

BOQ OF HVAC WORKS FOR ANIMAL HOUSE AT IIIM - JAMMU.						
Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
<p>The prices are to be quoted in the below mentioned form and shall include the supply, installation, testing & commissioning at site of all the equipments, ancillary materials as specified and all such items what so ever which may be required to fulfill the intent and purpose as laid down in the specifications and or the drawings.</p> <p>The tenderer shall quote rates in figures and in words under column 5&6 and extend amount to column 7</p>						
A)	<u>EQUIPMENTS</u>					
1.0	<u>WATER CHILLING UNITS.</u>					
1.1	Supply, installation, testing & commissioning of 125 TR (actual) capacity Air cooled water chilling units as specified and shown in equipment schedule complete as per specifications with.					
	a. Screw Compressor with motor.					
	b. Drive package.					
	c. Mounting frames for all components					
	d. Air cooled condenser with accessories.					
	e. Chiller with accessories.					
	f. Refrigerant piping, fittings, accessories and valves etc.					
	g. Insulation of chiller and suction line.					
	h. First charge of refrigerant and oil.					
	i. Base frame with Vibration isolators					
	j. Automatic capacity control arrangement.					
	k. Lot Safety controls, flow switches, pressure gauge, thermometer etc. as per specifications.					
	l. Suitable capacity motor with necessary insulation , soft starter panel complete with all necessary switchgears and control complete as required					
	m. Necessary water drain & air purge valves wherever required					
	n. Necessary lubrication device as per specifications complete.					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	o. Microprocessor based control panel complete with accessories as per specifications and BMS compatible BACNET Protocol					
	Chilled Water Leaving temp. 44 deg. F					
	Chilled Water Entering temp. 54 deg. F					
	Chiller fouling factor = 0.0005 (FPS units)					
	Complete water chilling machine as above(2W+1S)	3	Nos			
2.0	WATER CIRCULATION PUMPS					
2.1	Primary Chilled Water Pumps					
	Supply, installation, testing and commissioning of vertical split casing end suction type centrifugal chilled water pump sets factory assembled and tested for rated efficiency mounted on a common base frame etc each capable of delivering specified flow rate complete with following as per specifications & schedule of equipments.					
	a. Pump with IP 55 TEFC induction motor with class F insulation					
	b. Channel base with vibration isolators, coupling, coupling guard etc.					
	c. Cladded insulation and anti corrosive coating inside and outside casing of chilled water pump, etc.					
	d. 2 Nos.- 150 mm dia dial type pressure gauge					
	e. Pumps shall be suitable for operation on 415+/- 10% Volts/ 3ph / 50 Hz/ AC power supply.					
	The pump characteristic shall be as follows:					
	Water flow rate=300 USGPM					
	Head = 14 Metre WC					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	Primary chilled water pumps as described above. (2W+1S)	3	Nos			
2.2	Secondary Pumps & Variable Speed Pumping System					
	Supply, installation, testing and commissioning of vertical split casing type centrifugal chilled water recirculation pumps mounted on a common base frame etc each capable of delivering specified flow rate complete with following as per specifications & schedule of equipments.					
	a. Pump with IP 55 TEFC induction motor with class F insulation					
	b. Channel base with vibration isolators, coupling, coupling guard etc.					
	c. Cladded insulation and anti corrosive coating inside and outside casing of chilled water pump, etc.					
	d. 2 Nos.- 150 mm dia dial type pressure gauge					
	e. Pumps shall be suitable for operation on 415+/- 10% Volts/ 3ph / 50 Hz/AC power supply.					
	f. The price will include control software and networking hardware and software for integration and compatibility with BMS (BACNET Protocol).					
	g. All pumps to be provided with separate VFD's (variable frequency drives). Control panel should also consist of cooling fan.					
	h. Electronic Differential Pressure Transmitters and PLC as required.					
	i. The cost will include making necessary flanged suction and delivery headers in C-Class MS piping.					
	j. Complete set system to be mounted on a common MS base frame and shall follow following duty.					
	The pump characteristic shall be as follows:					
	Water flow rate=680 USGPM					
	Head = 24 Metre WC					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	Secondary chilled water pumps as described above. (1W+1S)	2	Nos			
2.3	Hot water Pumps					
	Supply, installation, testing and commissioning of vertical split casing type centrifugal hot water recirculation pump sets factory assembled and tested for rated efficiency mounted on a common base frame each capable of delivering specified flow rate complete with following as per specifications & schedule of equipments.					
	a. Pump with IP 55 TEFC induction motor with class F insulation					
	b. Channel base with vibration isolators, coupling, coupling guard etc.					
	c. Cladded insulation and anti corrosive coating inside and outside casing of hot water pump, etc.					
	d. 2 Nos.- 150 mm dia dial type pressure gauge					
	e. Pumps shall be suitable for operation on 415+/- 10% Volts/ 3ph / 50 Hz/AC power supply.					
