



Running Contract Details	
Equipment Name	MRI Machine 1.5 Tesla Normal Bore
Running Contract Valid Till	20-01-2025
Tender Ref No	KMSCL/EP/T479(R)/635B/2022
Tendered Quantity	5
Supplier Name	M/s Siemens Healthcare Private Limited
GST No	33AAVCS8021P1ZM
Installation & Delivery Period	26 Week(s)
Up-time / PM vist	95% & 4 Visits per year
Warranty period	3 Years

Supplier`s Details		
Address	Contact Details	
Seethakathi Business Centre No.272/688 5th Floor Anna Salai Chennai - 600 006	Contact Person	B V Rahul, K Unnikrishnan
	Phone	0484 4028622/04466784169
	Mobile No	+91 98406 22623, +91 85899 99606
	Email	rahul.b_v@siemens-healthineers.com, unnikrishnan.k@siemens-healthineers.com

Item-wise Price Details				
#	Item Details	Unit Rate (Incl.all taxes & charges)	Service Charges (Through KMSCL)	Grand Total
1	<b>MRI Machine 1.5 Tesla Normal Bore</b> <i>Model &amp; Make : Magnetom Sempra/ Siemens Healthcare GmbH</i>	8150000 Incl.GST :12%	6010625	87510625
2	<b>15.3 : Demolishing R.C.C. work manually / by mechanical means including stacking of steel bars and disposal of unserviceable material with in 50 metres lead as per direction of Engineer -in-Charge.</b>	4720 Incl.GST :18%	330.4	5050.4
3	<b>15.7.4 : Demolishing brick work manually / by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer-in-Charge.In cement mortar</b>	1298 Incl.GST :18%	90.86	1388.86

Item-wise Price Details				
4	<b>15.12.1 : Dismantling doors, windows and clerestory windows (steel or wood ) shutter including chowkhats, architrave, holdfasts etc. complete and stacking within 50 metres lead:Of area 3 sq. metres and below</b>	613.6 Incl.GST :18%	42.95	656.55
5	<b>15.12.2 : Dismantling doors, windows and clerestory windows (steel or wood ) shutter including chowkhats, architrave, holdfasts etc. complete and stacking within 50 metres lead: Of area beyond 3 sq. metres</b>	708 Incl.GST :18%	49.56	757.56
6	<b>15.23.1 : Dismantling tile work in floors and roofs laid in cement mortar including stacking material within 50 metres lead.For thickness of tiles 10 mm to 25 mm</b>	271.4 Incl.GST :18%	19	290.4
7	<b>15.57 : Dismantling aluminium / Gypsum partitions, doors, windows, fixed glazing and false ceiling including disposal of unserviceable surplus material and stacking of serviceable material with in 50 metres lead as directed by Engineer - in-Charge</b>	206.5 Incl.GST :18%	14.46	220.96
8	<b>2.34.1 : Supplying chemical emulsion in sealed containers including delivery as specified.Chlorpyriphos / Lindane emulsifiable concentrate of 20%</b>	554.6 Incl.GST :18%	38.82	593.42
9	<b>2.35.1.1 : Diluting and injecting chemical emulsion for POST -CONSTRUCTIONAL anti-termite treatment (excluding the cost of chemical emulsion):Along external wall where the apron is not provided using chemical emulsion @ 7.5 litres / sqm of the vertical surface of the substructure to a depth of 300mm including excavation channel along the wall &amp; rodding etc. complete:With Chlorpyriphos /Lindane E.C. 20% with 1% concentration</b>	37.76 Incl.GST :18%	2.64	40.4
10	<b>50.2.25.1 : Filling with contractor's own earth ( excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m as per direction of site Engineer-in-charge</b>	743.4 Incl.GST :18%	52.04	795.44
11	<b>50.4.1.1 : Providing and laying in position cement concrete 1:2:4 ( 1 cement : 2 coarse sand : 4 graded stone aggregate 12.5 mm nominal size) up to floor five level excluding the cost of centering, shuttering, finishing for leveling coarse of floor and roof etc.</b>	8709.58 Incl.GST :18%	609.67	9319.25

Item-wise Price Details				
12	<b>50.5.5 : Reinforced cement concrete work in arches, archribs, domes, vaults, shells, folded plate and roof having slope more than 15 degree up to floor five level excluding the cost of centering, shuttering, finishing and reinforcement with 1:1.5:3 ( 1 cement : 1.5 coarse sand: 3 graded stone aggregate 20 mm nominal size).</b>	11210 Incl.GST :18%	784.7	11994.7
13	<b>50.5.33.2 : Providing and laying in position machine batched and machine mixed design mix M-20 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer-in-charge.Note:- Cement content considered in this item is @ 330 kg/cum. Excess or less cement used as per design mix is payable or recoverable separately. All work above plinth level upto floor V level</b>	11210 Incl.GST :18%	784.7	11994.7
14	<b>5.22.1 : Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelMild steel and Medium Tensile steel bars</b>	101.48 Incl.GST :18%	7.1	108.58
15	<b>2.1.1 : Earth work in surface excavation not exceeding 30 cm in depth but exceeding 1.5m in width as well as 10 sqm on plan including disposal of excavated earth up to 50 m and lift up to 1.5 m, disposed soil to be levelled and neatly dressed:All Kinds of soil</b>	590 Incl.GST :18%	41.3	631.3
16	<b>6.26.2 : Brick work with common burnt clay selected F.P.S (non modular ) bricks of class designation 7.5 in exposed brick work including making horizontal and vertical grooves 10 mm wide 12 mm deep complete in cement mortar 1:6 ( 1 cement : 6 coarse sand)Above plinth level and upto floor V level</b>	8156.16 Incl.GST :18%	570.93	8727.09
17	<b>50.6.1.2 : Solid block masonry using pre cast solid blocks (Factory made) of size 40x20x20cm or nearest available size confirming to IS 2185 part I of 1979 for super structure up to floor two level thickness 20cm and above in: CM 1:6 ( 1 cement: 6 coarse sand) etc complete.</b>	10148 Incl.GST :18%	710.36	10858.36

Item-wise Price Details				
18	<b>50.6.1.8 : Solid block masonry using pre cast solid blocks (Factory made) of size 40x20x15cm or nearest available size confirming to IS 2185 part I of 1979 for super structure up to floor two level with thickness 15cm in: CM 1:6 ( 1 cement : 6 coarse sand etc complete</b>	9794 Incl.GST :18%	685.58	10479.58
19	<b>13.1.1 : 12 mm cement plaster of mix:1:4 ( 1 cement : 4 fine sand)</b>	601.8 Incl.GST :18%	42.13	643.93
20	<b>13.7.1 : 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 ( 1 cement : 3 fine sand)</b>	660.8 Incl.GST :18%	46.26	707.06
21	<b>11.36 : Providing and fixing I st quality ceramic glazed wall tiles conforming to IS : 15622 (thickness to be specified by the manufacturer), of approved make, in all colours, shades except burgundy, bottle green, black of any size as approved by Engineer -in-Charge, in skirting, risers of steps and dados, over 12 mm thick bed of cement mortar 1:3 (1 cement : 3 coarse sand) and jointing with grey cement slurry @ 3.3 kg per sqm, including pointing in white cement mixed with pigment of matching shade complete.</b>	1770 Incl.GST :18%	123.9	1893.9
22	<b>11.37 : Providing and laying Ceramic glazed floor tiles of size 300x300 mm (thickness to be specified by the manufacturer), of 1st quality conforming to IS : 15622, of approved make, in colours such as White, Ivory, Grey, Fume Red Brown, laid on 20 mm thick cement mortar 1:4 (1 Cement : 4 Coarse sand), including pointing the joints with white cement and matching pigment etc., complete.</b>	1770 Incl.GST :18%	123.9	1893.9
23	<b>11.41.2 : Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4(1 cement : 4 coarse sand), including grouting the joints with white cement and matching pigments etc., complete.Size of Tile 600 x 600 mm.</b>	1622.5 Incl.GST :18%	113.58	1736.08
24	<b>11.41.3 : Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4(1 cement : 4 coarse sand), including grouting the joints with white cement and matching pigments etc., complete.Size of Tile 800x 800 mm</b>	1947 Incl.GST :18%	136.29	2083.29

Item-wise Price Details				
25	<b>od330704/2020_2021 : Providing and fixing first quality Vitrified wall tiles conforming to IS: 15622 (thickness to be specified by the manufacturer), of approved make, in all colours, shades except burgundy, bottle green, black of any size as approved by Engineer-in-Charge, in skirting, risers of steps and dados, over 12 mm thick bed of cement mortar 1:3 (1 cement : 3 coarse sand) and jointing with grey cement slurry @ 3.3kg per sqm, including pointing in white cement mixed with pigment of matching shade complete.</b>	2183 Incl.GST :18%	152.81	2335.81
26	<b>od329357/2020_2021 : Supplying and fixing following rating, three pole, MCB 63 A rating, 3 pole, MCB</b>	1121 Incl.GST :18%	78.47	1199.47
27	<b>od329359/2020_2021 : Supplying and fixing following rating, three pole, MCB 40 A rating, 3 pole, MCB</b>	1062 Incl.GST :18%	74.34	1136.34
28	<b>"90.11.1.19 : Supply and installation of sheet steel, phosphatised and painted, dust and vermin proof enclosure of MCB DB including copper /brass bus bar, neutral link, earth bus and DIN rail suitable for fixing MCB/ isolator etc. fixed on wall using suitable anchor bolts or fixed in recess including cutting hole on the wall , making good the damages, colour washing etc. as required 6 way (8 + 18) - double cover TPN vertical DB with provision for fixing MCCB as incomer and SP/ TP MCB as outgoing (IP 42/43)"</b>	15340 Incl.GST :18%	1073.8	16413.8
29	<b>"90.11.1.19 : Supply and installation of sheet steel, phosphatised and painted, dust and vermin proof enclosure of MCB DB including copper /brass bus bar, neutral link, earth bus and DIN rail suitable for fixing MCB/ isolator etc. fixed on wall using suitable anchor bolts or fixed in recess including cutting hole on the wall , making good the damages, colour washing etc. as required 4 way (8+12) - double cover TPN vertical DB with provision for fixing MCCB as incomer and SP/ TP MCB as outgoing (IP 42/43) "</b>	14986 Incl.GST :18%	1049.02	16035.02
30	<b>2.2.13 : Providing and fixing following rating and breaking capacity and pole MCCB in existing cubicle panel board including drilling holes in cubicle panel, making connections, etc. as required. 100 Amp, 16/10 KA 4 Pole</b>	11210 Incl.GST :18%	784.7	11994.7
31	<b>2.2.14 : Providing and fixing following rating and breaking capacity and pole MCCB in existing cubicle panel board including drilling holes in cubicle panel, making connections, etc. as required.125 Amp, 16/10 KA</b>	12390 Incl.GST :18%	867.3	13257.3

Item-wise Price Details				
32	<b>90.14.10.10 : Supply, conveyance and fixing the following types &amp; current rated control gears &amp; switchgears conforming to IS 13947 suitable for 440 V, 50 Hz, AC supply in the existing panel assembly as required.16A -100A, 16/10 kA (Ics=100%Icu), 4 pole, current limiting type MCCB with microprocessor based release with overload setting of 50 - 100% having adjustable OL &amp; SC</b>	17700 Incl.GST :18%	1239	18939
33	<b>"7.8.2 : 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.Above 35 sq. mm and upto 95 sq. mm (clamped with 25x3mm MS flat clamp)"</b>	454.3 Incl.GST :18%	31.8	486.1
34	<b>90.12.41.20 : Supply, laying and clamping of 1 no. PVC insulated and PVC sheathed armoured copper power cable, 1.1 KV grade of the following sizes using clamps noted along with the cables, spacing of clamps not exceeding 60cms, making good the damages , colour washing etc. as required.3.5 core 25 sq mm with factory made clamp</b>	3422 Incl.GST :18%	239.54	3661.54
35	<b>90.12.41.21 : Supply, laying and clamping of 1 no. PVC insulated and PVC sheathed armoured copper power cable, 1.1 KV grade of the following sizes using clamps noted along with the cables, spacing of clamps not exceeding 60cms, making good the damages , colour washing etc. as required.3.5 core 35 sq mm with factory made clamp</b>	3894 Incl.GST :18%	272.58	4166.58
36	<b>od329875/2020_2021 : Providing and fixing 4.00 mm thick ACP sheet for cupboard including all cost, conveyance, labour charges etc complete</b>	2832 Incl.GST :18%	198.24	3030.24
37	<b>21.3.1 : Providing and fixing glazing in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber / neoprene gasket etc. complete as per the architectural drawings and the directions of Engineer - in -Charge. ( Cost of aluminium snap beading shall be paid in basic item):With float glass panes of 4.0 mm thickness</b>	1888 Incl.GST :18%	132.16	2020.16

**Item-wise Price Details**

38	<p><b>21.4.2 : Providing and fixing double action hydraulic floor spring of approved brand and manufacture conforming to IS: 6315, having brand logo embossed on the body / plate with double spring mechanism and door weight upto 125 kg, for doors including cost of cutting floors, embedding in floors as required and making good the same matching to the existing floor finishing and cover plates with brass pivot and single piece M.S. sheet outer box with slide plate etc. complete as per the direction of Engineer -in- Charge.With brass cover plate minimum 1.25 mm thickness</b></p>	<p align="center">5900 Incl.GST :18%</p>	<p align="center">413</p>	<p align="center">6313</p>
39	<p><b>21.12.2 : Providing and fixing aluminium tubular handle bar 32 mm outer dia, 3.0mm thick &amp; 2100 mm long with S.S. screws etc. complete as per direction of Engineer -in-Charge.Powder coated minimum thickness 50 micron aluminium tubular handle bar</b></p>	<p align="center">2950 Incl.GST :18%</p>	<p align="center">206.5</p>	<p align="center">3156.5</p>
40	<p><b>21.13 : Providing and fixing 100 mm brass locks ( best make of approved quality ) for aluminium doors including necessary cutting and making good etc. complete</b></p>	<p align="center">1534 Incl.GST :18%</p>	<p align="center">107.38</p>	<p align="center">1641.38</p>
41	<p><b>50.9.11.1 : Providing and fixing Thomson Multi wood board or equivalent make paneling 12 mm thick, to frame, backing or studding with screws etc. complete ( Frames, backing or studding to be paid separately) as per the direction of site Engineer-in-charge.</b></p>	<p align="center">3540 Incl.GST :18%</p>	<p align="center">247.8</p>	<p align="center">3787.8</p>

