				
		Hot water OUT 45°C				
		Chilled Water Flow 37 GPM				
		Working PSI 230 PSI				
		Test Pressure 300 PSI				
	MR 8	Capacity - 50 KW	Nos	1,56,084	2	3,12,169
8.0						

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
		<p>Air separator Supply, installation, testing, balancing and commissioning of centrifugal type air separator with required Support & Foundation for design water flow rate with a maximum pressure loss of 1 feet water gauge. The unit shall have Flanged inlet and outlet connections tangential to the vessel shell. Vessel shell diameter to be three times the nominal inlet/outlet pipe diameter. The unit shall have an internal stainless steel air collector tube. Manufacturer to furnish data sheet specifying air collection efficiency and pressure drop at rated flow. The shell shall be fabricated as per IS standrad for "non-fired pressure vessels" and the flanges shall be as per IS 6392-1971.. For chilled water application, it will be insulated with 50 mm thick insulation to the specifications and clad with 26G-aluminium cladding.. Install Air separator in accordance with manufacturer's written instructions. (The Air Separator Size is to be Calculated & validated by the contractor before ordering.)</p>				
8.1	MR 9	125 NB	Nos.	1,22,525	1	1,22,525
9.0		HEAT PUMP FOR HOT WATER REQUIREMENT				
		Supply, installation, testing and commissioning of Imported Air Cooled Outdoor Heat Pump Unit for the production of Hot Water upto 60°C. Heat Pump shall include dual circuit Scroll Compressor suitable for R 407c / R 410a refrigerant driven by suitable KW squirrel cage induction motor rated for 400± 10% volts, 3 phase , 50 Hz AC supply complete Heat pump shall have the following features:				
		Structure and base in hot - dip galvanised steel with epoxy powder coating finish				
		Heat - efficiency plate exchangers in AISI 316 stainless steel with low pressure drops, fitted with heating element for forst protection				
		High - efficiency cycle EVI Hermetic Scroll compressor with hot gas direct injection into the compressor to reach 60° C ,with the crankcase heater and thermal protection.				
		Finned coils made with copper pipes and aluminium fins with large exchange surface area				
		Safety Valve				
		Manual filling assembly				
		Pressure & Temperature gauge				
		Air Vent Valve				
		The compressor and plate heat exchangers shall be housed in a suitably insulated enclosure to limit vibration and noise.				
		Rubber anti vibration mounting kit				
		Heat pump shall be rated for the following capacity: (1w+1S)				
	MR 10	Minimum Heating Capacity of 22 KW for heating water upto 60° C Fouling factor 0.0001 FPS units.	Nos.	9,33,747	3.0	28,01,242
		Supply, installation , testing & commissioning of SS water tank for Hot water storage , tank shall be provided with Inner layer SS316 + Outer Layer SS 304 of specified thickness, tank should be provided with inlet, outlet and vent/overflow connection, 50mm Puf Insulation , manhole cover 450mm dia, Inlet connection of water tank shall be of 25mm nominal bore, overflow/vent - 25mm nominal bore and outlet connection at bottom of tank of 40mm nominal bore. Cost of tank shall be inclusive of Angle stiffeners,stand leg, SS flanges connecting from water treatment facility and distribution system complete as per approved specifications. (contractor shall provide drawing to civil contractor for tank foundation) (Thickness of inner layer 0.8mm & outer layer .6mm)				
	MR 11	1200 litre tank	Nos.	6,06,000	1.0	6,06,000

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
10.0						
	MR 12	WATER SOFTENING Supply, installation, testing & commissioning of water softening plant (FRP) for soft water feed for air conditioning purposes, comprising of face piping with butterfly valve with brine ejector and plastic piping complete with brine tank (200 litre), agitator with fittings and brine filtering media and complete charge of cation exchange resin as per specification for the capacity as given below:	Nos.	38,008	1.0	38,008
		Water Flow : 1.5 LPS				
		(Incoming hardness 600 mg / Ltr (Approx))				
		Working pressure 4.0 Kg / Cum)				
		Outgoing hardness less than 50 ppm				
		Diameter : 400 mm				
		Resin Quantity not less than 110 cm3.				
11.0						
		Pre insulated MS C class Pipe with HDPE (High density polyethylene) - CHILLED WATER PIPING OUT-SIDE THE BUILDING Supply , Installation , testing and commissioning of non corrosive pre insulated jacketed buried pipe which shall be MS ERW heavy duty class to specified following dia NB and with thickness as per technical specification. The outer protective insulation jacket material shall be HDPE as per Specs. Field joints shall be made in straight sections of pipes only and the same is not allowed at elbows or tees. All the field joint insulation and casing materials for the field joint shall be supplied by pre-insulated pipe manufacturer. The insulation shall be Superfoam rigid cellular polyurethane foam, injected between the core pipe and the outer casing/jacket, having a density of 40 kg/m3 (2.5 lbs/ft3) nominal and thermal conductivity coefficient of 0.021W/m*K maximum at a mean temperature of 24°C (75°F) and Insulation thickness shall be 65 mm for 150 dia, 75 mm thick upto 200 mm dia. and above as per specifications. The insulation shall meet IS 12436 specifications with typical operating temperature between -30°C to 100°C. Insulation thickness shall be as per technical specification. The pipe shall be suitable to convey the water having water temperature range of 5 C to 80 C without any distortion. The pipe shall be tested at site at a test pressure of 230 PSI for continue 7 days or 160 hours. The pipe shall be suitable for buried i.e. underground application. The pipes shall be complete with flanges at 500 mtr. distance at suitable locations. The pipe shall be complete in all respect including but not limited to bends, elbows, fittings, valves required, gauges, jointing etc. The drawing shall be referred for the complete routing of the pipe. Base pipe shall be MS IS-1239 part-I / IS-3589, depending upon size. The outer casing/jacket shall be made of extruded high-density Polyethylene (HDPE) pipe having a density of 900 to 960 kg/m3. HDPE wall thickness shall be 3mm thick. All ends of straight pipes and fittings shall be sealed with polyolefin end seal, applied to the exposed ends of the insulation for protection against moisture ingress.				
11.1	MR 13	150 mm dia MS pipes Class C	Rmt.	10,510	70	7,35,709
11.2	MR 14	125 mm dia MS pipes Class C	Rmt.	9,109	50	4,55,439
11.3	MR 15	100 mm dia MS pipes Class C	Rmt.	7,707	225	17,34,170
11.4	MR 16	80 mm dia MS pipes Class C	Rmt.	7,007	157	11,00,060
11.5	MR 17	65 mm dia MS pipes Class C	Rmt.	6,306	22	1,38,734
11.6	MR 18	50 mm dia MS pipes Class C	Rmt.	5,605	360	20,17,944
11.7	MR 19	40 mm dia MS pipes Class C	Rmt.	5,241	30	1,57,231
11.8	MR 20	32 mm dia MS pipes Class C	Rmt.	5,241	25	1,31,026