	The pump characteristic shall be as follows:					
	Water flow rate=98USGPM					
	Head = 24 Metre WC					
	Hot water pumps as described above. (2W+1S)	3	Nos			
3.0	Hot Water Generator					
	Supply, installation, testing & commissioning of Electric Hot Water Generator for winter heating/monsoon reheating system.Hot water shall be with IP 55 protection and compatible with controls, sensors,controll cabling,piping and fittings,thermal insulation,base frame etc. as per specifications.					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
3.1	Capacity : 140KW					
	Status : (2w+1s)					
	USGPM: 98					
	Temp IN/OUT : 110/125 DegF	3	Nos.			
4.0	AIR HANDLING UNITS					
	Supply, installation, testing and commissioning of draw through type Air Handling Units (double skin type) of horizontal /vertical type as specified & shown in schedule of equipment complete with the following :-					
	a. Fan Section and canvas connection. (double skin type)					
	b. Centrifugal blower					
	c. Coil sections with cooling and heating coil/s as per specifications.					
	d. Pre filters with filter section as required in all AHUs.					
	e. Fine and hepa filters with filter section wherever specifically specified as per AHU schedule .Wherever fine/hepa filters are specified, item shall include factory fabricated double skin plenum of same specifications as AHU panels and complete with filter frameworks.Fine/hepa filter section along with discharge plenum shall be part of AHU in upper tier.					
	f. Drain pan, drain connection.					
	g. Squirrel cage induction IP 55 TEFC drive motor, drive arrangement, guard etc. All AHU motors shall be compatible for working with VFD.					
	h. Necessary vibration isolators & supporting arrangement.					
	i. Fresh air intake arrangement, necessary water drain & air purge valves wherever required etc.					
	j. Canvass connections,necessary foundations, 2 nos pressure gauge, 2 nos thermometer etc					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	k Controls for AHUs comprising of a set of 2 way modulating valve of required size having manual override facility alongwith proportional thermostat, humidistat & wiring for interconnection with 1.5 sq. mm Cu Conductor multicore armoured complete as required.					
4.1	AH-GF-01 - 4000cfm/ 4+4 RD Cooling Coil/3 RD Heating coil /125 mm static (with fine & hepa filters)	2	Nos.			
4.2	AH-GF-02 - 2500cfm/ 4+4 RD Cooling Coil/3 RD Heating coil /50 mm static	1	Nos.			
4.3	AH-FF-01 -14000cfm/ 4+4 RD Cooling Coil/3 RD Heating Coil/125 mm static (with fine & hepa filters)	2	Nos.			
4.4	AH-FF- 02 - 8000cfm/ 4+4 RD Cooling Coil/3 RD Heating Coil/125 mm static (with fine & hepa filters)	2	Nos.			
5.0	DUCTABLE SPLIT AIR CONDITIONERS					
	Supply , installation , testing and commisioning of air cooled Ductable split air conditioner suitable for 3 Phase 50 Hz AC supply comprising of the following.					
	a) Outdoor condensing Units					
	b) Indoor Evaporative Units with fine filters.					
	c) Interconnecting Refrigerant and drain piping with insulation wherever required, refrigerant and oil. The unit shall include refrigerant piping, power cabling and drain piping as required.					
	d) Safety and operational controls					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	<p>e) The unit shall have advanced microcomputer controller with run time equalization, auto restart after power failure, fuzzy logic, self fault diagnostics .</p> <p>The controller shall have 2 digit 7 segment LED display, LED indicators and touch key pad. The controller shall have faults and alarm display and it shall be mounted in fire retardant box.</p> <p>The equipment shall be equipped with humidity control.</p>					
5.1	Capacity :7.5 TR	2	Nos.			
6.0	SPLIT AIR CONDITIONERS					
	Supply , installation , testing and commissioning of HI wall split air conditioner comprising of the following.					
	a) Outdoor condensing Units					
	b) Indoor Evaporative Units					
	c) Interconnecting Refrigerant and drain piping with insulation wherever required, refrigerant and oil. The unit shall include refrigerant piping, power cabling and drain piping.					
	c) Safety and operational controls					
	e) Hiwall splits shall be suitable for single phase power supply and complete with voltage stabilizer.					
	f) Mounting arrangement and structural supports for outdoor unit are included.					
	g) The units should have 5 star rating from BEE.					
6.1	Capacity : 1.5 TR	1	Nos.			
6.2	Capacity : 2.0 TR	4	Nos.			
6.3	Capacity : 2.5 TR	7	Nos.			
7.0	WINDOW AIR CONDITIONER					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	Supply , installation , testing and commisioning of Window Acs complete with transformer, electrical cabling as required along with mounting arrangement,Voltage stablizer.Complete in all respect as per specifications. The units should have 5 star rating from BEE.					