**Item-wise Price Details**

42	<p><b>12.45.2 : Providing and fixing false ceiling at all height including providing and fixing of frame work made of special sections, power pressed from M.S. sheets and galvanized with zinc coating of 120 gms/ sqm (both side inclusive) as per IS : 277 and consisting of angle cleats of size 25 mm wide x 1.6 mm thick with flanges of 27 mm and 37 mm, at 1200 mm centre to centre, one flange fixed to the ceiling with dash fastener 12.5 mm dia x 50 mm long with 6 mm dia bolts, other flange of cleat fixed to the angle hangers of 25x10x0.50 mm of required length with nuts &amp; bolts of required size and other end of angle hanger fixed with intermediate G.I. channels 45x15x0.9 mm running at the spacing of 1200 mm centre to centre, to which the ceiling section 0.5 mm thick bottom wedge of 80 mm with tapered flanges of 26 mm each having lips of 10.5 mm, at 450 mm centre to centre, shall be fixed in a direction perpendicular to G.I. intermediate channel with connecting clips made out of 2.64 mm dia x 230 mm long G.I. wire at every junction, including fixing perimeter channels 0.5 mm thick 27 mm high having flanges of 20 mm and 30 mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450 mm centre, with 25 mm long dry wall screws @ 230 mm interval, including fixing of gypsum board to ceiling section and perimeter channel with the help of dry wall screws of size 3.5x25 mm at 230 mm c/c, including jointing and finishing to a flush finish of tapered and square edges of the board with recommended jointing compound, jointing tapes, finishing with jointing compound in 3 layers covering upto 150 mm on both sides of joint and two coats of primer suitable for board, all as per manufacturer's specification and also including the cost of making openings for light fittings, grills, diffusers, cutouts made with frame of perimeter channels suitably fixed, all complete as per drawings, specification and direction of the Engineer in Charge but excluding the cost of painting with:12.5 mm thick tapered edge gypsum fire resistant board conforming to IS; 2095-Part I</b></p>	<p align="right">1244.9 Incl.GST :18%</p>	<p align="right">87.14</p>	<p align="right">1332.04</p>
----	---	---	----------------------------	------------------------------



**Item-wise Price Details**

43	<p><b>12.54.1 : Providing and fixing GI Clip in Metal Ceiling System of 600x600 mm module which includes providing and fixing 'C' wall angle of size 20x30x20 mm made of 0.5 mm thick pre painted steel along the perimeter of the room with help of nylon sleeves and wooden screws at 300 mm center to centre, suspending the main C carrier of size 10x38x10 mm made of G.I steel 0.7 mm thick from the soffit with help of soffit cleat 37x27x25x1.6 mm, rawl plugs of size 38x12 mm and C carrier suspension clip and main carrier bracket at 1000 mm c/c. Inverted triangle shaped Spring Tee having height of 24 mm and width of 34 mm made of GI steel 0.45 mm thick is then fixed to the main C carrier and in direction perpendicular to it at 600 mm centers with help of suspension brackets. Wherever the main C carrier and spring T have to join, C carrier and spring T connectors have to be used. All sections to be galvanized @ 120 gms/sqm (both side inclusive), fixing with clip in tiles into spring 'T' with :GI Metal Ceiling Clip in plain Beveled edge global white color tiles of size 600x600 and 0.5mm thick with 25 mm height, ,made of G.I sheet having galvanizing of 100 gms/ sqm (both sides inclusive) and electro statically polyester powder coated of thickness 60 microns (minimum), including factory painted after bending .</b></p>	<p align="right">2950 Incl.GST :18%</p>	206.5	3156.5
----	---	---	-------	--------

**Item-wise Price Details**

44	<p><b>12.58.1 : Providing and fixing tiled false ceiling of approved materials of size 595x595 mm in true horizontal level, suspended on interlocking metal grid of hot dipped galvanized steel sections (galvanized @ 120 grams/ sqm, both side inclusive) consisting of main "T" runner with suitably spaced joints to get required length and of size 24x38 mm made from 0.30 mm thick (minimum) sheet, spaced at 1200 mm center to center and cross "T" of size 24x25 mm made of 0.30 mm thick (minimum) sheet, 1200 mm long space between main "T" at 600 mm center to center to form a grid of 1200x600 mm and secondary cross "T" of length 600 mm and size 24x25 mm made of 0.30 mm thick (minimum) sheet to be interlocked at middle of the 1200x600 mm panel to form grids of 600x600 mm and wall angle of size 24x24x0.3 mm and laying false ceiling tiles of approved texture in the grid including, required cutting/making, opening of services like diffusers, grills, light fittings, fixtures, smoke detectors etc. Main "T" runners to be suspended from ceiling using GI slotted cleats of size 27 x 37 x 25 x 1.6 mm fixed to ceiling with 12.5 mm dia and 50 mm long dash fasteners, 4 mm GI adjustable rods with galvanized butterfly level clips of size 85 x 30 x 0.8 mm spaced at 1200 mm center to center along main T, bottom exposed width of 24 mm of all T-sections shall be pre-painted with polyester paint, all complete for all heights as per specifications, drawings and as directed by Engineer-in-charge. 8 mm thick fully perforated calcium silicate board made with Calcareous &amp; Siliceous materials reinforced with cellulose fiber manufactured through autoclaving process to give stable crystalline structure with minimum compressive strength 225 Kg/ sq. cm, bending strength 100 Kg/sq. cm, of size 595x595 mm, having perforation of dia, 10 mm with minimum perforated area 18% with non woven tissue on the back side, having an NRC (Noise Reduction Coefficient) of 0.85, with 50 mm thick rockwool of 48 Kg/cum backing.</b></p>	<p align="center">1740.5 Incl.GST :18%</p>	<p align="center">121.84</p>	<p align="center">1862.34</p>
45	<p><b>50.9.12.1 : Providing and fixing Thomson Multi wood board or equivalent make, in shelves with screws and fittings wherever required, edges to be painted with polyurethane primer (fittings to be paid separately) as per the direction of site Engineer-in-charge.</b></p>	<p align="center">4366 Incl.GST :18%</p>	<p align="center">305.62</p>	<p align="center">4671.62</p>
46	<p><b>13.61.1 : Painting with synthetic enamel paint of approved brand and manufacture to give an even shade:Two or more coats on new work</b></p>	<p align="center">283.2 Incl.GST :18%</p>	<p align="center">19.82</p>	<p align="center">303.02</p>
47	<p><b>13.69.1 : Polishing on wood work with ready mixed wax polish of approved brand and manufacture:New work</b></p>	<p align="center">495.6 Incl.GST :18%</p>	<p align="center">34.69</p>	<p align="center">530.29</p>

Item-wise Price Details				
48	<b>13.80 : Providing and applying white cement based putty of average thickness 1 mm, of approved brand and manufacturer, over the plastered wall surface to prepare the surface even and smooth complete.</b>	194.7 Incl.GST :18%	13.63	208.33
49	<b>13.83.2 : Wall painting with premium acrylic emulsion paint of interior grade, having VOC (Volatile including applying additional coats wherever required to achieve even shade and colour.Two coats</b>	330.4 Incl.GST :18%	23.13	353.53
50	<b>10.16.3 : Steel work in built up tubular (round, square or rectangular hollow tubes etc.) trusses etc., including cutting, hoisting, fixing position and applying a priming coat of approved steel primer, including welding and bolted with special shaped washers etc. complete.Electric resistance or induction butt welded tubes</b>	177 Incl.GST :18%	12.39	189.39
51	<b>od329889/2020_2021 : Roofing sheet with Sandwich PUF roof panel with 0.40 mm or nearest size pre painted Galvalume sheet at top &amp; Bottom , 30 mm or nearest size PUF sheet at middle portion , necessary overlap at ends including self screws, cyclone washer etc. complete</b>	2832 Incl.GST :18%	198.24	3030.24
52	<b>17.2.2 : Providing and fixing white vitreous china pedestal type water closet (European type W.C. pan) with seat and lid, 10 litre low level white P.V.C. flushing cistern, including flush pipe, with manually controlled device (handle lever), conforming to IS : 7231, with all fittings and fixtures complete, including cutting and making good the walls and floors wherever required:W.C. pan with ISI marked black solid plastic seat and lid</b>	10030 Incl.GST :18%	702.1	10732.1
53	<b>17.7.1 : Providing and fixing wash basin with C.I. brackets, 15 mm C.P. brass pillar taps, 32 mm C.P. brass waste of standard pattern, including painting of fittings and brackets, cutting and making good the walls wherever require:White Vitreous China Wash basin size 630x450 mm with a pair of 15 mm C.P. brass pillar taps</b>	7080 Incl.GST :18%	495.6	7575.6
54	<b>50.17.1.2 : Supplying and fixing CP Towel rod 45cm or nearest available length including cost of materials and labour charges etc complete as per the direction of site Engineer-in-charge.</b>	855.5 Incl.GST :18%	59.89	915.39

Item-wise Price Details				
55	<b>50.17.1.5 : Supplying and fixing CP Health Faucet superior quality ( Jagur or equivalent make ) including cost of materials and labour charges etc complete as per the direction of site Engineer-in-charge.</b>	442.5 Incl.GST :18%	30.98	473.48
56	<b>50.17.1.1 : Supplying and fixing Stainless steel soap dish including cost of materials and labour charges etc complete as per the direction of site Engineer-in-charge.</b>	767 Incl.GST :18%	53.69	820.69
57	<b>17.32.1 Providing and fixing mirror of superior glass ( of approved quality) and of required shape and size with plastic moulded frame of approved make and shade with 6 mm thick hard board backing : Circular shape 450 mm dia</b>	2065 Incl.GST :18%	144.55	2209.55
58	<b>50.18.7.1.1 : Providing and fixing PVC pipes, fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes &amp; fittings with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge 15mm dia 12kgf/cm2 -Internal work- Exposed on wall</b>	236 Incl.GST :18%	16.52	252.52
59	<b>50.18.7.4.1 : Providing and fixing PVC pipes, fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes &amp; fittings with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge 32 mm dia 10Kgf/cm2- Internal work - Exposed on wall</b>	413 Incl.GST :18%	28.91	441.91
60	<b>50.18.8.1.1 : Providing and fixing PVC pipes, fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes &amp; fittings with one step PVC solvent cement and testing of joints complete as per direction of Engineer- in-Charge. Concealed work, including cutting chases and making good the wall etc. 15 mm pipe 12 Kgf/ cm2</b>	413 Incl.GST :18%	28.91	441.91
61	<b>50.18.8.4.1 : Providing and fixing PVC pipes, fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes &amp; fittings with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge. Concealed work, including cutting chases and making good the wall etc. 32 mm pipe 10Kgf/cm2</b>	531 Incl.GST :18%	37.17	568.17

Item-wise Price Details				
62	<b>50.18.8.9.1 : Providing and fixing PVC pipes, fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge. Concealed work, including cutting chased and making good the wall etc. 110 mm pipe 6kgf/cm2</b>	1014.8 Incl.GST :18%	71.04	1085.84
63	<b>50.18.9.8.2 : Providing and fixing PVC pipes includings of pipes with one step PVC solvent cement, trenching and refilling &amp; testing of joints complete as per direction of Engineer in Charge. 75 mm dia 4 Kgf/cm2</b>	631.3 Incl.GST :18%	44.19	675.49
64	<b>od327710/2020_2021 : Supplying and fixing Name board of various sizes using foam sheet board including lettering as per the direction of departmental officers including cost, conveyance and fixing charges etc complete. 45x14cm size</b>	1180 Incl.GST :18%	82.6	1262.6
65	<b>od327711/2020_2021 : Supplying and fixing the name board of size using ACP board with acrylic lettering including cost, conveyance and labour charges for lettering and fixing etc complete</b>	5310 Incl.GST :18%	371.7	5681.7
66	<b>od329825/2020_2021 : Providing and fixing 24 mm thick factory made PVC door shutters made of styles and rails of a PVC hollow section of size 59 x 24 mm and wall thickness 2 mm with inbuilt edging on both sides. The styles and rails mitred and joint at the corners by means of M.S. galvanized/plastic brackets of size 75 x 220 mm having wall thickness 1.0 mm and stainless steel screws. The styles of the shutter reinforced by fixing galvanized M.S. tube of size 20 x 20 mm and 1 mm wall thickness. The lock rail made up of 'H' section, a PVC hollow section of size 100 x 24 mm and 2 mm wall thickness, fixed to the shutter styles by means of plastic/galvanized M.S. 'U' cleats. The shutter frame filled with a PVC multi-chambered single panel of size not less than 620 mm, having over all thickness of 20 mm and 1 mm wall thickness. The panels filled vertically and tie bar at two places by fixing horizontally 6 mm galvanized M.S. rod and fastened with nuts and washers, complete as per manufacturer's specification and direction of Engineer-in-charge( For W.C. and bathroom door shutter).</b>	3658 Incl.GST :18%	256.06	3914.06
67	<b>od327712/2020_2021 : Supplying and fixing Inaugration board using granite slab including lettering as per direction of departmental officers including cost of granite, lettering and fixing charges etc complete. Size: 100x84cm</b>	27140 Incl.GST :18%	1899.8	29039.8