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
		TOTAL OF SUB SECTION A				26003943
B)		AIR CONDITIONING EQUIPMENTS:				
1.0						
		<p>Desiccant Enhanced Evaporative System (DEVAP) Supplying, installing, testing and commissioning of factory built double skinned floor mounted Desiccant Cooling System, fabricated out of extruded aluminium section with 0.8mm pr-plasticized / pre-coated galvanised steel sheet outside & 0.8 mm plain galvanised steel sheet. The unit shall comprise Pre filter section with 10 micorn pre filters, heat recovery wheel section , Desiccant wheel section with Desiccant Wheel, with 3 Nos. of EC fan ,Indirect evaporative section with polymer media and have direct driven fan, Cooling coils section with Cooling coils, Hot water coil section with hot water Coil for regenerating the desiccant wheel & cooling / heating coil (cobber tube thickness is 0.5 mm), all stainless steel drain pan made out of 18 G-SS-304 duly insulated. The minimum effectiveness of heat recovery wheels shall be 75%. The performance of Heat Recovery Wheels shall be AHRI certified . All fan shall be AMCA certified. The complete unit i.e the casing, desiccant Wheel and Heat recovery wheel shall be from single manufacturer. The entire D-AHU shall be met the specifications. The Chilled water shall be selected at In/OUT - 55/65F. The unit panels shall be insulated with 46±2 mm thick & 40 Kg/m³ density PU foam along with thermal break profile. The motor & blower assembly shall be mounted on Aluminium extruded section only. The complete AHU shall confirm to standard specification. The face velocity across cooling coil shall be limited to 400 FPM maximum. The capacity of Air-handlers shall be as follows: Total Static pressure given below minimum required for the system. Actual static pressure shall be calculated & confirmed by the vendor at time of Bidding. The unit shall be BMS compatible.</p>				
	MR 21	Fresh Air 2000 CFM / Exhaust Air 2000 CFM and 6 / 4 row deep (4.3 tr.) cooling coil, 4 row deep heating coil, E.S.P SF-30 mmwg, ESP for EF -15mm, ESP for Regeneration Air Fan - 10 mm,	Nos.	17,82,206	1	17,82,206

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
2.1		<p>Desiccant Enhanced Air Handling Unit Supplying, installing, testing and commissioning of factory built double skinned floor mounted Desiccant Cooling System, fabricated out of extruded aluminium section with 0.8mm pre-plasticized / pre-coated galvanised steel sheet outside & 0.8 mm plain galvanised steel sheet. The unit shall comprise Pre filter section with 10 micron pre filters, heat recovery wheel section , Desiccant wheel section with Desiccant Wheel, with 2 Nos. of EC fan , Cooling coils section with Cooling coils, Hot water coil section with hot water Coil for regenerating the desiccant wheel & cooling / heating coil (copper tube thickness is 0.5 mm), all stainless steel drain pan made out of 18 G-SS-304 duly insulated. The minimum effectiveness of heat recovery wheels shall be 75%. The performance of Heat Recovery Wheels shall be AHRI certified . All fan shall be AMCA certified. The complete unit i.e the casing, desiccant Wheel and Heat recovery wheel shall be from single manufacturer. The entire D-AHU shall be met the specifications. The Chilled water shall be selected at In/OUT - 55/65F. The unit panels shall be insulated with 46±2 mm thick & 40 Kg/m³ density PU foam along with thermal break profile. The motor & blower assembly shall be mounted on Aluminium extruded section only. The complete AHU shall confirm to standard specification. The face velocity across cooling coil shall be limited to 400 FPM maximum. The capacity of Air-handlers shall be as follows: Total Static pressure given below minimum required for the system. Actual static pressure shall be calculated & confirmed by the vendor at time of Bidding. The unit shall be BMS compatible.</p>				
2.2	MR 22	Fresh Air 550 CFM / Exhaust Air 550 CFM, Supply Air 5000 CFM and 1 no. 8 row deep for 4.22 tr. Cooling coil, 1 no. 6 row deep for 7.6 tr. Cooling coil, 4 row deep heating coil , E.S.P SF-30 mmwg, ESP for EF -15mm, ESP for Regeneration Air Fan - 10 mm	Nos.	26,17,614	4	10366790
3.1		<p>CEILING SUSPENDED AIR HANDLING UNITS Supply , Installation , testing and commissioning of factory built Double Skinned Chilled/hot water Air-handling unit Ceiling suspended type fabricated out of extruded aluminium section with 0.8 mm pre-plasticized / pre-coated Galvanised steel sheet outside & 0.8 mm plain Galvanised steel sheet inside with blower with AMCA certified blower , blower section(Suitable static pressure as required , minimum 2 bend GSS/ PVC eliminators) and blower motor TEFC type with IE-3 Class rating suitable for operation on 415 volts ± 10% , 50 Hz ± 5% AC supply , 4/6 Row cooling coil and 2 row deep heating coil made of Aluminium finned Copper tube(Tube thickness not less than 0.5 mm) with coil section , thermostat , pre-filter section with non wovensynthetic media of 10 micron particle size with an efficiency of 90% , polished stainless steel drain pan made out of 18 G sheet duly insulated complete with motor and belt drive package. The AHU shall be complete in all respect and drain piping as per the specification to be provided to the closest floor drain. The cost should include 150 mm dia dial type pressure gauges (2 nos.) and industrial type thermometer (2 nos.) at the inlet and outlet of each type of coil , auto purge valve wherever required, Mixing chamber with return air and fresh air damper , necessary vibration isolation arrangement etc. complete as per specification and drawings. The AHU panels shall be insulated with 25±2 mm thick & 40 Kg/m³ density PU foam. The motor& blower assembly shall be mounted on Aluminium extruded section only. The complete AHU shall confirm to standard specification. The face velocity across cooling coil shall be limited to 400 FPM maximum. The capacity of Air-handlers shall be as follows: AHU shall be selected considering 1°F Chilled temperature rise in piping distribution. Total Static pressure given below minimum required for the system. Actual static pressure shall be calculated & confirmed by the vendor at time of Bidding.</p>				
3.1.1	MR 23	1600 CFM AND 3 TR capacity ,4 R.D cooling coil with 65 mm WG	Nos.	95,475	1	95,475
4.0						