	Capacity :					
7.1	1.5 TR	2	Nos.			
7.2	2.0 TR	5	Nos.			
8.0	Inline Fans/ Propeller Fans/Tube Axial Fan					
8.1	Supplying, installing, testing and commissioning of direct driven Propeller fan for exhaust air as shown in drawings. Each fan shall be complete with permanent split capacitor or shaded pole motor, mounting plate, accessories like wire guard, bird screen and fixed louvers for weather protection as required. Fan selection arrangement and Electrical characteristics shall be as follows:					
8.1.1	150 mm dia 900 RPM fan suitable for 220 +/- 10% volts, 50 Cycles, 1 Phase AC Supply	2	Nos			
8.1.2	225 mm dia 900 RPM fan suitable for 220 +/- 10% volts, 50 Cycles, 1 Phase AC Supply	3	Nos			
8.1.3	300 mm dia 900 RPM fan suitable for 220 +/- 10% volts, 50 Cycles, 1 Phase AC Supply	1	Nos			
8.2	Tube Axial Flow					
	Supply, installation,testing and commisioning of tube axial flow fans as shown in drawings, Each fan shall be direct driven. Fan motor shall be suitable for 3 Phase, 415+/- 10% V, 50Hz AC supply .					
8.2.1	Duty: Lift lobby pressurisation					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	Air Quantity : 2500 CFM					
	Static Pressure : 20 mm wg	3	No.			
8.2.2	Duty: Lift Well pressurisation					
	Air Quantity : 2500 CFM					
	Static Pressure : 20 mm wg	3	No.			
9.0	Exhaust / ventilation Fans					
9.1	Exhaust Module: Supply, Installation, and Testing and Commissioning of Double Skin Air Handling unit with internal coving, having static pressure of 125 mm. The unit shall comprise of Blower section with backward curve centrifugal fan with drive, plug type connection with TEFC high efficiency motor, level 1, 3Ø Induction motor with top terminal box assembly. All AHU Dampers to be of Extruded Aluminum Low Leakage Aerofoil design with polycasted wheels volume control dampers suitable for manual & motorized operation. Air handling Units Includes pre, fine and HEPA filters.					
9.1.1	Exhaust unit 5000 CFM with Magnehelic gauges with SS box and PVC Tubing for GF	2	No.			
9.1.2	Exhaust unit 13500 CFM with Magnehelic gauges with SS box and PVC Tubing	2	No.			
9.1.3	Exhaust unit 8000 CFM with Magnehelic gauges with SS box and PVC Tubing	2	No.			
9.1.4	Exhaust unit 2100 CFM suitable for wet exhaust with Magnehelic gauges with SS box and PVC Tubing for trolly wash.	2	No.			
9.2	Ventilation Fan Sections					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	Supply, installation, testing and commissioning of single skin construction fan sections suitable for outdoor duty. The unit shall be complete with belt driven double inlet double width, backward curved centrifugal fan, squirrel cage induction motor, vibration isolators, canvass connections, belt drive, pulley mounted on motor and fan shaft, belt guard mounted within the housing, The item shall have pre and fine filters as per specifications. The motor shall be suitable for operation on 3 Phase, 415 +/- 10% V, 50 Hz AC supply.					
	a. Casing (single skin type in 18 G GSS)					
	b. Centrifugal blower					
	c. Fine filters as per specifications.					
	d. Pre filters as required					
	e. Necessary foundations etc					
	f. Drive motor, drive arrangement, guard etc.					
	g Wiring for interconnection with AHU starter with 1.5 sq. mm Cu Conductor multicore armoured complete as required.					
9.2.1	For Supply					
	Space served :Sterile clean Area					
	Air Quantity : 3500 CFM	1	No.			
	Static Pressure : 50 mm wg					
9.2.2	For Exhaust					
	Space served :Sterile clean Area					
	Air Quantity : 3000 CFM	1	No.			
	Static Pressure :50 mm wg					
10.0	Terminal Reheat Arrangement					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	Supply, installation, testing & commissioning of monsoon reheating arrangements fixed in ducts/ plenums complete with strip heaters, fixing frame work, insulators, fire protection insulation in duct, controls such as heating thermostats, humidistats etc. The heaters banks shall be controlled by independent thermostats/ humidistats through electro magnetic type contactors and safety thermostats/ geyserstats as specified complete with wiring for interconnections with 1.5 sq.mm copper conductor multi core armoured cable. The heater capacity shall be as per schedule of equipment and specifications, drawing etc.					
10.1	1KW x 2 banks	15	sets			
10.2	1KW x 1 bank	15	sets			
11.0	EXPANSION TANK					
	Supply, installation, testing and commissioning of pressurised PVC., expansion tank of following capacities made of PVC 2 layer sheet complete with 50 mm thick fire retardant type 32 kg/mt cu density TF quality expanded polystyrene insulation finished with two layers of sand cement plaster and painted complete with vent, drain connections , float valve, quick fill connection, manhole cover etc as specified. (Of double layered Sintex or equivalent make).					