Item-wise Price Details				
68	<b>od330747/2020_2021 : Computer Chair;The Medium Back Adjustable Revolving chair made with Mesh back within Built Handle in the Nylon Finish, The Back is designed extra lumbar support. The seat have provided Seat cover in PP made with 12mm hot pressed ply and PU Moylded foam. The tilting mechanism should be synchro-tilt mechanism as per international ergonomics standards any position locking. The base and pin wheels are made in the Nylon. 120mm H Gas lift should be provided with Tower Bellow</b>	10030 Incl.GST :18%	702.1	10732.1
69	<b>od330748/2020_2021 : High Back Chair Made with feather Foam Seat &amp; Mesh Back with lumbar;support. , The Gas lift mechanism should be tested as per BIFMA ;05.01.2002 Standards. The pedestal should be five legged injection moulded;in black 30% glass –filled nylon and fitted with 5 nos twin wheel castors. Theastors of the chairs should be glass filled, It should have synchro any angle&lt;br&gt;locking arrangement</b>	12980 Incl.GST :18%	908.6	13888.6
70	<b>od330749/2020_2021 : Providing and fixing trap doors for access to the areas above false ceiling. The trap door shall have an external frame made of Powder coated aluminium channel on which the shutter is hinged. Shutter shall be made 3 mm thick ACP sheet shutter external frame of shutter made of Powder coated aluminium channel. Concealed heavy duty hinges shall be used to mount the shutters and locking shall be provided. The shutter shall be moulded in level with the false ceiling forming a groove all around. Sufficient number of hinges and locks shall be provided to avoid sagging of the shutter. Key also shall be supplied. No extra rate shall be provided for suspenders or frame works all round for linking the trap door to gyp board /any other false ceiling. The rate including all labour charges ,material charges ect complete.</b>	8850 Incl.GST :18%	619.5	9469.5
71	<b>FURNITURE &amp; OTHER WORKS 2mm Lead lined doors: 2mm Lead lined doors: Solid cored(30mm) Lead(2mm) lined flush door side hung two rebated shutters with plywood(6mm) &amp; laminated (1mm) on both sides and all accessories ( SS hinges (4 no's), towerbolt , SS handles etc..)</b>	24190 Incl.GST :18%	1693.3	25883.3

Item-wise Price Details				
72	<b>"2mm Lead lined door frames: Lead(2mm) lined flush door side hung single shutter with plywood(6mm) &amp; laminated (1mm) on both sides and all accessories (Lead sheet should overlap door frame &amp; wall ) Providing wood work in frames of doors, windows, clerestory windows and other frames, wrought framed and fixed in position with hold fast lugs or with dash fasteners of required dia &amp; length (hold fast lugs or dash fastener shall be paid for separately), using good quality Anjili wood /jack wood "</b>	14750 Incl.GST :18%	1032.5	15782.5
73	<b>Wood frame for fixing Lead Glass (Lead sheet should overlap door frame &amp; wall )</b>	23600 Incl.GST :18%	1652	25252
74	<b>Steel cupboard (Godrej) for storage 6ft tall 3 feet width</b>	36580 Incl.GST :18%	2560.6	39140.6
75	<b>Computer table (long) with keyboard tray, CPU storage at base in a side and storage drawers at other side. (For workstation and reports) reputed brand godrej/featherlite/wipro</b>	25960 Incl.GST :18%	1817.2	27777.2
76	<b>Vaccum cleaner power atleast : 1300Watts, input 230Vac, eureka forbes or equivalent</b>	30680 Incl.GST :18%	2147.6	32827.6
77	<b>Suitable De- Humidifier units : Extraction at least 35 litres/day, compresor : rotary, Air flow : at least 220m3/hr, reputed brand, input 230Vac</b>	53100 Incl.GST :18%	3717	56817
78	<b>Providing cable trench for system cables and wherever necessary with metal cover including finishing works and all allied works</b>	2360 Incl.GST :18%	165.2	2525.2
79	<b>Providing and fixing 2.0mm th. Vinyl floor with rubber based adhesive over clean and smooth surface including finishing by rolling a light roller all complete.</b>	1711 Incl.GST :18%	119.77	1830.77
80	<b>Fencing (PVC coated Chain link) for out side of Chiller plant including frame work, concreting, painiting, etc complete, also seperate gate with locking arrangement to be provided.</b>	28320 Incl.GST :18%	1982.4	30302.4
81	<b>Fabricating casting and fixing in position of Scrub with super grade SS heavy type (180 x55x45 ) cm with boarder edges and joint free sides bottom and top buffing neat finished inside face etc complete</b>	59000 Incl.GST :18%	4130	63130

Item-wise Price Details				
82	<b>Providing and fixing white vitreous china laboratory sink with C.I brackets, C.P. brass chain with rubber plug 40 mm C.P brass waste and 40 mm C.P. brass trap with necessary C.P. brass unions complete, including painting of fittings and brackets, cutting and making good the wall wherever required:Â Size 600x450x200 mmÂ</b>	14750 Incl.GST :18%	1032.5	15782.5
83	<b>"1.10.2 : Wiring for light point/ fan point/ exhaust fan point/ call bell point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable in surface / recessed medium class PVC conduit, with modular switch, modular plate, suitable GI box and earthing the point with 1.5 sq.mm. FRLS PVC insulated copper conductor single core cable etc as required.Group B"</b>	1475 Incl.GST :18%	103.25	1578.25
84	<b>1.38 : Supplying and fixing call bell/ buzzer suitable for single phase, 230 volts, complete as required.</b>	885 Incl.GST :18%	61.95	946.95
85	<b>1.55.2 : Wiring for group controlled (looped) light point/fan point/exhaust fan point/ call bell point ( without independent switch etc.) with 1.5 sq. mm FRLS PVC insulated copper conductor single core cable in surface/ recessed PVC conduit, and earthing the point with 1.5 sq. mm FRLS PVC insulated copper conductor single core cable etc. as required.Group B</b>	1298 Incl.GST :18%	90.86	1388.86
86	<b>1.14.1 : Wiring for circuit/ submain wiring alongwith earth wire with the following sizes of FRLS PVC insulated copper conductor, single core cable in surface / recessed medium class PVC conduit as required 2x1.5 sq.mm + 1x1.5 sq.mm earth wire</b>	224.2 Incl.GST :18%	15.69	239.89
87	<b>1.14.2 : Wiring for circuit/ submain wiring alongwith earth wire with the following sizes of FRLS PVC insulated copper conductor, single core cable in surface / recessed medium class PVC conduit as required 2X 2.5 sq. mm + 1 X 2.5 sq. mm earth wire</b>	271.4 Incl.GST :18%	19	290.4
88	<b>1.14.3 : Wiring for circuit/ submain wiring alongwith earth wire with the following sizes of FRLS PVC insulated copper conductor, single core cable in surface / recessed medium class PVC conduit as required 2 X 4 sq. mm + 1 X 4 sq. mm earth wire</b>	365.8 Incl.GST :18%	25.61	391.41



Item-wise Price Details				
89	<b>1.17.31 : Supplying and drawing following sizes of FRLS PVC insulated copper conductor, single core cable in the existing surface / recessed steel/ PVC conduit as required.4 x 6 sq. mm</b>	483.8 Incl.GST :18%	33.87	517.67
90	<b>1.17.3 : Supplying and drawing following sizes of FRLS PVC insulated copper conductor, single core cable in the existing surface / recessed steel/ PVC conduit as required.3 X 1.5 sq.mm</b>	112.1 Incl.GST :18%	7.85	119.95
91	<b>1.17.12 : Supplying and drawing following sizes of FRLS PVC insulated copper conductor, single core cable in the existing surface / recessed steel/ PVC conduit as required.3 x 2.5 sq. mm</b>	171.1 Incl.GST :18%	11.98	183.08
92	<b>1.17.21 : Supplying and drawing following sizes of FRLS PVC insulated copper conductor, single core cable in the existing surface / recessed steel/ PVC conduit as required.3 x 4 sq. mm</b>	247.8 Incl.GST :18%	17.35	265.15
93	<b>1.18.2 : Supplying and drawing following pair 0.5 mm dia FRLS PVC insulated annealed copper conductor,unarmored telephone cable in the existing surface/ recessed steel/ PVC conduit as required.2 Pair</b>	70.8 Incl.GST :18%	4.96	75.76
94	<b>1.19 : Supplying and drawing co-axial TV cable RG-6 grade, 0.7 mm solid copper conductor PE insulated,shielded with fine tinned copper braid and protected with PVC sheath in the existing surface/recessed steel/ PVC conduit as required.</b>	55.46 Incl.GST :18%	3.88	59.34
95	<b>1.21.1 : Supplying and fixing of following sizes of medium class PVC conduit along with accessories in surface/ recess including cutting the wall and making good the same in case of recessed conduit as required.20 mm</b>	88.5 Incl.GST :18%	6.2	94.7
96	<b>1.21.2 : Supplying and fixing of following sizes of medium class PVC conduit along with accessories in surface/ recess including cutting the wall and making good the same in case of recessed conduit as required.25 mm</b>	100.3 Incl.GST :18%	7.02	107.32
97	<b>1.53.1 : Supplying and drawn of UTP 4 pair CAT 6 LAN cable in the existing surface/recessed steel/PVC conduit as required1 run of Cable</b>	53.1 Incl.GST :18%	3.72	56.82
98	<b>1.53.2 : Supplying and drawn of UTP 4 pair CAT 6 LAN cable in the existing surface/recessed steel/PVC conduit as required2 run of Cable</b>	224.2 Incl.GST :18%	15.69	239.89

Item-wise Price Details				
99	od329339/2020_2021 : CAT 6 RJ 45 Computer jack modular SOCKET OUTLET	814.2 Incl.GST :18%	56.99	871.19
100	1.24.1 : Supplying and fixing following modular switch/ socket on the existing modular plate & switch box including connections but excluding modular plate etc. as required.5/6 amps switch	354 Incl.GST :18%	24.78	378.78
101	1.24.2 : Supplying and fixing following modular switch/ socket on the existing modular plate & switch box including connections but excluding modular plate etc. as required.2 way 5/6 amps switch	413 Incl.GST :18%	28.91	441.91
102	1.24.3 : Supplying and fixing following modular switch/ socket on the existing modular plate & switch box including connections but excluding modular plate etc. as required.15/16 amp switch	519.2 Incl.GST :18%	36.34	555.54
103	1.24.4 : Supplying and fixing following modular switch/ socket on the existing modular plate & switch box including connections but excluding modular plate etc. as required.3 pin 5/6 amp socket outlet	507.4 Incl.GST :18%	35.52	542.92
104	1.24.5 : Supplying and fixing following modular switch/ socket on the existing modular plate & switch box including connections but excluding modular plate etc. as required.6 pin 15/16 amp socket outlet	625.4 Incl.GST :18%	43.78	669.18
105	1.24.6 : Supplying and fixing following modular switch/ socket on the existing modular plate & switch box including connections but excluding modular plate etc. as required.Telephone socket outlet	472 Incl.GST :18%	33.04	505.04
106	1.24.7 : Supplying and fixing following modular switch/ socket on the existing modular plate & switch box including connections but excluding modular plate etc. as required.TV antenna socket outlet	519.2 Incl.GST :18%	36.34	555.54
107	1.24.8 : Supplying and fixing following modular switch/ socket on the existing modular plate & switch box including connections but excluding modular plate etc. as required.Bell push	377.6 Incl.GST :18%	26.43	404.03
108	1.26 : Supplying and fixing modular blanking plate on the existing modular plate & switch box excluding modular plate as required.	59 Incl.GST :18%	4.13	63.13

Item-wise Price Details				
109	<b>1.27.1 : Supplying and fixing following size/ modules, GI box alongwith modular base &amp; cover plate for modular switches in recess etc as required.1 or 2 Module (75mmX75mm)</b>	342.2 Incl.GST :18%	23.95	366.15
110	<b>1.27.2 : Supplying and fixing following size/ modules, GI box alongwith modular base &amp; cover plate for modular switches in recess etc as required.3 Module (100mmX75mm)</b>	413 Incl.GST :18%	28.91	441.91
111	<b>1.27.4 : Supplying and fixing following size/ modules, GI box alongwith modular base &amp; cover plate for modular switches in recess etc as required.6 Module (200mmX75mm)</b>	625.4 Incl.GST :18%	43.78	669.18
112	<b>1.27.5 : Supplying and fixing following size/ modules, GI box alongwith modular base &amp; cover plate for modular switches in recess etc as required.8 Module (125mmX125mm)</b>	696.2 Incl.GST :18%	48.73	744.93
113	<b>1.38 : Supplying and fixing call bell/ buzzer suitable for single phase, 230 volts, complete as required.</b>	236 Incl.GST :18%	16.52	252.52
114	<b>1.51 : Extra for fixing the louvers/ shutters complete with frame for a exhaust fan of all sizes</b>	708 Incl.GST :18%	49.56	757.56
115	<b>90.4.8 : Charges for cutting holes suitable for accommodating exhaust fans up to 305mm sweep including plastering colour washing etc. as required.</b>	684.4 Incl.GST :18%	47.91	732.31
116	<b>1.50.1 : Installation of exhaust fan in the existing opening, including making good the damage connection testing, commissioning etc. as required.Upto 450 mm sweep</b>	531 Incl.GST :18%	37.17	568.17
117	<b>od329345/2020_2021 : Supply of exhaust fan of 380 mm sweep,heavy duty with metallic vanes and housing with louvers and shutters</b>	2655 Incl.GST :18%	185.85	2840.85
118	<b>od329349/2020_2021 : Supply of 300/305 mm sweep Light Duty Exhaust fan in metal frame working on230 V A/C</b>	2124 Incl.GST :18%	148.68	2272.68