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
4.1		FAN COIL UNITS - Floor Supply , installation , testing and commissioning of Dobule sking floor mounted factory fabricated Fan coil unit with 12 mm static pressure each complete with copper pipe connections with brass fittings , wiring with 3 pin socket plug , U-trap in drain pipe connection near FCU , 3 speed switch , fire retardant double canvas connections , 3/4 row deep chilled water coil , three speed motor , washable filters , 18 G-SS304 Stainless steel drain pan insulated with 13 mm aluminium faced nitrile rubber. Fan coil unit shall be suitable for 220 ± 10 volts , 50 Hz cycle single phase power supply , maximum RPM of motor shall be 960 & Maximum db level not more than 35 db(A) at 1 mtr. distance.				
2.1.1	MR 24	1.0 TR cooling Capacity/400 CFM, 3 row deep cooling coil, Floor mounted	Nos.	28,643	42	12,02,989
4.1.2	MR 25	1.5 TR cooling Capacity/500 CFM, 4 row deep cooling coil, Floor mounted	Nos.	35,008	12	4,20,091
5.1		FAN COIL UNITS VALVE STATION Supply, installation, testing and commissioning of valve station for fan coil Unit . It shall include following Item: 1. Ball Valve with Y-Strainer - 1 Nos. 2. PICV Valve - 1 Nos. 3. Ball Valve - 1 Nos. 4. Necessary Insulated copper Pipe connection				
5.1.1	MR 26	25 mm dia valve station	Nos.	16,226	12	1,94,714
5.1.2	MR 27	20 mm dia valve station	Nos.	16,226	42	6,81,499
6.1		Split type Air-conditioners Supplying , installation, testing and commissioning of (nominal capacity) Air-cooled split AC unit , inverter type along with indoor/ outdoor units , controls , copper piping , PVC condensate drain piping , valves and insulation suitable to operate on 230 Volts 50 Hz AC supply etc.complete as required including voltage stabiliser of suitable rating to give constant output of 230V for input range of 180 V to 260 V with time delay , high/low cut off , meter to read input and output voltages , ON/OFF switches etc. as required. Quoted price shall include cost of wireless remote controller , cooling thermostat , wiring , control cooling and earthing. Unit shall be provided with auto timer setting , complete as per technical specifications and tender drawings.Quoted price shall also include wireless remote.				
		Hi Wall Split Unit for IT/Server Room and UPS Room				
6.1.1	MR 28	1.5 TR	Nos.	47,203	3	1,41,610
6.1.2	MR 29	1.0 TR	R/o	53,104		
7.1		Drain Piping for Split Air Conditioner & FCU Supply ,installation , testing and commissioning of Rigid heavy class PVC piping complete with fittings , supports as per specifications and duly insulated with 6 mm thick closed cell crosslinked polyethylene (XLPE) tubular insulation.				
7.1.1	MR 30	25 mm dia	Nos.	162	43	6,901
7.1.2	MR 31	32 mm dia	Nos.	226	170	38,466
		Drain Piping for Split Air Conditioner Supply ,installation , testing and commissioning of GI piping complete with fittings , supports as per specifications and duly insulated with 6 mm thick closed cell crosslinked polyethylene (XLPE) tubular insulation.				
8.1	MR 32	32 mm dia	Nos.	727	15	10,910
8.2	MR 33	50 mm dia	Nos.	970	37	35,880