11.1	1000 ltrs. (for chilled water circuit)	1	No.			
11.2	1000 ltrs. (for hot water circuit)	1	No.			
B)	<u>PIPING</u>					
12.0	CHILLED WATER PIPING					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	Supply, laying/fixing, testing and commissioning of M.S. heavy class ERW piping confirming to IS : 3589/IS:1239 with necessary clamps, supports, anti vibration mountings, hangers and fittings such as bends, tees, reducers etc. duly insulated and painted as per specifications :					
12.1	150 mm dia	110	RM			
12.2	125 mm dia	40	RM			
12.3	100 mm dia	110	RM			
12.4	80 mm dia	100	RM			
12.5	65 mm dia	60	RM			
12.6	50 mm dia	40	RM			
12.7	40 mm dia	65	RM			
12.8	32 mm dia	80	RM			
13.0	PIPING (Burried)					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
13.1	Supply, Installation, Testing and Commissioning of following nominal sizes of Chilled water piping Outside the building buried in ground (with necessary clamps, vibration isolators and fittings but excluding valves, strainers, gauges) adequately supported on rigid supports and duly insulated with fire retardant quality expanded polysterene molded pipe sections of specified density after a thick coat of cold setting adhesive (CPRX compound) wrapping with 500 gm polythene faced hessain and secured with 0.5mmx20mm G.I wire mesh and two coats of cement plaster (each layer not less than 10mm) as per specifications including digging and refilling the trenches and providing suitable thickness 1:2:4 cement concrete pads at 3 m intervals complete as per specifications and as required.					
13.1.1	150 mm dia	70	RM			
13.2	Supply, Installation, Testing and Commissioning of following nominal sizes of Hot water piping Outside the building buried in ground (with necessary clamps, vibration isolators and fittings but excluding valves, strainers, gauges) adequately supported on rigid supports and duly insulated with fire retardant quality expanded rock wool insulated pipe sections of density not less than 36 kg/cu.m after and secured with 0.5mmx20mm G.I wire mesh and two coats of cement plaster (each layer not less than 10mm) as per specifications including digging and refilling the trenches and providing suitable thickness 1:2:4 cement concrete pads at 3 m intervals complete as per specifications and as required.					
13.2.1	100 mm dia	70	RM			

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
14.0	VALVES & STRAINERS					
	Supply, fixing and testing of following valves, strainers, in the chilled water piping complete with companion flanges, nut bolts, gaskets, supports etc. duly insulated and painted as per specifications:					
14.1	Butterfly valves :					
14.1.1	150 mm dia.	7	Nos			
14.1.2	125 mm dia	14	Nos			
14.1.3	100 mm dia.	11	Nos			
14.1.4	80 mm dia.	36	Nos			
14.1.5	65 mm dia	12	Nos			
14.1.6	50 mm dia.	2	Nos			
14.1.7	40 mm dia.	4	Nos			
14.1.8	32 mm dia.	2	Nos			
14.2	Balancing valves :					
14.2.1	150 mm dia	1	Nos			
14.2.2	125 mm dia	5	Nos			
14.2.3	100 mm dia	5	Nos			
14.2.4	80 mm dia.	3	Nos			
14.2.5	65 mm dia	6	Nos			

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
14.2.6	50 mm dia.	5	Nos			
14.2.7	40 mm dia.	2	Nos			
14.2.8	32 mm dia.	1	Nos			
14.3	Non return/Check valves :					
14.3.1	150 mm dia.	2	Nos			
14.3.2	125 mm dia	3	Nos			
14.3.3	80 mm dia.	3	Nos			
14.4	Y- strainers with drain valve					
14.4.1	150 mm dia.	2	Nos			
14.4.2	125 mm dia	5	Nos			
14.4.3	100 mm dia.	4	Nos			
14.4.4	80 mm dia.	3	Nos			
14.4.5	65 mm dia	6	Nos			
14.4.6	50 mm dia.	1	Nos			
14.4.7	40 mm dia	2	Nos			
14.4.8	32 mm dia.	1	Nos			
14.5	Providing and fixing in position the following Gate Valves duly insulated as per specifications:					
14.5.1	50 mm dia Valves	2	Nos.			
14.5.2	40 mm dia Valves	2	Nos.			
14.5.3	32 mm dia Valves	2	Nos.			

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
14.6	Supply, installation, testing and commissioning of cooling thermostats :-					
14.6.1	For AHUs	7	Nos.			
15.0	DRAIN PIPING					
	Supply, laying/fixing, testing and commissioning of G.I. medium class ERW piping confirming to IS:1239 with necessary clamps, supports, anti vibration mountings, hangers and fittings such as bends, tees, reducers etc. duly insulated and painted as per specifications for condensate drain from air handling units and chillers etc.					