Item-wise Price Details				
119	<b>90.11.1.10 : Supply and installation of sheet steel, phosphatised and painted, dust and vermin proof enclosure of MCB DB including copper /brass bus bar, neutral link, earth bus and DIN rail suitable for fixing MCB/ isolator etc. fixed on wall using suitable anchor bolts or fixed in recess including cutting hole on the wall , making good the damages, colour washing etc. as required 4 way (8+12) - three phase double cover (IP 42/43), LDB and PDB</b>	12980 Incl.GST :18%	908.6	13888.6
120	<b>" 90.11.1.11Supply and installation of sheet steel, phosphatised and painted, dust and vermin proof enclosure of MCB DB including copper /brass bus bar, neutral link, earth bus and DIN rail suitable for fixing MCB/ isolator etc. fixed on wall using suitable anchor bolts or fixed in recess including cutting hole on the wall , making good the damages, colour washing etc. as required 6 way (8+18) - three phase double cover (IP 42/43) UPS DB"</b>	8850 Incl.GST :18%	619.5	9469.5
121	<b>od329335/2020_2021 : Supplying and fixing following rating, four pole, (three phaseand neutral), 415 V, residual current circuit breaker (RCCB),having a sensitivity current 30 mA in the existing MCB DBcomplete with connections, testing and commissioning etc. asrequired. 63 A rating, 4 pole, 30 mA RCCB</b>	4602 Incl.GST :18%	322.14	4924.14
122	<b>od329340/2020_2021 : Supplying and fixing following rating, four pole, (three phaseand neutral), 415 V, residual current circuit breaker (RCCB),having a sensitivity current 30 mA in the existing MCB DBcomplete with connections, testing and commissioning etc. asrequired.40 A rating, 4 pole, 30 mA RCCB</b>	3776 Incl.GST :18%	264.32	4040.32
123	<b>2.13.1 : Supplying and fixing following rating, four pole, 415 volts, isolator in the existing MCB DB complete with connections, testing and commissioning etc. as required. 40 amps</b>	1451.4 Incl.GST :18%	101.6	1553
124	<b>2.13.2 : Supplying and fixing following rating, four pole, 415 volts, isolator in the existing MCB DB complete with connections, testing and commissioning etc. as required. 63 amps</b>	1416 Incl.GST :18%	99.12	1515.12
125	<b>2.10.1 : Supplying and fixing 5 amps to 32 amps rating, 240/415 volts, "C" curve, miniature circuit breaker suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required.Single pole</b>	383.5 Incl.GST :18%	26.85	410.35

Item-wise Price Details				
126	<b>90.12.41.22 : Supply, laying and clamping of 1 no. PVC insulated and PVC sheathed armoured copper power cable, 1.1 KV grade of the following sizes using clamps noted along with the cables, spacing of clamps not exceeding 60cms, making good the damages , colour washing etc. as required.3.5 core 50 sq mm with factory made clamp</b>	4720 Incl.GST :18%	330.4	5050.4
127	<b>90.12.41.33 : Supply, laying and clamping of 1 no. PVC insulated and PVC sheathed armoured copper power cable, 1.1 KV grade of the following sizes using clamps noted along with the cables, spacing of clamps not exceeding 60cms, making good the damages , colour washing etc. as required.4 core 10 sq mm with factory made clamp</b>	1062 Incl.GST :18%	74.34	1136.34
128	<b>90.12.41.34 : Supply, laying and clamping of 1 no. PVC insulated and PVC sheathed armoured copper power cable, 1.1 KV grade of the following sizes using clamps noted along with the cables, spacing of clamps not exceeding 60cms, making good the damages , colour washing etc. as required.4 core 16 sq mm with factory made clamp</b>	1829 Incl.GST :18%	128.03	1957.03
129	<b>"90.12.41.24 Supply, laying and clamping of 1 no. PVC insulated and PVC sheathed armoured copper power cable, 1.1 KV grade of the following sizes using clamps noted along with the cables, spacing of clamps not exceeding 60cms, making good the damages , colour washing etc. as required. 3.5 core 95 sq mm "</b>	7788 Incl.GST :18%	545.16	8333.16
130	<b>" 90.12.41.4 Supply, laying and clamping of 1 no. PVC insulated and PVC sheathed armoured copper power cable, 1.1 KV grade of the following sizes using clamps noted along with the cables, spacing of clamps not exceeding 60cms, making good the damages , colour washing etc. as required. 2 core 16 sq mm with factory made clamp "</b>	1180 Incl.GST :18%	82.6	1262.6
131	<b>"4.1.3 : Supplying and installing following size of perforated pre-painted M.S. cable trays with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts &amp; nuts, painting suspenders etc as required.225 mm width X 50 mm depth X 1.6 mm thickness"</b>	1239 Incl.GST :18%	86.73	1325.73

Item-wise Price Details				
132	"4.2.3 : Supplying and installing following size of perforated pre-painted M.S. cable trays bends with perforation not more than 17.5%, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, painting suspenders etc as required.225 mm width X 50 mm depth X 1.6 mm thickness"	1888 Incl.GST :18%	132.16	2020.16
133	" 90.12.41.4 Supply, laying and clamping of 1 no. PVC insulated and PVC sheathed unarmoured flexible copper power cable, 1.1 KV grade of the following sizes using clamps noted along with the cables, spacing of clamps not exceeding 60cms, making good the damages , colour washing etc. as required. Single core 35 sq mm with factory made clamp "	531 Incl.GST :18%	37.17	568.17
134	" 90.12.41.4 Supply, laying and clamping of 1 no. PVC insulated and PVC sheathed unarmoured flexible copper power cable, 1.1 KV grade of the following sizes using clamps noted along with the cables, spacing of clamps not exceeding 60cms, making good the damages , colour washing etc. as required. Single core 50 sq mm with factory made clamp "	649 Incl.GST :18%	45.43	694.43
135	"Supply, laying and clamping of 1 no. PVC insulated and PVC sheathed unarmoured flexible copper power cable, 1.1 KV grade of the following sizes using clamps noted along with the cables, spacing of clamps not exceeding 60cms, making good the damages , colour washing etc. as required. Single core 70 sq mm with factory made clamp "	700 Incl.GST :0%	57.82	757.82
136	" Supply, laying and clamping of 1 no. PVC insulated and PVC sheathed unarmoured flexible copper power cable, 1.1 KV grade of the following sizes using clamps noted along with the cables, spacing of clamps not exceeding 60cms, making good the damages , colour washing etc. as required. Single core 95 sq mm with factory made clamp "	944 Incl.GST :18%	66.08	1010.08
137	" Supply, laying and clamping of 1 no. PVC insulated and PVC sheathed unarmoured flexible copper power cable, 1.1 KV grade of the following sizes using clamps noted along with the cables, spacing of clamps not exceeding 60cms, making good the damages , colour washing etc. as required. Single core 10 sq mm with factory made clamp "	129.8 Incl.GST :18%	9.09	138.89

Item-wise Price Details				
138	" Supply, laying and clamping of 1 no. PVC insulated and PVC sheathed unarmoured flexible copper power cable, 1.1 KV grade of the following sizes using clamps noted along with the cables, spacing of clamps not exceeding 60cms, making good the damages , colour washing etc. as required. Single core 16 sq mm with factory made clamp "	224.2 Incl.GST :18%	15.69	239.89
139	od329321/2020_2021 : Supplying siemens / tropodur type nickel plated Double compression brass cable gland for PVC insulated and PVC sheathed armoured aluminium/ copper conductor cable 1.1 KV grade, and making end termination suitable for 4 core cable of the following sizes as required. 50 Sqmm	1121 Incl.GST :18%	78.47	1199.47
140	od329326/2020_2021 : Supplying siemens / tropodur type nickel plated Double compression brass cable gland for PVC insulated and PVC sheathed armoured aluminium/ copper conductor cable 1.1 KV grade, and making end termination suitable for 4 core cable of the following sizes as required.16 Sqmm	590 Incl.GST :18%	41.3	631.3
141	od329329/2020_2021 : Supplying siemens / tropodur type nickel plated Double compression brass cable gland for PVC insulated and PVC sheathed armoured aluminium/ copper conductor cable 1.1 KV grade, and making end termination suitable for 4 core cable of the following sizes as required.25 Sqmm	649 Incl.GST :18%	45.43	694.43
142	od329332/2020_2021 : Supplying siemens / tropodur type nickel plated Double compression brass cable gland for PVC insulated and PVC sheathed armoured aluminium/ copper conductor cable 1.1 KV grade, and making end termination suitable for 4 core cable of the following sizes as required.10 Sqmm	590 Incl.GST :18%	41.3	631.3
143	od329336/2020_2021 : Supplying siemens / tropodur type nickel plated Double compression brass cable gland for PVC insulated and PVC sheathed armoured aluminium/ copper conductor cable 1.1 KV grade, and making end termination suitable for 4 core cable of the following sizes as required. 35 Sqmm	885 Incl.GST :18%	61.95	946.95
144	od329341/2020_2021 : Supply of superior quality copper tubular cable socket and making core termination of cables of the following sizes including crimping etc. as required. 50 Sqmm	354 Incl.GST :18%	24.78	378.78

Item-wise Price Details				
145	<b>od329346/2020_2021 : Supply of superior quality copper tubular cable socket and making core termination of cables of the following sizes including crimping etc. as required. 35 Sqmm</b>	295 Incl.GST :18%	20.65	315.65
146	<b>od329350/2020_2021 : Supply of superior quality copper tubular cable socket and making core termination of cables of the following sizes including crimping etc. as required. 25 Sqmm</b>	295 Incl.GST :18%	20.65	315.65
147	<b>od329352/2020_2021 : Supply of superior quality copper tubular cable socket and making core termination of cables of the following sizes including crimping etc. as required.16 Sqmm</b>	295 Incl.GST :18%	20.65	315.65
148	<b>od329353/2020_2021 : Supply of superior quality copper tubular cable socket and making core termination of cables of the following sizes including crimping etc. as required.10 Sqmm</b>	295 Incl.GST :18%	20.65	315.65
149	<b>od329354/2020_2021 : Supplying and providing earth clamps for siemens/ tropodur type cable glands of suitable length and other dimensions noted along with each size of glands for the following sizes of cables as required.25 sq - 95sq mm with 20 mm wide x 1.20 mm thick clip</b>	590 Incl.GST :18%	41.3	631.3
150	<b>od329355/2020_2021 : Supplying and providing earth clamps for siemens/ tropodur type cable glands of suitable length and other dimensions noted along with each size of glands for the following sizes of cables as required.4sqmm-16 sq mm with 12 mm wide x 1 mm thick clip</b>	413 Incl.GST :18%	28.91	441.91
151	<b>90.16.1.2 : Supply and drawing bare earthing conductors of the following sizes along with wiring/ cables and giving connection as required2.65 mm copper conductor (12 SWG)</b>	165.2 Incl.GST :18%	11.56	176.76
152	<b>90.16.1.3 : Supply and drawing bare earthing conductors of the following sizes along with wiring/ cables and giving connection as required3.15 mm copper conductor ( 10 SWG)</b>	224.2 Incl.GST :18%	15.69	239.89
153	<b>90.16.1.4 : Supply and drawing bare earthing conductors of the following sizes along with wiring/ cables and giving connection as required4.00 mm copper conductor ( 8 SWG)</b>	259.6 Incl.GST :18%	18.17	277.77



Item-wise Price Details				
154	<b>90.16.5.2 : Supply of superior quality copper earth socket for the following size of earth conductor including crimping etc. as required.2.65 mm (12 SWG)</b>	106.2 Incl.GST :18%	7.43	113.63
155	<b>90.16.5.3 : Supply of superior quality copper earth socket for the following size of earth conductor including crimping etc. as required.3.15 mm (10 SWG)</b>	118 Incl.GST :18%	8.26	126.26
156	<b>90.16.5.4 : Supply of superior quality copper earth socket for the following size of earth conductor including crimping etc. as required.4.00 mm (8 SWG)</b>	118 Incl.GST :18%	8.26	126.26
157	<b>5.6 : Earthing with copper earth plate 600 mm X 600 mm X 3 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 metre long etc. with charcoal/ coke and salt as required.</b>	30680 Incl.GST :18%	2147.6	32827.6
158	<b>od329356/2020_2021 : Supplying , threading , laying and jointing of the following sizes of &amp;apos;B&amp;apos; class GI pipe with all required accessories in ground in trench as protective covering to earth leads.40 mm Dia</b>	401.2 Incl.GST :18%	28.08	429.28
159	<b>od329358/2020_2021 : Supply and providing test joint for the earthing system using 2 Nos of the following sizes of strips including cutting and bending to shape, drilling necessary holes and fixed to the watering pipe etc as required. 2 x 25 x 3 mm tinned copper strip</b>	3422 Incl.GST :18%	239.54	3661.54
160	<b>90.16.1.1 : Supply and drawing bare earthing conductors of the following sizes along with wiring/ cables and giving connection as required2.00 mm copper conductor ( 14 SWG)</b>	165.2 Incl.GST :18%	11.56	176.76
161	<b>Supply and clamping the following size of strips on surface of wall/ parapet/ existing cable tray using clamps fabricated from 20 X 3 mm GI flat duly painted or heavy duty GI spacer saddles spacing of clamps not exceeding 1 m, making good the damages, colour washing etc. as required ( for horizontal run)</b>	218.3 Incl.GST :18%	15.28	233.58