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
9.1		<p>Thermal Insulation Supply,Installation,Testing and commissioning of Thermal insulation material for Duct insulation shall be anti-microbial closed cell cross linked polyethylene foam. Thermal conductivity of the insulation material shall not exceed 0.032 W/m^oK at an average temperature of 23°C. Density of the material shall be 25-30 Kg/m³. The product shall have temperature range of -40 °C to 105°C. The insulation material shall be fire rated for Class 1 as per BS 476 Part 7, 1987 for surface spread of flame test. Water vapour permeability as per DIN 52615 shall not exceed 0.15ng/Pa.Sec.m.</p> <p>Thermal conductivity of the material shall not be affected by ageing, as per DIN 52616. The material must be tested for ageing effect in an accredited laboratory for a minimum period of five years to satisfy the ageing criteria.</p> <p>The smoke density of the material as per AS-1530.3 shall not exceed 1. There shall be no toxicity in the emitted smoke, both under flaming and non-flaming conditions, as per AITM 3.000 (1993).</p>				
9.1.1	MR 34	19 mm	SQMT	811	990	8,03,195
9.1.2	MR 35	32 mm	SQMT	1,106	20	22,127
10.1	MR 36	<p>Chiller Plant Manager Supply,Installation,Testing and commissioning of chiller plant manager as per specification and shall be BMS compatilbe.</p>	No.	4,65,442	1	4,65,442
		TOTAL OF SUB SECTION B				16268294
C)		VENTILATION SYSTEM:				
1.1		<p>Propeller Fans Supply , installation , testing and commissioning of propeller type fan with Aluminium/SS blades and complete with induction Motor suitable for operation with 230 V single phase 50 Hz with suitable frame etc. as per IS:2312-1967 with gravity dampers for exhaust complete as per specifications and drawings. for fan upto 100 CFM, wall/Ceiling mounted propeller type exhaust fans shall be of slim line Axial Flow type as per manufacture std. Fan casing and impeller are manufactured from tough injection moulded poly propylene . Front grill shall be high quality ABS and neon indicators from polycarbonate. Motor shall be of single phase, shaded pole, 230 V, 50 Hz . Noise level should not exceed 45dB(A) @3m.The fan shall be complete in all respect and should match the specification ,Drawings and Schedule.The unit shall be capable to communicate with BMS system.</p>				
1.1.1	MR 37	150 CFM	Nos.	4,315	7	30,203
1.1.2	MR 38	300 CFM	Nos.	4,315	4	17,259
1.1.3	MR 39	600 CFM	Nos.	4,315	2	8,629
2.1		<p>Cabinet Fan Supply, installation, testing and commissioning of factory fabricated double Skinned cabinet type fans section made out of extruded aluminium section with 1.0 mm pre-plasticized / pre-coated Galvanised steel sheet with DIDW blower, blower section and TEFC motor suitable for operation on 415 volts ± 10%, 50 Hz ± 5% AC supply with motor and belt drive package. The fan Motor shall be of efficiency class IE2 . The blower should be AMCA Certified for air performance and sound rating and should be selected for maximum efficiency.</p> <p>The motor & blower assembly shall be mounted on Aluminium extruded section only. The complete fan section shall conform to standard specification. The fan outlet velocity shall be limited to 9.5 MPS maximum..The maximum sound level of unit shall be 60dB(A) @ 3 m from source.</p>				
2.1.1	MR 40	2250 CFM (20mm Static Pressure, Ceiling Mounted)	Nos.	45,286	1	45,286

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
2.1.2	MR 41	1000 CFM (15 mm Static Pressure, Floor Mounted)	Nos.	32,305	1	32,305
3.1		Inline Fans Supply , installation , testing and commissioning , of duct mounted inline fans complete with direct driven centrifugal fan , TEFC squirrel cage induction motor , with efficiency class IE-3 whichever is higher , direct drive arrangement , heavy gauge sheet metal casing , rubber isolator mounts and other accessories.The fan shall be complete in all respect and should match the specification ,Drawings and Schedule. Inline fans shall be of following capacities.				
3.1.2	MR 42	450 CFM (15 mm Static Pressure)	Nos.	23,159	1	23,159
3.1.3	MR 43	300 CFM (15 mm Static Pressure)	Nos.	23,159	2	46,318
		TOTAL OF SUB SECTION C				203159
D)		AIR DISTRIBUTION SYSTEM:				
1.0	16.12.1	Factory fabricated Sheet Metal Duct:				
		Supply, installation, balancing and commissioning of factory fabricated GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, hangers, supports etc. as per approved drawings and specifications of following sheet thickness complete as required.				
1.1	16.12.1.1	0.63mm thick	SQMT	891	395	3,52,067
1.2	16.12.1.2	0.80mm thick	SQMT	1,146	470	5,38,524
2.0	16.12.2	Site fabricated Sheet Metal Duct:				
		Supply, installation, balancing and commissioning of site fabricated GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, hangers, supports etc. as per approved drawings and specifications of following sheet thickness complete as required.				
2.1	16.12.2.1	0.63mm thick	SQMT	760	130	98,780
2.2	16.12.2.2	0.80mm thick	SQMT	906	25	22,645
3.1	16.13	Volume Control Damper Supply, installation, testing and commissioning of G.I volume control duct damper complete with neoprene rubber gaskets, nuts, bolts, screws, linkages, flanges etc, as per specifications	SQMT	6,589	10	62,595
	16.14	Motorised ON/OFF Volume Control Damper Supply, installation, testing and commissioning of motorised(ON-OFF Type)duct mounted G.I volume control damper with enthalpy sensor and necessary control wiring (minimum 1.5 mm) for intergeration within AHU room.The unit shall be capable to communicate with BMS system				
	16.14.1	Damper	SQMT	7,608	8	60,865
	16.14.2	Actuator	NO.	6,613	16	1,05,809
	16.21	Duct Acoustic Lining Supply and fixing of acoustic lining of supply air duct and plenum with 25 mm thick resin bonded glass wool having density of 32 kg/m ³ , with 25 mm X 25 mm GI section of 1.25 mm thick, at 600 mm centre to centre covered with inforced Plastic tissue paper and 0.5 mm thick perforated aluminum sheet fixed to inside surface of ducts with admium plated nuts, bolts, stick pins, CPRX compound etc. complete as required and as per specifications.				
5.1		25 mm thick	SQMT	665	40	26,582
	16.22	AHU Room Acoustic Lining Supplying,fixing acoustic lining on wall and ceiling of AHU rooms with 50 mm thick,density 32 kg/cu.m resin bonded glass fibre insulation friction fixed in 610 mm X 610 mm frame work made of 25X 50 X 50 X 25 mm made out of 0.6 mm thick GI Sheet U Shaped channel and covered with reinforced fibre glass tissue and finished with 0.80 mm perforated aluminium sheet etc.complete as per drawings and as per specification				