15.1	50 mm dia	30	RM			
15.2	40 mm dia	40	RM			
15.3	32 mm dia	120	RM			
15.4	25 mm dia	90	RM			
15.5	20 mm dia	80	RM			
C)	<u>AIR DISTRIBUTION</u>					
16.0	DUCTING					
16.1	GSS DUCTING					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	Supply, installation, testing, commissioning and balancing of G.S.S ducting of following thickness including necessary supports, hangers, nut bolts, gaskets, splitter dampers, vanes canvass connections etc. complete. Firerated ducts shall be fabricated from 1.25 mm thk GI sheets of 275 GSM irrespective of duct size.(All accessories shall be suitably fire rated for 250 deg C for 2 hrs)completeete as per specifications & drawings:					
16.1.1	1.25 mm (18 G) GSS	100	Sqm.			
16.1.2	1.0 mm (20 G) GSS	400	Sqm.			
16.1.3	0.80 mm (22 G) GSS	650	Sqm.			
16.1.4	0.63 mm (24 G) GSS	1000	Sqm.			
17.0	FIRE DAMPERS					
	Supply, installation, testing and commissioning of motorized combined smoke & fire dampers made out of GI sheet of at least 120 minutes fire rating complete with GI damper of required size, smoke sensor, etc as per specifications and shop drawings.					
17.1	Fire/smoke Damper	10	Sqm			
17.2	Actuator & control panel	7	sets			
18.0	VOLUME CONTROL DAMPERS					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	Supply, installation, testing and commissioning of zero leak proof volume control dampers of GI sheet, box type to be provided in ducts complete with suitable links, levers and quadrants for manual control of air volume and air balancing as per specifications and drawings.	15	Sqm.			
19.0	CEILING DIFFUSERS					
19.1	Supply, Installation, testing and balancing of square/circular supply air diffusers of powder coated aluminium construction with attached zero leak proof volume control dampers as per specs. and drawings.	20	Sqm.			
19.2	Supply, installation, testing and balancing of square/circular return air diffusers of powder coated aluminium construction without volume control dampers as per specifications and drawings	5	Sqm.			
20.0	GRILLES					
20.1	Supply, installation, testing and balancing of supply/return air grilles with/without zero leak proof volume control dampers of powder coated aluminium construction suitable for installation in walls, false ceiling boxing etc as per specifications and drawings.					
20.1.1	Supply air grilles in single louvers with zero leak proof volume control dampers.	2	Sqm.			
20.1.2	Return air grilles in single louvers without volume control dampers.	3	Sqm.			
20.1.3	Exhaust air grilles for animal room made of 1 mm thick GSS sheet with exhaust air filter arrangement (10 micron with 90% eff) with volume control damper and its complete fixing arrangement with S S perforated sheet.	18	Sqm.			

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21.0	Fresh Air Louvers with bird screen					
	Supply, installation, testing, commissioning and balancing of fresh air opening comprising of powder coated extruded aluminium louvers with bird screen, projection with frame and volume control damper with lever mounting arrangement etc. as per specifications and drawings.	2	Sqm.			
22.0	DUCT INSULATION					
	Supply and fixing resin bonded fibre glass insulation on supply/return air ducts covered with polythene and finished as specified.					
22.1	50 mm thick insulation (For duct in Non AC area)	80	Sqm.			
22.2	25 mm thick insulation (For duct in AC area)	200	Sqm.			
22.3	Supply and fixing of 19 mm thick foil faced FR Closed Cell Chemically Crossed Linked PolyEthylene Foam insulation for supply air ducting as per the specifications and approved shop drawings.	1000	Sqm.			
23.0	DUCT ACOUSTIC LINING					
23.1	Supply,application and fixing of resin bonded fibre glass hard board acoustic insulation in supply air ducting/plenum covered with tissue paper and perforated aluminium sheet as specified.	20	Sqm.			
24.0	PLANT ROOMS ACOUSTIC INSULATION					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
24.1	Supply and fixing of acoustic insulation on walls and ceiling of Air handling units rooms with 50mm thick resin bonded fibre glass slabs fixed in frame work and finished with vapour barrier and perforated aluminium sheet complete as per specifications and drawings.	320	Sqm.			
25.0	Pan type Humidifier					
	Supply, installation, testing and commissioning of electric pan type humidifiers in each Air Handling Rooms to provide humidification during winter months heating operation. The humidifier shall evaporate 12 liters water per hour and complete with all required water valves incoming MCB, humidistat and ,electrical & control wiring and earthing as required.					