Item-wise Price Details				
162	<b>90.3.19.3 : Supply conveyance, installation, testing and commissioning the light fittings of following types made from CRCA sheet 0.5mm thickness with all accessories and lamps directly on wall and giving connections with 16/0.20 mm 3 core PVC insulated and sheathed round copper conductor flex wire or extending the original wiring and giving connections as required 1200 mm 1X20W LED Lamp with box type fixture</b>	1805.4 Incl.GST :18%	126.38	1931.78
163	<b>"90.3.20.3 : Supply &amp; installation of light fittings on TW round block Supply, conveyance installation testing and commissioning the light fittings of following types made of CRCA with 0.5mm thickness complete with all accessories and lamps etc. directly on wall or ceiling with PVC round block neatly painted to suit the fitting and giving connection with required length of 16/0.20mm 3 core copper conductor flex wire conforming to relevant ISS and giving connections as required. 1200 mm 1X20W LED Lamp with box type fixture"</b>	2183 Incl.GST :18%	152.81	2335.81
164	<b>od329330/2020_2021 : Recess mounted LED luminaire with full diffuser type upto 36 W (max), 2x2 LED, Cool White, 5700k, White powder coated CRCA housing, WIPRO CRCO10R038HP57GL1 or Bajaj BZRSQL 36W GZi CW or Equivalent</b>	2714 Incl.GST :18%	189.98	2903.98
165	<b>od329333/2020_2021 : Frame for Fixing Recess mounted LED 2x2 ft luminaire 608 mm x 608 mm</b>	590 Incl.GST :18%	41.3	631.3
166	<b>od329337/2020_2021 : Recess mounted circular LED retrofit downlighter, 15W, powder coated white finish, BPSLR 15W WH Bajaj or Equivalent</b>	885 Incl.GST :18%	61.95	946.95
167	<b>od329342/2020_2021 : Supplying and Fixxing of 6 / 7 W pin type LED bulb in the existing angle batton etc as required (Philips, Wipro or similar superior make)</b>	354 Incl.GST :18%	24.78	378.78
168	<b>od329322/2020_2021 : SITC of 400mm sweep meduim duty wall fans with metallic vanes (Make: M/s Almonard/ Crompton/Bajaj or Equivalent)</b>	2478 Incl.GST :18%	173.46	2651.46
169	<b>od329323/2020_2021 : 4 kg ABC Powder Type Fire Extinguisher With NABL Approval, Fights Class A, B, C and Electrically started fires.</b>	3540 Incl.GST :18%	247.8	3787.8
170	<b>od329327/2020_2021 : 4.5 kg Fire Extinguisher Carbon Di-oxide Type With NABL Approval</b>	8142 Incl.GST :18%	569.94	8711.94

Item-wise Price Details				
171	<b>od329324/2020_2021 : Charges for dismantling the existing Electrical Installations complete making good the damages of the wall and conveying the dismantled materials to store etc as required.</b>	413 Incl.GST :18%	28.91	441.91
172	<b>1.49 : Numbering of ceiling fan / exhaust fan/ fluorescent fittings as required.</b>	94.4 Incl.GST :18%	6.61	101.01
173	<b>Supplying, installing, testing and commissioning of Conventional Single action Manual call point</b>	2006 Incl.GST :18%	140.42	2146.42
174	<b>Supplying, installing, testing and commissioning of Conventional Hooter with builtin Flasher light with base UL/EN listed.</b>	2360 Incl.GST :18%	165.2	2525.2
175	<b>Supply of LT Switch board cubicle type, made out of 2 mm thick CRCA sheet, totally enclosed, IP42, free standing, wall/floor mounting, dust and vermin proof, powder coated, indoor, compartmentalized, suitable for operation on 3 phase and neutral, 415 V, 50Hz AC system with bus-bars extendable on both sides, including all the necessary internal wiring , suitable spreader etc. The panel shall be fabricated from a firm having CPRI certification with test certificates for similar panel(required for short circuit rating, temperature rise and IP classification) and with following switchgears, metering instruments and accessories etc. complete as required as per drawing &amp; specification. RYB Indicating lamps LED type, 4A SP MCB, Digital Multi-function Meter to read V,A,HZ,PF,Kwh, Surge Protection Device, EFR, 400/5 A 5 VA Class .5S CTs, ON/OFF INDICATION LAMP, Incomer 400A FP Moulded Case Circuit Breaker with Micro Processor based release with OL and SC protection neutral link (Ics =100%Icu= 25kA) -1 Nos 400A Copper TPN busbar chamber with Copper busbar. Outgoing 250 A FP Moulded Case Circuit Breaker with Micro Processor based release with OL and SC protection neutral link (Ics =100%Icu= 25kA) - 1 Nos, 125 A FP Moulded Case Circuit Breaker with thermal release with OL and SC protection neutral link (Ics =100%Icu= 16kA) - 2 Nos, 100 A FP Moulded Case Circuit Breaker with thermal release with OL and SC protection neutral link (Ics =100%Icu= 16kA) - 2 Nos, 63 A FP Moulded Case Circuit Breaker with thermal release with OL and SC protection neutral link (Ics =100%Icu= 16kA) - 2 Nos</b>	354000 Incl.GST :18%	24780	378780

**Item-wise Price Details**

176	<p><b>Supply of LT Switch board cubicle type, made out of 2 mm thick CRCA sheet, totally enclosed, IP42, free standing, wall/floor mounting, dust and vermin proof, powder coated, indoor, compartmentalized, suitable for operation on 3 phase and neutral, 415 V, 50Hz AC system with bus-bars extendable on both sides, including all the necessary internal wiring , suitable spreader etc. The panel shall be fabricated from a firm having CPRI certification with test certificates for similar panel(required for short circuit rating, temperature rise and IP classification) and with following switchgears, metering instruments and accessories etc. complete as required as per drawing &amp; specification. RYB Indicating lamps LED type, 4A SP MCB, Digital Multi-function Meter to read V,A,HZ,PF,Kwh, Surge Protection Device, EFR, 400/5 A 5 VA Class .5S CTs, ON/OFF INDICATION LAMP, Incomer 250A FP Moulded Case Circuit Breaker with Micro Processor based release with OL and SC protection neutral link (Ics =100%Icu= 25kA) -1 Nos 200A Copper TPN busbar chamber with Copper busbar. Outgoing 200 A FP Moulded Case Circuit Breaker with Micro Processor based release with OL and SC protection neutral link (Ics =100%Icu= 25kA) - 1 Nos, 100 A FP Moulded Case Circuit Breaker with thermal release with OL and SC protection neutral link (Ics =100%Icu= 16kA) - 2 Nos, 63 A FP Moulded Case Circuit Breaker with thermal release with OL and SC protection neutral link (Ics =100%Icu= 16kA) - 2 Nos, 40 A FP Moulded Case Circuit Breaker with thermal release with OL and SC protection neutral link (Ics =100%Icu= 16kA) - 2 Nos</b></p>	<p align="center">312700 Incl.GST :18%</p>	<p align="center">21889</p>	<p align="center">334589</p>
177	<p><b>Supplying, installing, testing and commissioning of 2 core x 1.5 Sqmm FR PVC,multistrand Copper Cu Ar cable conforming to IS standards and specifications. Make: Polycab / Century</b></p>	<p align="center">135.7 Incl.GST :18%</p>	<p align="center">9.5</p>	<p align="center">145.2</p>
178	<p><b>Providing installing, connecting, testing and commissioning Heat Detectors type with mounting base, blinking LED as required complete and integration</b></p>	<p align="center">2006 Incl.GST :18%</p>	<p align="center">140.42</p>	<p align="center">2146.42</p>
179	<p><b>Supplying, installation, testing and commissioning of Conventional Photoelectric Smoke detectors as required to connect with existing system</b></p>	<p align="center">2124 Incl.GST :18%</p>	<p align="center">148.68</p>	<p align="center">2272.68</p>
180	<p><b>Providing and fixing of response indicator as required</b></p>	<p align="center">354 Incl.GST :18%</p>	<p align="center">24.78</p>	<p align="center">378.78</p>
181	<p><b>Conventional Single -Zone Fire Panel with batteries, battery charger mimic diagram etc</b></p>	<p align="center">27140 Incl.GST :18%</p>	<p align="center">1899.8</p>	<p align="center">29039.8</p>

Item-wise Price Details				
182	<b>Installation, testing and commissioning of air conditioners Including Gas Charging, Pressure testing with sufficient Gas as per CPCB/CPWD Guidelines. Gas charging the system after necessary leak testing with 300 PSI dry nitrogen, and vacuumhold testing (for a period of 12 hrs) (with Freon 22 or superior refrigerant gas)</b>	21830 Incl.GST :18%	1528.1	23358.1
183	<b>Supply, installation, testing and commissioning of Aluminium ducting for Air distribution network from indoor unit as per ducting specifications in Machine Room complete with angle flanges ,supports, GI rods , anchor bolts ,GI nuts and bolts, PVC/ rubber gaskets complete with all fittings , bends, transformations , vanes , splitter dampers ,inspection doors , plenums, channels, rods, anchor bolts, etc to roof /truss as per IS 655 . The job includes entire air distribution network and sizing of ducts also. The materials used shall be paramagnetic.: Thickness 24 G</b>	1180 Incl.GST :18%	82.6	1262.6
184	<b>Supply, installation, testing and commissioning (SITC) of 2 No's 11 TR or higher capacity aircooled ductable split air conditioner with ceiling suspended IDU and all standard fittings, IDU SS drain pan, as per specifications complete with suitable capacity drive motor, air cooled condenser with all accessories, hermetically sealed scroll twin compressor, Evaporator coil have integrally finned copper tubes. The compressor should have independent refrigerent circuits, expansion devices , HP/LP cut off, electronic microprocessor pendant controller with digital display, first charge refrigerent gas, vibration isolator pads, structural supports for fixing IDU/ ODU as shown in the drawing, safety devices including thermal protector, pressure relief valve, over load relays single phase preventor, wired remote control etc, power wiring(max 3m from isolator) and control cabling(indoor to outdoor),thermostat wiring, high-low pressure cut out, suitable for three phase 440V supply etc complete as required.</b>	584100 Incl.GST :18%	40887	624987
185	<b>Supply, installation, testing and commissioning of Aluminium ducting for Air distribution network from indoor unit as per ducting specifications in Machine Room complete with angle flanges ,supports, GI rods , anchor bolts ,GI nuts and bolts, PVC/ rubber gaskets complete with all fittings , bends, transformations , vanes , splitter dampers ,inspection doors , plenums, channels, rods, anchor bolts, etc to roof /truss as per IS 655 . The job includes entire air distribution network and sizing of ducts also. The materials used shall be paramagnetic.: Thickness 22 G</b>	1475 Incl.GST :18%	103.25	1578.25

Item-wise Price Details				
186	<b>Supply, installation, testing and commissioning of suitable sized hard drawn 18 SWG copper refrigerant piping(both suction and liquid piping) including 25mm thick closed cell elastomeric insulation as per specification for 11/8.75/ 5.5 TR machine between indoor &amp; outdoor units as per site conditions all complete.</b>	1711 Incl.GST :18%	119.77	1830.77
187	<b>Supply, installation, testing and commissioning of volume control duct damper made of extruded aluminium for ducts/collars to be provided with suitable links, lebers and quadrants for manual control of volume of air flow and for proper balancing of the air distribution in the main duct complete with neoprene rubber gaskets, nuts, bolts, screws linkages, flanges etc., as per specifications. The materials used shall be paramagnetic.</b>	11800 Incl.GST :18%	826	12626
188	<b>Supplying, fixing testing commissioning of Return air Diffusers of powder coated aluminium without volume control dampers with anti smudge ring &amp; removable core.</b>	14160 Incl.GST :18%	991.2	15151.2
189	<b>Supplying, fixing testing commissioning of supply air diffusers of powder coated aluminium with aluminium volume control dampers with anti smudge ring &amp; removable core.</b>	14160 Incl.GST :18%	991.2	15151.2
190	<b>"Supply, installation, testing and commissioning of Powder coated extruded aluminium Continuous grilles 150 mm high for supply air with aluminium damper as per spec "</b>	11210 Incl.GST :18%	784.7	11994.7
191	<b>Supply, installation, testing and commissioning of Powder coated extruded aluminium Continuous grilles 150mm high for return air as per spec</b>	11210 Incl.GST :18%	784.7	11994.7
192	<b>Providing and fixing of Acoustic Duct lining with 10mm thick nitrile rubber open cell type inside the ducts</b>	1298 Incl.GST :18%	90.86	1388.86
193	<b>Providing and fixing of Thermal insulation lining with 10mm thick fiberglass rigid board with adhesive, on supply duct using 9mm thick nitrile rubber closed cell type.</b>	1180 Incl.GST :18%	82.6	1262.6
194	<b>Supply and Fixing of Canvas connection and ribbed rubber pads as vibration isolators</b>	7670 Incl.GST :18%	536.9	8206.9
195	<b>Supply and Fixing of Heater Package with Humidistat and contactor for humidity control</b>	53100 Incl.GST :18%	3717	56817

Item-wise Price Details				
196	<b>Motorized volume control damper for individual operation of ductable split air conditioners</b>	14750 Incl.GST :18%	1032.5	15782.5
197	<b>Supply, installation, testing and commissioning UPVC drain pipe 6kg/sq.cm of suitable dia connecting the drain pan of the indoor units to nearest drain point, with 12mm thick closed cell elastomeric insulation as per specification</b>	377.6 Incl.GST :18%	26.43	404.03
198	<b>Electrical Cabling between indoor and outdoor units, with required size cables/wires(Havells/RR Kabel/V-guard FRLS wires)</b>	383.5 Incl.GST :18%	26.85	410.35
199	<b>Outdoor unit stand with ribbed rubber pads for Ductable Split AC units</b>	9440 Incl.GST :18%	660.8	10100.8
200	<b>Charges for wall openings for accommodating the supply ducts including plastering, colour washing etc. as required.</b>	2950 Incl.GST :18%	206.5	3156.5
201	<b>SITC of 19 mm thick nitrile rubber for under deck insulation</b>	885 Incl.GST :18%	61.95	946.95
202	<b>4 KVA Voltage Stabilizer Wall mount type with Time delay, High &amp; low voltage &amp; Thermal overload protection, Input voltage: 170-220V, Output Voltage : 200-240V, High Voltage Cut Off : 240V, Efficiency: 95%, Frequency : 50Hz, V guard VG 500 or Equivalent</b>	7670 Incl.GST :18%	536.9	8206.9
203	<b>Supply, Conveyance testing and commissioning of 2 Ton 5 Star Inverter Type, split AC unit with Copper Tube cooling coils, 5 star rating Bluestar/LG(Dual Inverter Type)/Voltas/Mitsubishi or Superior Superior brands, Cooling Capacity 6000 KW/hr with rotary/scroll type compressors. with microprocessor controlled code less remote, CFM above 500/450, LED/LCD Display</b>	75933 Incl.GST :18%	5315.31	81248.31
204	<b>Supply, Conveyance testing and commissioning of 1.5 Ton 5 Star Inverter Type, split AC unit with Copper Tube cooling coils, 5 star rating Bluestar/LG(Dual Inverter Type)/Voltas/Mitsubishi or Superior brands, Cooling Capacity 3000 KW/hr with rotary/scroll type compressors. with microprocessor controlled code less remote, CFM above 500/450, LED/LCD Display</b>	73337 Incl.GST :18%	5133.59	78470.59
205	<b>Supporting Stand for Fixing Outdoor Unit(Powder coated) suitable for 1/1.5/2 TR Split AC units</b>	2950 Incl.GST :18%	206.5	3156.5