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
6.1		50 mm thick	SQMT	1,049	100	1,04,931
	16.19	Thermal Insulated Flexible Duct Supply, installation, testing & commissioning of thermal insulated flexible duct of sizes shown per drawings and duly supported at regular interval as per site requirement, shop drawings etc. complete as required as per specifications.				
7.1	16.19.1	200mm dia	SQMT	460	2	919
	16.20	Fire Damper Supplying, Fixing,testing and commissioning of fire damper in supply air duct/main branch and return air path as and where required of required sizes i/c control wiring, the damper shall be motorized and spring return so as to close the damper in the event of power failure automatically and open the same in case of power being restored. The spring return action shall be inbuilt mechanism and not externally mounted. the damper shall also be closed in the event of fire signal complete as required adn as per specifications.				
8.1	16.20.1	Fire damper	SQMT	8,567	6	51,402
	16.15	Supply Air Grills Supplying & fixing of powder coated extruded aluminium Supply Air Grills with aluminium volume control dampers as per specifications and approved drawings and schedules.	Sqmtr	8,602	10	86,019
	16.16	Return Air Grills Supplying & fixing of powder coated extruded aluminium Return Air Grills with louvers but without volume control dampers complete as as per specifications and approved drawings and schedules.	Sqmtr	4,903	12	58,834
11.1	MR 44	Exhaust Air Grilles: Supplying , Installing, testing , balancing & fixing of powder coated extruded aluminium Exhaust Air Grills of various sizes and as per specifications and approved drawings and schedules	Sqmtr	5,163	2.5	12,907
12.1	MR 45	Drum louver grill Supplying , Installing, testing , balancing & fixing of powder coated extruded aluminium Drum louver grills of various sizes and as per specification and approved drawing and schedule	Sqmtr.	16,742	10	1,67,424
13.1	MR 46	Exhaust Air Louvers Supplying , Installing, testing and commissioning of powder coated extruded aluminium exhaust air louvers with min.60 % free area , with metallic frame work & fixing accessories , to be fixed on external wall to exhaust air from basement area to ambient , it shall be suitable for exhausting required air in CFM . Louvers need to be suitable in order avoid rain water entry in to basement @ 15 degree deflection with bird screen complete as per specification approved drawings and schedules.	Sqmtr	7,376	4	29,502
14.1	MR 47	Fresh Air Louvers Supplying, installation, testing and commissioning of GI construction fresh air louvers with min. 60 % free area , bird screen and fresh air filters and painted in baked enamel shade with metallic frame work complete as per specification approved drawings and schedules.	Sqmtr	7,376	4	29,502
15.1	MR 48	Back Draft Dampers Supplying, fixing , testing & commissioning of Back Draft damper having 18 gauge G.I. frame and 20 gauge louvers at exhaust/supply air fans.	Sqmtr	7,081	4	28,322
16.1	MR 49	Heat Exchanger Supplying, fixing , testing & commissioning of heat exchanger unit for hot water as per specification	Nos.	4,22,306	2	8,44,613
		TOTAL OF SUB SECTION D				2682239.2

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
E)		PIPING & ACCESSORIES				
1.0		Chilled Water Piping: Inside Building				
	16.2	Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled / hot water piping inside the building (with necessary clamps, vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with following closed cell elastometric nitrile rubber of minimum 45 Kg / m3 density, thermal conductivity 0.037 W/MK or better at 20 deg mean temperature class 'O' insulation applied by suitable adhesive complete including repairing of damage to building etc. as per specifications and as required complete in all respect. Note:-The Pipes of sizes 150 mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150 mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35 mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above.				
		Note:- The pipes of sizes 150 mm and below shall be M.S 'C' class as per IS:1239 and pipes size above 150 mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35 mm thick M.S. Sheet for pipes upto 350 mm dia and from minimum 7mm thick MS sheet for Pipes of 400 mm Dia and above.				
1.1	16.2.6	150mm dia MS pipes (75 mm insulation)	RMT	2,942	20	58,834
1.2	16.2.7	125 mm dia MS pipes (50 mm insulation)	RMT	2,583	30	77,504
1.3	16.2.8	100 mm dia MS pipes (50 mm insulation)	RMT	2,061	46	94,816
1.4	16.2.9	80 mm dia MS pipes (50 mm insulation)	RMT	1,514	5	7,568
1.5	16.2.10	65 mm dia MS pipes (50 mm insulation)	RMT	1,242	10	12,423
1.6	16.2.11	50 mm dia MS pipes (50 mm insulation)	RMT	1,063	240	2,55,018
1.7	16.2.12	40 mm dia MS pipes (50 mm insulation)	RMT	847	125	1,05,835
1.8	16.2.13	32 mm dia MS pipes (50 mm insulation)	RMT	680	125	85,030
1.9	16.2.14	25 mm dia MS pipes (50 mm insulation)	RMT	558	184	1,02,750
1.10	16.2.14	20 mm dia MS pipes (50 mm insulation)	RMT	558	125	69,803
2.0	16.10	Condensor water Piping				
		Supplying, fixing, testing and commissioning of condensor water pipe of following size of MS "C" class along with necessary clamps,vibration isolator nad fittings such as bends,tees etc.but excluding valves, strainers, gauges etc.adequately supported on rigid supports duly painted as per specification and as required complete in all respect. Note:- The pipes sizes 150 mm and below shall be M.S 'C' class as per IS:1239 and pipes size above 150 mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35 mm thick M.S. Sheet for pipes upto 350 mm dia and from minimum 7 mm thick MS sheet for Pipes of 400 mm Dia and above.				
2.1	16.10.4	150 mm dia	Rmt	2,392	40	95,668
2.2	16.10.5	125 mm dia	Rmt	2,062	4	8,250
3.0	16.7.1	Supplying, fixing, testing & commissioning of Butterfly Valve (Manual) , for chilled water circulation, with C.I body SS disc nitrile sheet & O- ring & PN-16 pressure rating with insulation as specified.				
3.1	16.7.1.2	150 mm dia	Nos.	7,990	4	31,962
3.2	16.7.1.3	125 mm dia	Nos.	6,971	20	1,39,425
3.3	16.7.1.4	100 mm dia	Nos.	6,429	8	51,428
3.4	16.7.1.5	80 mm dia	Nos.	4,485	2	8,971