25.1	9 KW	4	Sets			
25.2	6 KW	2	Sets			
D)	<u>ELECTRICAL</u>					
26.0	AIR- CONDITIONING PANELS					
	All bill of items are to be read in conjunction with specifications and drawings.					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	Supply, installation, testing and commissioning of A/C panels suitable for 415 V, 3 phase, 4 wires, 50 Hz power distribution system. The panel shall be cubicle non draw out type free standing floor mounting sheet metal enclosed flush front with aluminium busbars, separate earth bus bars to be provided throughout the length of the panel. The incoming & outgoing feeder breakers, fuses, indicating lamps etc. shall be accomodated in a modular multitier arrangement. The painting shall be done as per relavant IS codes as specified in the specifications. Adequate size cable alley shall be provided all round the panel and in the back for each cable bending and termination. The outgoing feeders inside the panel shall be connected through solid bus bar. Flexible cable links are not acceptable. Bus bars shall be provided with sleeves or heat resistant insulated paint. The panel shall be suitable for cable entry from top. The panel shall be fabricated after the approval of fabrication drawings.All the panels shall have minimum 20%spare capacity.					
	i)All doors to have pad locking and shrouding arrangement.					
	ii)All switches to be heavy duty type base mounted having operating handle.					
	iii) BMS compatible with BACnet protocol					
26.1	Main/ Emergency Air-conditioning MCC in plant room in basement					
	INCOMER					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	2 No. 800A, 415/500V, Motorised, Fully Drawout type (EDO), Four Pole, Air Circuit Breaker with microprocessor based overload, short circuit, Instantaneous & earth Fault trip including under voltage release and lockable trip push button. The ACB should have $I_{cw} = I_{cs} = 50KA$ for 1 sec. R, Y & B Phase indicating lamps (LED type) with 2A control SP MCBs. Digital multi function meter with one set of suitable CTs, CT shorting links, R/Y/B LED indicating lamps and 2A control SP MCBs.					
	1 set of indicating lamps to indicate OPEN, CLOSE, TRIP.					
	Push button to CLOSE the ACB.					
	1 Set of A meter with ASS and CTs.					
	All ACBs should be computer compatible.					
	BUSBARS :1000 TPN					
	Bus Coupler					
	1 No. 800A, 415/500V, Motorised, Fully Drawout type (EDO), Four Pole, Air Circuit Breaker with microprocessor based overload, short circuit, Instantaneous & earth Fault trip including under voltage release and lockable trip push button. The ACB should have $I_{cw} = I_{cs} = 35KA$ for 1 sec.					
	1 set of indicating lamps to indicate OPEN, CLOSE, TRIP.					
	Push button to CLOSE the ACB.					
	1 Set of A meter with ASS and CTs.					
	OUTGOING					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	3 No. 400A, 415/500V, Motorised, Fully Drawout type (EDO), Four Pole, Air Circuit Breaker with microprocessor based overload, short circuit, instantaneous & earth Fault trip including under voltage release and lockable trip push button. The ACB should have $I_{cw}=I_{cs}=35$ KA for 1 sec. 1 set of indicating lamps to indicate OPEN, CLOSE, TRIP. 1 set of indicating lamps to indicate OPEN, CLOSE, TRIP. Push button to CLOSE the ACB. 1 Set of A meter with ASS and CTs. For Water chilling machines (3W).					
	3 nos 400 Amp 415 volts, 35 KA (Isc), FP MCCB with thermal magnetic release having variable current settings of 0.8 to 1.0 In. Extended rotary operating mechanism with door interlock with defeat feature and padlock facility. MCCB should be with spreader link and phase barriers. Indicating lamps with 2A protection MCBs to indicate OPEN, CLOSE, TRIP for MCCB. Ampere Metre of suitable range with suitable set of CT's and ASS. For hot water generators. (2W+1S)					
	4 Nos. 63 Amp 415 volts, 35 KA (Isc), FP MCCB with thermal magnetic release having variable current settings of 0.8 to 1.0 In. Extended rotary operating mechanism with door interlock with defeat feature and padlock facility. MCCB should be with spreader link and phase barriers. Indicating lamps with 2A protection MCBs to indicate OPEN, CLOSE, TRIP for MCCB. Ampere Metre of suitable range with suitable set of CT's and ASS with fully automatic star delta starter suitable for 7.5 hp Primary chilled water pumps. (3W+1S)					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	3 Nos. 63 Amp 415 volts, 35 KA (Isc), FP MCCB with thermal magnetic release having variable current settings of 0.8 to 1.0 In.Extended rotary operating mechanism with door interlock with defeat feature and padlock facility. MCCB should be with spreader link and phase barriers.Indicating lamps with 2A protection MCBs to indicate OPEN, CLOSE, TRIP for MCCB.Ampere Metre of suitable range with suitable set of CT's and ASS with fully automatic star delta starter suitable for 25 hp Secondary chilled water pumps.(2W+1S)					
	2 Nos. 250 Amp 415 volts, 35 KA (Isc), FP MCCB with thermal magnetic release having variable current settings of 0.8 to 1.0 In.Extended rotary operating mechanism with door interlock with defeat feature and padlock facility. MCCB should be with spreader link and phase barriers.Indicating lamps with 2A protection MCBs to indicate OPEN, CLOSE, TRIP for MCCB.Ampere Metre of suitable range with suitable set of CT's and ASS for AHP1 Panel. (1W+1S)					
	3 Nos. 32 Amp 415 volts, 35 KA (Isc), FP MCCB with thermal magnetic release having variable current settings of 0.8 to 1.0 In.Extended rotary operating mechanism with door interlock with defeat feature and padlock facility. MCCB should be with spreader link and phase barriers.Indicating lamps with 2A protection MCBs to indicate OPEN, CLOSE, TRIP for MCCB.Ampere Metre of suitable range with suitable set of CT's and ASS with fully automatic star delta starter suitable for 5 hp Hot water pumps.(2W+1S)					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	3 Nos. 32 Amp 415 volts, 35 KA (Isc), FP MCCB with thermal magnetic release having variable current settings of 0.8 to 1.0 In. Extended rotary operating mechanism with door interlock with defeat feature and padlock facility. MCCB should be with spreader link and phase barriers. Indicating lamps with 2A protection MCBs to indicate OPEN, CLOSE, TRIP for MCCB. Ampere Metre of suitable range with suitable set of CT's and ASS .					