Item-wise Price Details				
206	<b>Additional Copper Pipe with Superlon Insulation for Suction and Discharge suitable for 1/1.5/2 TR Split AC units(Qy shall be measured for exceeding the 3 mtr supplied along with AC Units)</b>	1475 Incl.GST :18%	103.25	1578.25
207	<b>AC Drain Pump suitable for 1/1.5/2 TR Split AC units</b>	10030 Incl.GST :18%	702.1	10732.1
208	<b>24-Port Gigabit manageable smart Network Switch with 2 SFPs. Rack mountable</b>	43070 Incl.GST :18%	3014.9	46084.9
209	<b>Patch panel - 24-Port patch panel with cable tray. Rack mountable</b>	8024 Incl.GST :18%	561.68	8585.68
210	<b>4U Rack- Wall Mountable including 4x 6Amp power distribution box</b>	14160 Incl.GST :18%	991.2	15151.2
211	<b>Supply of branded 1mtr patch cords with cat 6 cable.</b>	413 Incl.GST :18%	28.91	441.91
212	<b>Supply of branded 2mtr patch cords with cat 6 cable.</b>	413 Incl.GST :18%	28.91	441.91
213	<b>Supply of branded 3mtr patch cords with cat 6 cable.</b>	531 Incl.GST :18%	37.17	568.17
214	<b>Shed for Chiller - 0.5mm thick Aluminium sheet including truss work, post to be provided for the chiller area. Painting to be done for structures</b>	35400 Incl.GST :18%	2478	37878
215	<b>Additional Iron shielding if any</b>	13570 Incl.GST :18%	949.9	14519.9
216	<b>MR Compatible pipe for medical gas 12mm</b>	1858.5 Incl.GST :18%	130.1	1988.6
217	<b>MR compatible outlet</b>	1209.5 Incl.GST :18%	84.67	1294.17
218	<b>MR compatible flowmeter with humidifier</b>	5310 Incl.GST :18%	371.7	5681.7
219	<b>MR compatible wall mounted suction jar</b>	5518 Incl.GST :0%	455.79	5973.79
220	<b>MR compatible probes</b>	2950 Incl.GST :18%	206.5	3156.5
221	<b>MR compatible bed head panels for 6 outlets</b>	34220 Incl.GST :18%	2395.4	36615.4



Item-wise Price Details				
222	<b>Supply &amp; laying of one number PVC insulated and PVC sheathed armoured aluminium power cable of 1.1KV grade of the following sizes in ground including excavation of trench of size 35 x 75 cm, refilling the trench etc. as required but excluding sand cushioning and protective covering (in ordinary soil). 3.5 core 300 sq mm</b>	2596 Incl.GST :18%	181.72	2777.72
223	<b>Supply &amp; laying of one number PVC insulated and PVC sheathed armoured aluminium power cable of 1.1KV grade of the following sizes in the existing RCC/ HUME / STONE WARE/ GI/ DWC pipe as required. 3.5 core 300 sq mm</b>	2360 Incl.GST :18%	165.2	2525.2
224	<b>Supply, laying and clamping of 1 no. PVC insulated and PVC sheathed armoured aluminium power cable, 1.1 KV grade of the following sizes using clamps noted along with the cables, spacing of clamps not exceeding 60cms, making good the damages , colour washing etc. as required. 3.5 core 300 sq mm</b>	2360 Incl.GST :18%	165.2	2525.2
225	<b>Bilateral Breast coil</b>	1523200 Incl.GST :12%	112336	1635536
226	<b>Dedicated high resolution knee coil</b>	2620800 Incl.GST :12%	193284	2814084
227	<b>Dedicated shoulder coil</b>	1523200 Incl.GST :12%	112336	1635536
228	<b>Dry Imager</b>	629627.94 Incl.GST :18%	44073.96	673701.9
229	<b>Supply, installation, testing and commissioning (SITC) of 2 No's 8.75 TR or higher capacity aircooled ductable split air conditioner with ceiling suspended IDU and all standard fittings, IDU SS drain pan, as per specifications complete with suitable capacity drive motor, air cooled condenser with all accessories, hermetically sealed scroll twin compressor, Evaporator coil have integrally finned copper tubes. The compressor should have independent refrigerent circuits, expansion devices , HP/LP cut off, electronic microprocessor pendant controller with digital display, first charge refrigerent gas, vibration isolator pads, structural supports for fixing IDU/ ODU as shown in the drawing, safety devices including thermal protector, pressure relief valve, over load relays single phase preventor, wired remote control etc, power wiring(max 3m from isolator) and control cabling(indoor to outdoor),thermostat wiring, high-low pressure cut out, suitable for three phase 440V supply etc complete as required. (not taken for evaluation)</b>	493240 Incl.GST :18%	34526.8	527766.8

Item-wise Price Details				
230	<b>Supply, installation, testing and commissioning (SITC) of 2 No's 5.5 TR or higher capacity aircooled ductable split air conditioner with ceiling suspended IDU and all standard fittings, IDU SS drain pan, as per specifications complete with suitable capacity drive motor, air cooled condenser with all accessories, hermetically sealed scroll twin compressor, Evaporator coil have integrally finned copper tubes. The compressor should have independent refrigerent circuits, expansion devices , HP/LP cut off, electronic microprocessor pendant controller with digital display, first charge refrigerent gas, vibration isolator pads, structural supports for fixing IDU/ ODU as shown in the drawing, safety devices including thermal protector, pressure relief valve, over load relays single phase preventor, wired remote control etc, power wiring(max 3m from isolator) and control cabling(indoor to outdoor),thermostat wiring, high-low pressure cut out, suitable for three phase 440V supply etc complete as required. (not taken for evaluation)</b>	350460 Incl.GST :18%	24532.2	374992.2
231	<b>Pressure injector dual head with syringes (MR compatible)</b>	2050102.88 Incl.GST :12%	151195.09	2201297.97
232	<b>IV stand (MR compatible)</b>	26906.95 Incl.GST :18%	1883.49	28790.44
233	<b>Patient trolley (MR compatible)</b>	161442.88 Incl.GST :18%	11301	172743.88
234	<b>Music System with speakers</b>	33633.54 Incl.GST :18%	2354.35	35987.89
235	<b>Hand held metal detector</b>	10762.78 Incl.GST :18%	753.39	11516.17
236	<b>Metal detector door</b>	248891.5 Incl.GST :18%	17422.41	266313.91
237	<b>Wheel Chair (MR Compatible)</b>	125118.94 Incl.GST :18%	8758.33	133877.27
238	<b>Digital Patient weighing scale</b>	13453.77 Incl.GST :18%	941.76	14395.53
239	<b>UPS whole system of suitable capacity</b>	1181276.76 Incl.GST :18%	82689.37	1263966.13
240	<b>Fire extinguisher MR compatible</b>	72649.06 Incl.GST :18%	5085.43	77734.49
241	<b>Desktop computer with monochrome printer, UPS as per spec</b>	289252.22 Incl.GST :18%	20247.66	309499.88
242	<b>Instrument trolley (MR compatible)</b>	1089740.62 Incl.GST :18%	76281.84	1166022.46

Item-wise Price Details				
243	<b>MR Compatible Stethoscope</b>	51077.6 Incl.GST :12%	3766.97	54844.57
244	<b>Multiparameter monitor (MR Compatible)</b>	4150090.56 Incl.GST :12%	306069.18	4456159.74
245	<b>Clamps (MR Compatible)</b>	13453.18 Incl.GST :18%	941.72	14394.9
246	<b>Generator of suitable capacity</b>	1517564.96 Incl.GST :18%	106229.55	1623794.51
247	<b>11.48.2 : Grouting the joints of flooring tiles having joints of 3 mm width, using epoxy grout mix 0.70 kg of organic coated filler of desired shade (0.10 kg of hardener and 0.20 kg of resin per kg). including filling /grouting and finishing complete as per direction of Engineer-in-charge.Size of Tile 600x600 mm</b>	177 Incl.GST :18%	12.39	189.39
248	<b>11.48.3 : Grouting the joints of flooring tiles having joints of 3 mm width, using epoxy grout mix 0.70 kg of organic coated filler of desired shade (0.10 kg of hardener and 0.20 kg of resin per kg). including filling /grouting and finishing complete as per direction of Engineer-in-charge.Size of Tile 800x800mm</b>	171.1 Incl.GST :18%	11.98	183.08
249	<b>50.9.1.1 : Providing wood work in frames of doors, windows, clerestory windows and other frames, wrought framed and fixed in position with hold fast lugs or with dash fasteners of required dia &amp; length (hold fast lugs or dash fastener shall be paid for separately), using good quality Anjili wood /jack wood</b>	152220 Incl.GST :18%	10655.4	162875.4
250	<b>50.9.2.1 : Providing and fixing paneled and glazed shutters for doors, windows and clerestory windows, 35 mm thick shutters including ISI marked M.S. pressed butt hinges bright finished of required size with necessary screws, excluding panelling which will be paid for separately, all complete as per direction of Engineerin - charge.using Anjili/ Jack wood</b>	7316 Incl.GST :18%	512.12	7828.12

Item-wise Price Details				
251	<b>21.1.1.2 : Providing and fixing aluminium work for doors, windows, ventilators and partitions with extruded built up standard tubular sections/ appropriate Z sections and other sections of approved make conforming to IS : 733 and IS: 1285, fixing with dash fasteners of required dia and size, including necessary filling up the gaps at junctions, i.e. at top, bottom and sides with required EPDM rubber/ neoprene gasket etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminium snap beading for glazing /paneling, C.P. brass/ stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge.(Glazing, paneling and dash fasteners to be paid for separately):For fixed portion Powder coated aluminium (minimum thickness of powder coating 50 micron)</b>	613.6 Incl.GST :18%	42.95	656.55
252	<b>21.2.2 : Providing and fixing 12 mm thick prelaminated particle board flat pressed three layer or graded wood particle board conforming to IS : 12823 Grade I Type II, in panelling fixed in aluminum doors, windows shutters and partition frames with C.P. brass / stainless steel screws etc. complete as per architectural drawings and directions of Engineer - in- Charge.Pre- laminated particle board with decorative lamination on both sides</b>	1475 Incl.GST :18%	103.25	1578.25
253	<b>21.1.2.2 : For shutters of doors, windows &amp; ventilators including providing and fixing hinges / pivots and making provision for fixing of fittings wherever required including the cost of EPDM rubber/ neoprene gasket required (Fittings shall be paid for separately) Powder coated aluminium (minimum thickness of powder coating 50 micron)</b>	613.6 Incl.GST :18%	42.95	656.55
254	<b>od329872/2020_2021 : Supplying and fixing flush door shutter, shutter of required size, thickness 30mm thick, finished with 1 mm laminate of approved shade with clear glass vision panels as per design including necessary hinges &lt;br&gt;</b>	6372 Incl.GST :18%	446.04	6818.04
255	<b>od329873/2020_2021 : Frosted film - Supply and installation of 3M make frosted film pattern throughout all the internal glass panels wherever required of approx. 1.5 m height as per the approved pattern.&lt;br&gt;</b>	944 Incl.GST :18%	66.08	1010.08

Item-wise Price Details							
256	od329874/2020_2021 : Providing and fixing extruded section body tubular type universal hydraulic door closer(having brand logo with IS: 3564, embossed on the body, door weight upto 36 kg to 80 kg and door width from 701 mm to 1000 mm), with double speed adjustment with necessary accessories and screws etc. complete			2006 Incl.GST :18%	140.42	2146.42	
				<b>102405595.88</b>	<b>7518789.32</b>	<b>109924385.2</b>	
Annual / Comprehensive Maintenance Charges (Exl.Tax)							
Rate	4 <sup>th</sup> Year	5 <sup>th</sup> Year	6 <sup>th</sup> Year	7 <sup>th</sup> Year	8 <sup>th</sup> Year	9 <sup>th</sup> Year	10 <sup>th</sup> Year
<b>MRI Machine 1.5 Tesla Normal Bore</b>							
Labour	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Comprehensive	45,25,000.00	47,28,625.00	49,41,413.13	51,63,776.72	53,96,146.67	56,38,973.27	58,92,727.07

### Other terms & conditions

1. The supplier shall execute an agreement with the purchaser as per tender conditions (agreement format is given in the tender document).
2. The supplier shall submit performance security amounting to 5.00% of the value of the supply order.
3. The labour & comprehensive charges of equipment after the completion of warranty period is finalized by KMSCL as mentioned above.
4. Since discount rate is not applicable for equipment under Running Contract of KMSCL, purchase/supply order can be issued directly to supplier at the given rate with tax & other charges (exclusive of KMSCL service charges).
5. If purchase/supply order is issued directly to the supplier, KMSCL service charge need not be paid. But the copy of the said order may be forwarded to KMSCL for information.