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
3.5	16.7.1.6	65 mm dia	Nos.	4,042	2	8,083
3.6	16.7.1.7	50 mm dia	Nos.	3,679	16	58,858
3.7	16.7.1.8	40 mm dia (Ball Valve)	Nos.	3,240	2	6,479
4.0	16.11.1	Supplying, fixing, testing & commissioning of Butterfly Valve (Manual) , for Condensor water circulation, with C.I body SS disc nitrile sheet & O- ring & PN-16 pressure rating as specified.				
4.1	16.11.1.2	150 mm dia	Nos.	7,133	8	57,063
5.0	16.7.2	Supply,installation ,testing and commisnong of BALANCING VALVE WITH BUILT IN MEASURING FACILITY with C I body flanged construction with EPDM coated disc with long pitch with protected out pipe insulation & PN 16 pressure rating for chilled / hot water circulation including insulation as specified.				
5.1	16.7.2.2	150 mm dia	Nos.	28,703	2	57,406
5.2	16.7.2.3	125 mm dia	Nos.	22,443	6	1,34,659
5.3	16.7.2.4	100 mm dia	R/O	14,407	1	14,407
6.0		Supply,installation ,testing and commisnong of BALANCING VALVE WITH BUILT IN MEASURING FACILITY with C I body flanged construction with EPDM coated disc with long pitch with protected & PN 16 pressure rating for condensing circulation including insulation as specified.				
6.1		150 mm dia	Nos.	31,359	2	62,717
7.0	16.7.3	Supply,installation ,testing and commisnong of Non Return Valve with dual plate of CI body SS plates vulcanized NBR seal flanged end & PN-16 pressure rating for chilled / hot water circulation including insulation as specified.				
7.1	16.7.3.2	150 mm dia	Nos	7,812	2	15,624
7.2	16.7.3.3	125 mm dia	Nos	6,227	4	24,908
7.3	16.7.3.4	100 mm dia	Nos	4,695		
8.0		Supply,installation ,testing and commisnong of Non Return Valve with dual plate of CI body SS plates vulcanized NBR seal flanged end & PN-16 pressure rating for condensing water circulation including insulation as specified.				
8.1	MR 50	150 mm dia	Nos	6,542	2	13,084
9.0	16.7.4	Supplying, fixing, testing & commissioning of Y Strainer of Ductile CI Body flanged ends with stainless steel strainer for chilled / hot water circulation including insulation as specified.				
9.1	16.7.4.2	150 mm dia	Nos.	12,700	4	50,801
9.2	16.7.4.3	125 mm dia	Nos.	11,916	4	47,665
9.3	16.7.4.8	40 mm dia	R/O	2,989		
9.4	16.7.4.8	32 mm dia	Nos.	2,989	1.00	2,989
10.1	16.8	Pressure Gauges: Providing and fixing in position the industrial type pressure gauges with gun metal/ brass valves complete as required	Nos.	1,174	120	1,40,824
11.1	16.9	Temperature Gauges: Providing and fixing in position the mercury in glass industrial type thermometers	Nos.	853	120	1,02,326
		Motorized butter fly valve Supplying, fixing, testing & commissioning of Motorised Butterfly Valve , for chilled water circulation, with C.I body SS disc nitrile sheet & O- ring & PN-16 pressure rating as specified.All valve shall be insulated with the same material as of pipe insulation material.				
12.1	MR 51	125 mm Dia	Nos.	1,06,421	2	2,12,842
		Expansion BELOW Supplying , fixing, testing & commissioning of expansion below of PN-16 pressure rating for chilled / hot water across pump and chiller, AHU for resisting the unit vibration to the main pipe Line.				

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
13.1	MR 52	150 mm dia	Nos.	19,176	4	76,705
13.2	MR 53	125 mm dia	Nos.	19,176	6	1,15,058
14.1	MR 54	Auto Air Vent Supply , Installation , Testing, & Commissioning of Auto air vent with ball valves as required in the drawings and as per specifications.	Nos.	2,213	10	22,127
		2-Way PICV Valves Supply, Installation , Testing & Commissioning of Two way Modulating type Pressure Independent Balancing Cum Flow Control Valves. Supply , Installation, testing and commissioning of Pressure independent type 2 way Balancing and modulating Control valves in a single Unit of Valve. PN16 Rating. It should be diaphragm type & pressure balancing should be done with Delta P controller only (not cartridge). Pressure Drop across the valve must not exceed 20 kpa up to DN 32 (for FCUs) and 30 Kpa in bigger Sizes (for AHUs). DN 15 to DN 32 Brass Body Ext. Threaded DN 40 & DN 50 Cast Iron Body2 , Ext. Threaded AND DN 65 to DN 100 Cast Iron body, Flanged Ends Connection. Duly mounted with Modulating actuator IP42/54 Accordingly type suitable for 24V AC. The Valve should be selected to enable lowest possible pressure drop to have benefits of lower recurring Pumping Energy.All Valve shall be capable to communicate with BMS System.				
15.1	MR 55	DN 32 mm dia (18.3-28.5 USGPM)	Nos.	47,203	1	47,203
15.2	MR 56	DN 40 mm dia (28.6-39.6 USGPM)	R/0	53,104		
15.3	MR 57	DN 50 mm dia (39.7-76 USGPM)	Nos.	59,004	6	3,54,025
	MR 58	DN 80 mm dia (127-174 USGPM)	R/0	1,15,058		
16.0	MR 59	Supply, Installation , testing and commissioning of Proportional type cooling / heating type digital display type thermostat at locations specified in the drawings. The thermostat shall have provision of setting of space temperature as per requirement. Unit controller shall be installed in the spaces marked in drawings.	Each	2,213	38	84,081
17.1	MR 60	Drain Valve Supply, Installation, Testing , & Commissioning of Ball Valve of 25 mm diameter (Drain) in dirt legs complete with nipples etc. as required as per specifications.	Rmtr.	3,282	12	39,385
17.1	MR 61	CO2 sensor Supply, Installation, Testing , & Commissioning of co2 sensor as per specifications.	Rmtr.	22,551	13	2,93,167
		TOTAL OF SUB SECTION E				3247771.18
F)		ELECTRICAL WORK				
		ELECTRICAL PANEL				