	Complete panel as above	1	Panel			
26.2	AHU DISTRIBUTION PANEL (AHP-1)					
	Supply, installation, testing and commissioning of cubicle type totally enclosed wall/floor mounted free standing type, dust, damp and vermin proof for AHU made of 2mm thick CRCA sheet steel in compartmentalized design as per specification and drawings. These distribution boards shall be mounted on 50x50x6 MS angle frame work grouted to floor/walls of recessed. The rate includes the angle iron frame, support, painting, numbering, earthing etc. as required					
	INCOMER :					
	1 No. 250 Amps FP MCCB 36 KA, 1 no of 0-250 amp ammeter with selector switch & CT's , 1 no. 0-500 volt voltmeter with selector switch & fuses , 1set of indicating lights (RYB).					
	Bus Bar					
	300 A TPN Aluminium bus bar 415V , 50 Hz.					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	OUTGOINGS :					
	20 set - 63 A, 415 V MCCB 36 KA, ON-OFF indication lamps for starter panel.					
	8 set - 16 A, 415 V MCCB 15 KA, single phase preventor, 2 HP suitable starters for motor and spare NO-NC contacts for interlocking, ON-OFF indication lamps with push button for heat recovery wheel / Fan.					
	3 set - 32 A, 415 MCCB 15 KA with HRC fuses of suitable rating , as spares.					
	1 set - 16 A, 415 MCCB 15 KA with HRC fuses of suitable rating , as spares.					
	Complete panel as above	1	Panel			
26.3	AHU/FAN STARTER PANEL					
	OUTGOING :					
	1 No. 63 Amps MCCB 10 KA for 25 HP Motor with suitable Starters for motor with thermal overload protection,single phase preventor,spare NO_NC contacts for interlocking, ON-OFF indication lamps with push button,ammeter with ASS and CTs for Air Washer motor as required.	6	Nos.			
26.4	AHU/FAN STARTER PANEL					
	OUTGOING :					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	1 No. 63 Amps MCCB 10 KA for 15 HP Motor with suitable Starters for motor with thermal overload protection,single phase preventor,spare NO_NC contacts for interlocking, ON-OFF indication lamps with push button,ammeter with ASS and CTs for AHU/Fan motor as required.	2	Nos.			
26.5	AHU/FAN STARTER PANEL					
	OUTGOING :					
	1 No. 63 Amps MCCB 10 KA for 12.5 HP Motor with suitable Starters for motor with thermal overload protection,single phase preventor,spare NO_NC contacts for interlocking, ON-OFF indication lamps with push button,ammeter with ASS and CTs for AHU/Fan motor as required.	2	Nos.			
26.6	AHU/FAN STARTER PANEL					
	OUTGOING :					
	1 No. 63 Amps MCCB 10 KA for 5 HP Motor with suitable Starters for motor with thermal overload protection,single phase preventor,spare NO_NC contacts for interlocking, ON-OFF indication lamps with push button,ammeter with ASS and CTs for AHU/Fan motor as required.	3	Nos.			
26.7	AHU/FAN STARTER PANEL					
	OUTGOING :					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	1 No. 16 Amps MCCB 10 KA for 2 HP Motor with suitable Starters for motor with thermal overload protection, single phase preventor, spare NO_NC contacts for interlocking, ON-OFF indication lamps with push button, ammeter with ASS and CTs for AHU/Fan motor as required.	1	Nos.			