### Technical Specification

#### Equipment :MRI Machine 1.5 Tesla Normal Bore

#### Item Name: MRI Machine 1.5 Tesla Normal Bore

S.N	Description
1	<b>Magnet</b>
a	Actively shielded super-conducting magnet with operational field strength of 1.5 Tesla suitable for high resolution imaging
b	The length of magnet should be short and it should have at least 60cm. patient bore with flared opening.
c	The homogeneity of the magnet (in PPM) should be mentioned in relation to 10, 20, 30, 40 cm DSV
d	The Magnet should be well ventilated and illuminated with 2 way intercom for communication with patient.
	Cryogen vessel to be of Helium only with appropriate super thermal shielding & refrigeration facility for minimum

e	helium boils off. Specify the helium tank capacity & boil-off rate
f	Helium level monitoring equipment in the magnet & facility for appropriate quick shut down of the magnet in the event of emergency
g	Helium refill time should not be < 2 years. Please mention the helium refill time
2	<b>Shim System</b>
a	High performance & highly stable shim system with global & localised manual & auto-shimming for high homogeneity magnetic field for imaging. Specify time for shimming. Quote the number of shim coil used.
b	Specify the minimum time for auto-shim(global and voxel shim)of the magnetic field with patient in position.
3	<b>Gradient System</b>
a	Actively shielded Gradient system.
b	The gradient should be actively shielded with each axis having Independently a slew rate of atleast 100T/m/s and a peak amplitude of 30mT/m.
c	The Gradient system should have provision for efficient and adequate eddy current compensation.
d	Effective cooling system for gradient coil and power supply.
4	<b>RF SYSTEM</b>
a	A fully digital solid-state RF system capable of transmitting power of at least 10KW
b	It must have at least minimum of 16 independent digital RF receiver channels with each having bandwidth of 1 MHz or more along with necessary hardware to support Quadrature / CP array /Matrix coils.
c	It should support Parallel acquisition techniques with a factor of upto 2 in 2D.
d	It should allow remote selection of coils and/or coil elements
5	<b>COIL SYSTEM</b>
a	The main body Coil integrated to the magnet must be quadrature /CP. <b>The rate for the below mentioned items shall be included with the main equipment cost</b>
1	Multichannel Head coils with at least 12 channels for high resolution Brain imaging. (16 channel coil should be supplied whenever available to the vendor with no additional cost)
2	General purpose Flexible coils and circular coils
3	Coil Storage Cart
4	Neuro -vascular coil with 15 or more channels of Head/Neck coil combined, capable of high resolution neurovascular imaging. Maximum achievable FOV should be mentioned.
5	Spine Array/Matrix coils for thoracic and lumbar spine imaging ( 12 or more channels)
6	Body Array/Matrix coils with at least 45 cm Z axis coverage for imaging of abdomen, angiograms and heart. ( 12 or more channels).
7	The cost for the following items are included in the cost of MRI Machine and shall be supplied along with the machine - Work Station, Suitable chiller system with all connections, RF Cage, Patient comfort kit as per spec, Phantoms for regular QA
8	Suitable coil for peripheral angiography application.
	Rate for the below mentioned coils shall be quoted separately in BOQ

9	Dedicated Cardiac coil (Optional-Price to be quoted separately if available which will not be taken for evaluation)
10	Bilateral Breast coil with at least 4 channels or more.
11	Dedicated High resolution knee coil ( 8 channels or more)
12	Dedicated shoulder coil (6 channels or more).
	The system should be continuously monitor the RF coils used during scanning to detect failure modes. RF coils should not require either setup time or coil tuning; Multi coil connection for up to 2 or more Mutinous scanning without patient repositions should be quoted as standard.
<b>6</b>	<b>PATIENT HANDLING SYSTEM</b>
a	Computer controlled patient table (suitable for whole body) movement in vertical and horizontal direction. Patient table should have facility for moving table angiography.
b	The table should be able to take at least 150 kg patient load.
c	Emergency manual traction of the patient from the magnet.
d	The table should have patient auto audio alarm system.
e	The CCTV system with LCD display to observe the patient (OPTIONAL)
f	Two way communications should be possible with the patient from the console room.
<b>7</b>	<b>COMPUTER SYSTEM IMAGE PROCESSOR /OPERATOR CONSOLE</b>
a	Computer should be latest in the industry, fast and efficient,
	Largest field of view should be at least 45 cm in all three axis
b	One color console for acquisition. All calculations, post processing etc Console must have full colour screen with user define protocols with programmable inter scan delay
c	Necessary image processor with large RAM for ultra-fast image reconstruction should be provided. It should be at least 2 GB RAM. Please specify.RAM and reconstruction speed in images per second for full FOV 256 matrix. Higher will be preferred.
e	The main host computer should have at least 19-inch TFT/LCD type color monitor with 1024 x 1024 display matrix size.
f	The main console should have facility for music system for the patient in the magnet room.
g	Filming and adequate storage for images and other applications
h	Total hard disk memory to be sufficient to store at least 200,000 images of 256 x 256 matrix data size. Systems offering higher' storage will be preferred. The system should have CD/DVD archiving facility on the main console and workstation.
i	Dual DVD write/CD Read/Rewrite drive for writing of images, spectra and raw data along with the necessary software for reading the Images and spectra on DVD/CD storing capabilities. Provision for archival of k-space data and raw (unprocessed) images.
j	DICOM interface to hook DICOM dry/laser camera capable of storing printing 1024 x 1024 matrix size images at least in 16 format without loss of digital resolution.
k	The system should be capable to connect to PACS through RIS/HIS at no extra cost. Highest version of DICOM connectivity be provided.
l	Automatic software updating should be done as and when available for the particular model during the period of warranty and CMC

<b>8</b>	<b>WORKSTATION</b>
a	One work station with 24"LCD/LED/TFT color monitor- 1280 X 1024 pixel resolution monitor with dual exam processor with at least 8 GB RAM (expandable),separate hard disk with image storage of at least 2.0 lacs images in 256 x256 matrix with C DRW or DVDRW.Hard disk storage 1TB or higher.CD/DVD/Blueray writer to be included.
b	All necessary software in including post-processing software for all offered applications (point no. 9,10) perfusion, diffusion DTI (with software), cardiac evaluation, and other associated post processing like MIP, MPR, surface reconstruction should be provided. The workstation should have availability of Cardiac (optional), perfusion analysis & Processing of Real Time  BOLD imaging data, with color metabolite mapping, quantification of the CSF flow date. Complete 3D reformation package.
c	The workstation should have display of Cardiacine images in movie mode with rapid arccreation.
d	Printing of films should be possible from both main console and workstation.
e	Workstation should also be able to have the similar function and user interface of the main console and from the same OEM Company. Workstation to be provided with a workstation table and two nos of ergonomically designed operator chair.
<b>9</b>	<b>DATA ACQUISITION</b>

a	The system should be capable of 2D and 3D ACQUISITIONS in conventional, fast &ultra-fast spin echo and gradient echo modes so that real- time online images can be observed if needed.
b	2D multi-slice imaging should be possible in all planes (axial,sagital, coronal, oblique arid double oblique).
c	1024 x 1024 matrix acquisition for all applications
d	Half Fourier or other techniques to reduce scan acquisition time while maintaining adequate SNR
e	3D volume,multiple contiguous slabs,multipleinterleavedand multiple over lapping slabs
f	Slice thickness in 2D and partition in 3D to be freely selectable
g	Dynamic acquisition (serial imaging with capability to initiate scan sequences either from the magnet panel or from the console.
h	Dynamic acquisition' number of repeat scans with delay time either identical time interval or selectable.
i	Auto slices positioning from the localizer images.
j	Maximum-off center positioning both anterior-posterior and lateral direction and should be selectable.
<b>10</b>	Gating: physiological signals like ECG, pulse, respiratory, external Signal triggering (interface for triggering in put pulse from external source).
a	Simultaneous acquisition, processing and display of image data in 2D multi-slice mode.
b	The application software for image smoothing and edge sharpness etc.for improvement in image re solution should be quoted.
c	Artifact reduction/motion correction techniques/imaging enhancement/image filtering/image subtraction / addition multiplication / division techniques:
d	Flow 1st and 2nd order flow artifact compensation.
e	presentation slabs: a number of relocatable saturation bands to be placed either inside or outside the region of



	interest.
f	Graphic prescription.
g	Fat saturation techniques frequency selective RF pulses to suppress fat signal in the measured image FOV. ROI selective (regional) fat suppression should also be given.
h	Magnetization transfer saturation; OFF resonance RF pulses to suppress signals from stationary issue in FOV.
i	Phase contrast capability in 2D and 3D mode.
j	Image intensity correction.
k	Breath hold acquisition
<b>11</b>	<b>EPI MODE</b>
a	Single and multi shot EPI imaging techniques.
b	Data acquisition in all three standard planes (axial,sagittal,coronal) and oblique and double oblique planes.
c	Higher matrix acquisition capability in single shot EPI, Acquisition time, TR ,TE and slice thickness should be clearly mentioned and supported by data sheet reference.
	<b>IMAGING SEQUENCES</b>
12	
a	The system should be capable of selecting TR and TEs as per requirement in majority of the pulse sequences.
b	Spin echo (SE); multi-slice single echo, multi slice multi echo (B echo or more) with minimum TR and TE. SE with symmetrical and a symmetrical echo intervals: MT-SE imaging sequence.
c	Inversion recovery (IR) including short TI, modified IRSE, FLAIR, DIR (Double Inversion Recovery) MT and FLAIR.
d	Gradient echo(GE) 3D gradient echo with shortest TR and TE ,free choice of flip angle selection while maintaining SNR
e	Fast Sequences
I	Fast spin echo in 2D and 3Dmode TI, T2 and PD contrast capable of acquiring maximum number of slices with a given TR a minimum TE. echotrains should beat least 128 or more in fast spinecho mode.
II	Half Fourier acquisition capabilities should be available with/without diffusion gradients and in combination with fast spin echo.
III	Fast inversion recovery with spin echo.
IV	Fast gradient spin echo, IR multi-slice multi-echo mode with maximum turbo factor. Sequence should incorporate RF focusing to acquire ultra fast gradient spin echo.
V	Fast gradient echo sequence should be provided to acquire images in ultra-fast 2D and 3D mode.
VI	Fat and water suppressed imaging sequences including the sequence which should give 4contrast(in phase, opposed phase, FAT and Water) images in a single acquisition to be quoted as standard.
VII	EPI optimized sequences for T1, T2, PD imaging, perfusion, regular diffusion values (5b, 3 directions), EPI-FLAIR. CPIIR, IPI-FLAIR diffusion tensor. EPI-MT-FLAIR, tensor diffusion (5b values in minimum in six directions) for diffusion studies. Suitable artifact/fat suppression techniques to be incorporated in the sequence to have optimum image quality. There should be capability of generation of ADC map (isotropic and anisotropy from the regular diffusion and tensor data). Facility of generation of ADC map should be there
f	Optimized sequence package for special applications.

I	NMR angio: 2D/3D TOF, 2D/3D Phase contrast (with and without gating) magnetization transfer saturation, black board angiography for cerebral, pulmonary, abdominal and peripheral vessel for peripheral angio moving table angiography should be offered so that complete limb can be examined in one go Bolus tracking software package should be offered. Sequences for breath hold angiography with contrast enchainment should also be offered.
II	NON Contrast Angiography like Native, Inhance, Trance for whole body applications to be quoted as standard.
III	Contrast bolus tracking (including single shot whole body MRA, interactive and automatic, etc.
IV	The system should have the Hydrogen, Single Voxel spectroscopy, Multivoxel, multislice 2D, 3D Spectroscopy and also the Chemical shift imaging in 2D/3D. The complete processing / post –processing software including color metabolite maps should be available. System shouldbecapableofwholebodydiffusionof200cmlength.

	Full comprehensive cardiac sequences which includes
(a)	MR cardiology package fo revaluation of heart in long and short axis with black blood cardiac imaging,
(b)	Package for–prospective and retrospective gating, etc.(Optional- Price to be quoted separately)
VI	Advanced Cardiac Applications: morphology, wall motion, perfusion imaging myo cardial viability imaging, Cardiac functions including EF,ED/ES volume, Cardiac output ,wall thickness.(Optional-Prictobe quoted separately)
VII	Sequence package for whole body diffusion study in organs like brain, kidney, muscle, heart,etc
	Perfusion study in organ systems like kidney, brain , heart etc.
VIII	Evaluation package for calculating CBV, CBF, MTT, perfusion map etc.
IX	Flow quantification in vessels and CSF, hepatobiliary system
X	Optimized breath hold sequences for abdominal studies including angiogram.
XI	Sequence package for functional mapping of brain.
XII	Internal ear imaging.3D acquisition slike CUBE, SPACE, 4D VISTA to be quoted as standard.
XIII	MRChol angiography and Pancreatogram:Specialized sequences and processing to perform MRCP.
XIV	Pulmonary 2D/3D MRA sequence, including single breath hold Sequence.
XV	MR ventriculography and cisternography, Myelography.
XVI	FATSAT Techniques : Dixon method to be quoted as standard (eg. Dixon, 3D Dual Echo, Ideal etc).
XVII	Parallel acquisition technique such as SENSE, SMASH ,ASSET, IPAT, ARC and other new sequences to be quoted as standard.
XVIII	Specify the factor by which the acquisition time is reduced for similar acquisition with and without parallel imaging technique. A scan time reduction factor of 4 for head, body, cardiac, angio andortho application is required.
XIX	Flow quantification packages for CSF with dynamic CSF flow imaging, aqueduct. and spinal canal
	In-line motion correction for un cooperative’ patients/ pediatric applications That Is motions/patient movement