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
2.0		<p>Supply, installation, testing and commissioning of indoor floor mounted/ wall mounted, IP42, factory built, modular, sectionalised, compartmentalized, extendable type LT cubicle panel of suitable size suitable for operation on 433/415 volts, 50 Hz AC 3 phase 4 wire supply system fabricated from CRCA sheet steel of 2mm thick for frame work and covers, 3mm thick for gland plates with stiffeners wherever required, having vibration free structure chemically treated with seven tank process or better before painting for surface treatment and powder coated in approved shade, with suitable electrolytic grade high conductivity bus bars extensible, DMC/ SMC (whichever is superior) bus bar supports, with short circuit withstand capacity as mentioned ,bottom base channel of section not less than 100mmX 50mmX 5 mm thick, fabrication shall be done in transportable sections, entire panel shall have a common earth bar of required size at the rear with 2 Nos. earth stud, connections and interconnection with solid conductor wires / copper strips, neutral links, control wiring with 1.5 sqmm. & 2.5sqmm. PVC insulated FRLS copper conductor S/C cable for voltage & current respectively, including providing and fixing following switch gears and as per schedules ,technical specifications etc.complete etc. as required.</p> <p>Starter Panel. Supply, installation testing and commissioning of Direct online starters suitable for motors of air handling units/ Heat recovery wheel/Ventilation fans / pumps of below mentioned capacities. The starter shall comprise of all necessary power and control equipments including, Auto / manual selector switch, start / stop push button, LED indication, line contactor, Overload relays, Potential free NO/NC contact for control wiring, 415V actuated relay coil, necessary control wirings properly connected in fully usable state. Minimum utilization category for all contactors shall be AC3 and contactor shall be capable to withstand the steady state (full load) and starting inrush current. The starter shall have necessary protection device (MPCB +EOCR) whose settings and ratings shall be as per the type-2 co-ordination chart. The starter shall have inbuilt protection against overcurrent, short circuit and single phasing. All below mentioned starters shall be BMS compatible and additional contacts and wiring required for BMS integration shall be provided.</p>				
	MR 62	1.5 kW DOL starter as per type-2 co-ordination	Nos.	35,474	1	35,474
	MR 63	1.1 kW DOL starter as per type-2 co-ordination	Nos.	31,217	1	31,217
	MR 64	<p>MAIN CHILLER PLANT PANEL INCOMING Surge arrester 2kVp,75kA rated surge arrestor suitable fo both lightning and switching surges,complete with suitable protection fuse (inbuilt) along with 160A, 36kA, FP, MCCB (Thermal magnetic based) and surge counter- 1 No. MCCB 415V, 50Hz, 400A, 4P, 50kA for 1 sec rated microprocessor based MCCB with inbuilt LSIG protection and TNC switch. Indication lamps LED type phase indication lamps suitable for 230V,50Hz AC (red, yellow, blue) - 1 Nos. LED type Indication lamps for breaker, suitable for 230V,50Hz AC supply (on, off, trip) - 1 Nos. Metering Multifunction meter with inbuilt selector switch for measurement of current, voltage, power factor, KVA, kVAh, KVArh, KVAR, frequency, %THD (upto 15th order), THDi,THDv,KWWhr (both line and phase) and maximum demand recording and indicating etc. complete as per specifications,RS-485 port along with 3Nos. ,415V ,400/5A, 15VA, CL-0.5 current transformer as required Emergency trip button on front door at an accessible height -1 Nos.</p>	Nos.	15,15,000	1	15,15,000

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
		Selector type auto / manual switch -1 Nos. 230 volt, 50Hz, AC operated Hooter with noise level of 80db at every 3 metres with acknowledge and reset push button-4 Nos. 8-window microprocessor based annunciation panel with visual LED indicator complete as per specifications and schedule as required. - 4 Nos. Chiller Plant manager along with wiring complete as per logic required (This item will be supplied seperately under Head No-B, item head no. 10 and shall be integral part of this panel, associated cost shall be taken accordingly)				
		Busbar : Busbar (1 Set - 4P + E) Busbar made up of electrolytic grade high conductivity aluminium in rectangular cross section and suitable for 415V, FP, 50 Hz, 400 A, 50 kA for 1 sec of required length and cross sectional area. Note : Concerning vendor needs to furnish the busbar calculations (for both phase and earth bus) at the time of GA approval and busbar size has to be as per the approved GA drawing.				
		Outgoing : Supply, installation testing and commissioning of Direct online starters / star delta suitable for motors of air handling units/ Heat recovery wheel/Ventilation fans / pumps / Chillers / cooling tower / hot water generator / heat pump etc. of below mentioned capacities. The starter shall comprise of all necessary power and control equipments including, Auto / manual selector switch, start / stop push button, LED indication, line contactor, star contactor (in case of start delta starter), Overload relays, timer relay (for star delta starter), Potential free NO/NC contact for control wiring, 415V actuated relay coil, necessary control wirings properly connected in fully usable state. Minimum utilization category for all contactors shall be AC3 and contactor shall be capable to withstand the steady state (full load) and starting inrush current. The starter shall have necessary protection device (MPCB +EOCR) whose settings and ratings shall be as per the type-2 co-ordination chart. The starter shall have inbuilt protection against overcurrent, short circuit and single phasing. All below mentioned starters shall be BMS compatible and additional contacts and wiring required for BMS integration shall be provided. 3 KW DOL STARTER - 2 NOS. 5.5 KW STAR DELTA STARTER - 4 NOS. 7.5 KW STAR DELTA STARTER - 7 NOS. 22 KW STAR DELTA STARTER - 3 NOS. 50 KW STAR DELTA STARTER - 2 NOS. 70 KW STAR DELTA STARTER - 2 NOS.				
		CABLES AND TERMINATION				
		Supplying following 1.1kV grade, heavy duty XLPE insulated, FRLS type armoured cables suitable for 415V, 50Hz, AC system, with inner and outer PVC sheath, outer sheath provided with FRLS insulation, galvanised steel armouring (round or flat as mentioned) and with all components as mentioned in BOQ, specifications and schedule, complete as required.				
	MR 65	3.5C x 95 sqmm aluminium conductor, A2XFY.	Rmtr.	482	150	72,310
	MR 66	3.5C x 50 sqmm aluminium conductor, A2XFY.	Rmtr.	325	200	65,003