26.8	AHU/FAN STARTER PANEL					
	OUTGOING :					
	1 No. 16 Amps MCCB 10 KA for 1/1.5HP Motor with suitable Starters for motor with thermal overload protection, single phase preventor, spare NO_NC contacts for interlocking, ON-OFF indication lamps with push button, ammeter with ASS and CTs for AHU/Fan motor as required.	6	Nos.			
27.0	CABLING					
	Supplying, laying, effecting proper connections, testing & commissioning of following size of 1.1 kv PVC insulated aluminium conducting armoured cables as per IS 1554 Part-1 laid underground/cable tray/on surface of wall/hume pipe etc. & termination with brass compression glands as required.					
27.1	3.5C x 185 sq.mm cable	80	Mtr			
27.2	4Cx 25 sq.mm Cable	20	Mtr			
27.3	4 C X 16 sq. mm. Cable	30	Mtr			
27.4	4 C X10 sq. mm. Cable	80	Mtr			
27.5	4 C X 6 sq. mm. Cable	80	Mtr			

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
27.6	4 C X 4 sq. mm. Cable	120	Mtr			
27.7	3C X6 sq. mm. Cable	100	Mtr			
28.0	CABLE TRAYS					
	Supply & installation of following sizes of perforated MS cable trays including horizontal & vertical bends, reducers, tees, cross members and other accessories as required and duly supported from the ceiling/wall/floor with MS suspenders/supports and including painting etc. as required					
28.1	200 mm widthx50 mm deep x1.6 mmthickness	100	Mtr			
28.2	150 mm widthx50 mm deep x1.6 mmthickness	80	Mtr			
28.3	100 mm widthx50 mm deep x1.6 mmthickness	100	Mtr			
29.0	EARTHING					
29.1	Earth pits with GI earth plate of size 600mmx600mmx6mm thick including all accessories , down watering GI pipes 40mm dia and providing masonry enclosure with cover plate having interlocking arrangement and watering pipe etc. with charcoal of or coke and salt) complete as required	2	Set			
29.2	Providing & fixing GI earth strip 40mm x 6mm on surface or in recess for earth connections etc. as required	30	Mtr			
29.3	Providing and fixing GI earth strip on walls/ trenches complete as per specifications and as required.					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
29.3.1	38mmx 6mm	30	Mtr			
29.3.2	25mm x 3mm	30	Mtr			
29.4	Providing and fixing earth wire of complete as per specifications as required.					
29.4.1	4 SWG wire	30	Mtr			
29.4.2	6 SWG wire	50	Mtr			
29.4.3	8 SWG wire	40	Mtr			
30.0	CONTROL CABLING					
	Supply, laying, effecting proper connections, testing & commissioning of 1.5 sq.mm. PVC insulated copper multicore cables from AHU's and AC equipments to central control console					
30.1	14 core cable	250				
30.2	10 core cable	250				
30.3	8 core cable	100				
30.4	6 core cable	100				
30.5	5 core cable	100				
30.6	3 core cable	50				
30.7	2 core cable	150				
31.0	CONTROL CONSOLE /DESK					

Item No. 1	Description 2	Qty 3	Unit 4	Rate In Rs (in Figure) 5	Rate in Rs (in Words) 6	Amount (Rs.) 7
	Supplying, installation, testing & commissioning of floor mounted desk type control console cum indicating panel in the A.C. plant room containing various indications and controls for the complete air-conditioning system comprising chilling units, chilled/ Hot water pumps, and AHUs/ Ex. blower/ Fans etc , Hot water Generator with test push button facility. The panel shall be fabricated from minimum 1.6mm thick M.S. powder coated sheet of approved design. The air-conditioning module of the central control cum indicating panel shall contain the following accessories.					
	Status indication (ON, OFF & fault) of each compressor for each chilling machine, hot water generator etc.					
	Push buttons and indicating lamps for remote start & stop and status indication for every nos of the water circulating pumps, Air Handling Units, Ex blower, Fans etc.					
	Push buttons and indication lamps for remote start & stop and status indication (On, Off & Fault) for every nos. condenser motors indication for every no fans.					
	Hooter and flashing lamp to indicate operation of any safety/ shut down with necessary contactors, accept, reset and test push buttons.					
	Complete wiring with copper conductor PVC insulated multicore 2.5 sq.mm stranded cable (including supply of cable, tray, clamps etc) from various equipments in the A.C. plant room, AHU's Terrace plant room and etc to the control console panel as required.					
	COMPLETE PANEL AS ABOVE	1	Panel			
	TOTAL FOR HVACWORKS					

	<u>ANIMAL HOUSE at IIIM - JAMMU</u>		
	<u>SUMMARY SHEET FOR HVAC WORKS</u>		
SECTION	DESCRIPTION OF WORK	AMOUNT(Rs.)	AMOUNT(Rs.) IN FIGURES
A	EQUIPMENTS		
B	PIPING		
C	AIR DISTRIBUTION		
D	ELECTRICAL		
	GRAND TOTAL		