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
	MR 67	4C X 6 sqmm copper conductor, 2XWY	Rmtr.	310	40	12,399
	MR 68	4C X 4 sqmm copper conductor, 2XWY	Rmtr.	222	350	77,605
	MR 69	3C X 6 sqmm copper conductor, 2XWY	Rmtr.	240	40	9,619
	9.1	Supplying and making end termination with brass compression gland and aluminium lugs for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 kV grade as required.				
	9.1.24	3½ X 95 sq. mm (45 mm)	Nos.	427	8	3,416
	9.1.22	3½ X 50 sq. mm (35 mm)	Nos.	581	20	11,627
		Supplying and making end termination with brass compression gland and copper lugs for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 kV grade as required.				
	MR 70	4C X 6 sqmm copper conductor, 2XWY	Nos.	373	4	1,491
	MR 71	4C X 4 sqmm copper conductor, 2XWY	Nos.	372	44	16,354
	MR 72	3C X 6 sqmm copper conductor, 2XWY	Nos.	445	4	1,782
	7.8	Laying and fixing of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size on cable tray as required.				
	7.8.1	Upto 35 sq. mm (clamped with 1mm thick saddle)	Nos.	519	21	10,891
	7.8.2	Above 35 sq. mm and upto 95 sq. mm (clamped with 25x3mm MS flat clamp)	Nos.	422	49	20,685
	4.6	Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray (galvanisation thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required.				
	4.6.1	100 mm width x 50 mm depth x 1.6 mm thickness	Rmtr.	526	100	52,586
	4.6.4	300 mm width x 50 mm depth x 1.6 mm thickness	Rmtr.	848	100	84,789
	4.6.6	450 mm width x 50 mm depth x 2 mm thickness	Rmtr.	1,235	50	61,752
	4.7	Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray "bends" (galvanisation not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required.				
	4.7.1	100 mm width X 50 mm depth X 1.6 mm thickness	Nos.	985	12	11,825
	4.7.4	300 mm width X 50 mm depth X 1.6 mm thickness	Nos.	1,745	12	20,943
	4.7.6	450 mm width x 50 mm depth x 2 mm thickness	Nos.	2,634	12	31,609
	4.8	Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray "Tee" (galvanisation not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required.				
	4.8.1	100 mm width X 50 mm depth X 1.6 mm thickness	Nos.	1,135	6	6,810
	4.8.4	300 mm width X 50 mm depth X 1.6 mm thickness	Nos.	2,044	6	12,266
	4.8.6	450 mm width x 50 mm depth x 2 mm thickness	Nos.	3,107	6	18,641
	4.9	Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray "Cross member" (galvanisation not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required.				
	4.9.1	100 mm width X 50 mm depth X 1.6 mm thickness	Nos.	1,135	4	4,540
	4.9.4	300 mm width X 50 mm depth X 1.6 mm thickness	Nos.	2,044	4	8,177
	4.9.6	450 mm width x 50 mm depth x 2 mm thickness	Nos.	3,285	4	13,142

S.No	No.	Description of Work	Unit	Index Cost and Labor Cess	Quantity	Total Amount
A.		HIGH SIDE EQUIPMENT				
	4.10	Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray "Reducer" (galvanisation not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required.				
	4.10.1	100 mm width X 50 mm depth X 1.6 mm thickness	Nos.	1,923	4	7,690
	4.10.3	300 mm width X 50 mm depth X 1.6 mm thickness	Nos.	3,563	4	14,251
	4.10.6	450 mm width x 50 mm depth x 2 mm thickness	Nos.	4,554	4	18,217
		TOTAL OF SUB SECTION F				2252110
G)		AMC (Manpower Support to undertake the operation of the machinaries installed at site)				
		Providing following manpower support to undertake the operation of the machinaries installed at site : Min 2 Nos. certified Technician and 1 Nos. helper. However contractor may deploy more man power to ensure the smooth operation and pro rata calculation shall be performed on the basis of 2 No. Technician and 1 No. helper. The contractor has to maintain the service level agreement as stipulated in NIT.				
	MR 73	AMC for 1st year	Job	3,14,514	1	3,14,514
	MR 74	AMC for 2nd year	Job	3,14,514	1	3,14,514
		TOTAL OF SUB SECTION G				629028.00
		GRAND TOTAL OF SUB SECTIONS (A+B+C+D+E+F)				51286544
		Notes:				
		1. Electrical Work				
		2. All civil work extra and shall be taken care by civil contractor.				