XX	correction sequence and algorithm (not just faster scanning or parallel imaging techniques) for non cooperative/ sick patients/children should be provided.
<b>13</b>	<b>POST PROCESSING AND EVALUATION:</b>
a	3D Multi planar reconstruction(MPR) in any arbitrary plane including curved planes with freely selectable Slice thickness s and slice Increments.
b	3D Surface reconstruction and evaluation on reconstructed images with minimum time.
c	MIP in 2D and 3D mode, targeted / segmented MIP in any orthogonal axis with minimum processing time and capable of displaying in cine mode.
d	Full cardiac evaluation Operator selective or automatic contour mapping and calculation of Cardiac parameters like wall thickness, stroke volume EF, filling rate myocardial wall motion including display of data in label, graph and in cine mode, blood flow quantitation, velocity mapping, pressure gradient quantification, shunt quantification, regurgitation calculation, stenosis blood flow, etc. These should be usable on main or on the work station. (Optional- Price to be quoted separately)
e	Evaluation and display of diffusion images
f	Full Perfusion imaging with necessary post processing with time intensity graph and other statistical parameters.
g	Flow quantification and evaluation for vascular(high and low).CSF bladder outlet and cine display
h	Image statistics: measurement of distance, area, volume (2D and 3D), angle ,sd, mean, image addition subtraction, multiplication, division, interpolation, segmental, threshold, histogram (ROC)
i	Evaluation features like zoom, rotation, scroll, image synthesis, multi point T1 and T2 calculation (more than 8) window searching, text dialogues graphics. Sorting, searching, archiving, recalling, etc.
<b>14</b>	<b>UPS</b>
	The system should be provided with the suitable UPS system for the complete system (MR + accessories supplied) with at least 30 minutes back up. Suitable Chiller to be provided.  GENERATOR An automatic generator with adequate capacity to run the MR scanner, UPS, AC units etc. must be provided. The generator must be from noise free from reputed firms. Rate for Generator shall be quoted separately in BOQ which will be taken for evaluation.
<b>15</b>	<b>DOCUMENTATION</b>
a	The dry imaging system should have digital DICOM 3.0 dry chemistry camera with resolution of 500 dpi or more . A color laser printer for printing color images and protocols on plane in 1200 dpi resolution and more than 20 ppm.
b	The camera must be DICOM compatible (attach conformance statement)
c	The system must be able to process up to 100 films / hour (Min) depending on the size.
d	The system must deliver its first film within 80 seconds from request.
e	The system must have contrast resolution of 500 Dpi or more
f	The system must have a t least three online film sizes, and should be capable to print on any of the 8x10, 10x12, 11x14, 14x17 sizes.
g	The system must not involve any wet process and must give a dry film in single stage (without any users intervention) functionally

h	Start up time should be less than 10 minute
i	Easy day light loading.

j The system should be freely configurable by the user, to use any of the above mentioned size.

**16A ACCESSORIES**

a Must have independent dual Syringe Pressure injector of reputed make (Med-Rad) with following features; Non- ferrous, automatic syringe size detection, performs single/dual phase contrast injections, provides Saline flush delivery and allows timed contrastdelivery. 100 nos compatible syringes with connectors should be provided. Must be able to observe progress of injection and view injection result. Desktop computer with laser inkjet printer and ups for reporting purpose – 2 nos

b Two non magnetic patient transfer trolleys should be provided

c Metal detectors three in number, two of which are handheld

d Phantoms to be provided for regular QA studies.

e Complete manuals and older necessary documentation should be provided.

Computer tables -2 nos along with chairs - 4 nos of reputed make

MR compatible pulse oximeter and instrument trolley -1 nos

MR compatible wheel chair- 1 nos

RF Cage - 1 Nos

**16B PATIENT COMFORT ACCESSORIES :**

A Soft mattress with head rest

b Support, positioning wedges

c Set of soft Velcro immobilization straps.

d MR compatible sandbags.

e Knee Hand held nurse call device.

**17 Warranty**

3 years warranty of complete MRI system along with all accessories supplied i.e. Camera ,AC, Chiller, UPS etc. The warranty should start from the day of complete satisfactory installation of equipment.

Please attach a complete list of spares which would be provided with the equipment

**18 CMC**

After warranty CMC for next 7 years for complete MR system and all that is supplied with the system including AC, camera, chiller, UPS etc. the warranty and CMC of machine would be extended by double the period of downtime of machine

**19 SPECIAL CONDITIONS**

In case the company can offer any other technical features which are better than these specifications of would be available at the time of machine is installed. Point wise technical compliance report supported along with original product data sheet must be submitted in all truthfulness and shall be the essence of the technical bid. In the absence of this the offer may liable to be rejected. The offered unit must be FDA approved. All operating and technical manual so main and sub system must be supplied in duplicate.

<b>20</b>	<b>Site Development / Turnkey Project</b>
a	The site will be provided along with requisite power supply & water connection by the purchaser
b	The vendor should visit the installation site before bidding to assess the turnkey costs
c	The selected vendor is requested to install the equipment after developing the site as per their requirement
d	It is the responsibility of the bidder to alter the site & to provide & finish the interiors of the rooms in all respects for successful installation & commissioning of the equipment to the satisfaction of the purchaser. The layout should be made in consultation with the purchaser
e	The turnkey includes complete civil & electrical works like site modifications, wall tiles, RF flooring, glass, air conditions, power DB box, false ceiling, lights, painting ,plumbing, furniture etc
f	RF cabin with best quality appropriate acoustic shielding
<b>21</b>	<b>MRI Compatible Multi parameter Monitor</b>
1	Should be able to monitor 6 channels ECG from 5 lead ECG, SPO2, NIBP, Respiration Rate and temperature.
2	Should be MRI Compatible, portable with carrying handle.
3	Should have touch screen TFT display with at least 12 inches or higher with at least 6 waveforms and numeric display simultaneously.
4	Should have Lithium ion battery with 3 hours battery backup
5	Should have keys for quick access to main functions.
6	Should have adult, pediatric and neonatal modes
7	Should provide prominent prioritized audio, visual alarms for high, low heart rate, SpO2, RR, low battery and lethal arrhythmia.
8	Recognition with detailed list (more than 15 parameters) in the monitor to set priority and ST Analysis
9	NIBP can be taken on manual/auto/stat modes.
10	Should provide following accessories
a	Reusable adult 5 lead ECG cable set – 1 no
b	Reusable adult and pediatric SPO2 finger probes – 1 each
c	Adult and pediatric NIBP cuff of different size
d	Rate of Reusable Neonatal SpO2 probe shall be quoted separately which will not be taken for evaluation
11	Should work on 200-240V AC/50Hz with inbuilt rechargeable battery
12	Should have safety certificate from a competent authority CE issued by a notified body registered in European Commission / FDA (US) / STQC CB certificate/ STQC S certificate or valid detailed electrical and functional safety test report from ERTL. Copy of the certificate / test report shall be produced along with the technical bid
13	Should have display perfusion index
14	Monitor should have networking facility with bidirectional & bed to bed communication
15	Equipment performance should not be affected by electromagnetic interferences radiated or conducted through power lines from another device
<b>22</b>	<b>TRAINING</b>
	Minimum 2 weeks of onsite training at the Hospital should be provided.

23	<b>NOTE</b>
1	Bidders may propose any product / system which is equivalent or better than the requirements specified above. Bidder should provide sufficient documents evidence to support such offer.
2	All equipment needing consumables must allow the possibility to use generic and /or locally made consumables and/or disposables. Compliance to this condition must be declared here by the bidders.
3	Bidder shall give his response to the Purchaser's requirements in the left column by furnishing a clause-by clause commentary on each parameter lines above. Bidder who comments with texts such as "Yes" , "Complied", Better, "Refer to catalogue", copying directly the purchaser's description leaving any parameter line blank and/or submit any text or content of this nature would be considered as NON-RESPONSIVE

















## TURNKEY SPECIFICATIONS

23.1 The specifications and mode of measurements for works shall be in accordance with C.P.W.D. Specifications 2009 Volumes I and II/MORTH/IRC with up to date correction slips unless otherwise specified in the nomenclature of individual item or in the individual item specification in the BoQ. The entire work shall be carried out as per the C.P.W.D./MORTH/IRC specifications in force with up to date correction slips up to the date of opening of tender.

23.2 For the item not covered under CPWD Specifications mentioned above, the work shall be executed as per latest relevant standards/codes published by B.I.S. (formerly ISI) inclusive of all amendments issued thereto or revision thereof, if any, up to the date of opening of tenders.

23.3 In case of B.I.S. (formerly I.S.I) codes/specifications are not available, the decision of the Engineer based on acceptable sound engineering practice and local usage shall be final and binding on the contractor.

23.4 However, in the event of any discrepancy in the description of any item as given in the schedule of quantities or specifications appended with the tender and the specifications relating to the relevant item as per CPWD specifications mentioned above, or in drawings the former shall prevail.

23.5 The work shall be carried out in accordance with the design and drawings of the Department. The drawings shall have to be properly correlated before executing the work. In case of any difference noticed between the drawings, final decision, in writing of the Engineer shall be obtained by the contractor. For items, where so required, samples shall be prepared before starting the particular items of work for prior approval of the Engineer and nothing extra shall be payable on this account.

23.6 All materials to be used on works shall bear I.S. certification mark unless specifically permitted otherwise in writing. In case I.S. marked materials are not available (not produced), the materials used shall conform to I.S. Code or CPWD specifications, as applicable in this contract.

23.7 In such cases the Engineer shall satisfy himself about the quality of such materials and give his approval in writing. Only articles classified as "First Quality" by the manufacturers shall be used unless otherwise specified. All materials shall be tested as per provisions of the Mandatory Tests in CPWD specifications and the relevant IS specifications. The Engineer may relax the condition regarding testing if the quantity of materials required for the work is small. Proper proof of procurement of materials from authentic manufacturers shall be provided by the contractor to the satisfaction of Engineer. Grade of cement used shall be OPC 43 Grade unless otherwise specified explicitly. The contractor shall get the Design Mix for RCC done by the labs approved by Engineer-in-Charge only. Reinforcement Steel used shall be of TMT Fe-500 unless otherwise specified.

23.8 In respect of the work of other-agencies deployed in the same site through a separate contract by the KMSCL for doing work like electrification, air-conditioning, external services, other building work, horticulture work, etc. and any other agencies simultaneously executing other works, the contractor shall afford necessary coordination and facilities for the same. The contractor shall leave such necessary holes, openings, etc. for laying / burying in the work pipes, cables, conduits, clamps, boxes and hooks for fan clamps, etc. as may be required for the electric, sanitary air-conditioning, fire fighting, PA system, telephone system, C.C.T.V. system, etc. and nothing extra over the agreement rates shall be paid for the same.

- 23.9. Unless otherwise specified in the bill of quantities, the rates for all items of work shall be considered as inclusive of pumping out or bailing out water if required for which no extra payment will be made. This will include water encountered from any source such as rains, floods, or due to any other cause whatsoever.
- 23.10. Any cement slurry added over base surface (or) for continuation of concreting for bond is added its cost is deemed to have in built in the item unless otherwise/explicitly stated and nothing extra shall be payable or extra cement considered with consumption on this account.
- 23.11. The rate for all items in which the use of cement is involved is inclusive of charges for curing.
- 23.12. The contractor shall clear the site thoroughly of all scaffolding materials and rubbish etc. left out of his work and dress the site around the building to the satisfaction of the Engineer before the work is considered as complete.
- 23.13. Rates for plastering work, if any (excluding washed grit finish on external wall surfaces) shall include for making grooves, bands, chicken wire mesh over joints etc. wherever required and nothing extra shall be paid for the same.
- 23.14. The rates quoted for all brick/concrete work shall be deemed to include making openings and making good these with the same specifications as shown in drawings and/or as directed. No extra payment shall be made to the contractor on this account.
- 23.15. Rates for all concrete/plaster work shall include for making drip course moulding, grooves etc. wherever required and no extra shall be paid for the same.
- 23.16. Rates for flooring work shall include for laying the flooring in strips/as per sample or as shown in drawings wherever required and nothing extra shall be paid for the same.
- 23.17. The drawing(s) attached with the tender documents are for the purpose of tender only, giving the tenderer a general idea of the nature and the extent of works to be executed. The rates quoted by the tenderer shall be deemed to be for the execution of works taking into account the "Design Aspect" of the items and in accordance with the "Construction Drawings" to be supplied to the Contractor during execution of the works.
- 23.18. The quoted rate shall be for finished items and shall be complete in all respects including the cost of all materials, labour, tools & plants, machinery etc., all taxes, duties, levies, octroi, royalty charges, statutory levies etc. applicable from time to time and any other item required but not mentioned here involved in the operations described above. The KMSCL shall not be supplying any material, labour, plant etc. unless explicitly mentioned so.
- 23.19. There could be some restrictions on the working hours, movement of vehicles for transportation of materials and location of labour camp. The contractor shall be bound to follow all such restrictions and adjust the programme for execution of work accordingly.
- 23.20. The contractor shall also ensure that all work sites within the site are properly cordoned off by means of barricades and screens up to a height of 3.0 m above ground level at his own cost. The contractor shall use pre-coated GI sheets which are in good condition mounted on steel props.
- 23.21. Stacking of materials and excavated earth including its disposal shall be done as per the directions of the Engineer-in-Charge. Double handling of materials or excavated earth if required shall have to be done by the contractor at his own cost.
- 23.22. The Contractor will have to take prior approval of the Engineer/ Architect for the Make of materials before procurement of the same. It may also be noted that if any of the makes does not comply with Standards, it will not be allowed to use. No claim what so ever shall be entertained on this account.
- 23.23. The contractor shall clear the site of all rubbish, remove all grass and low vegetation and remove all bush wood, trees, stumps of trees, and other vegetation only after consultation with the Engineer-in-charge as to which bushes and trees shall be saved.
- 23.24. The contractor shall carry out the survey of the site and shall establish sufficient number of grids and level marks to the satisfaction of the Engineer-in-charge, who shall decide on the basis of this information, the general levels of the construction works.
- 23.25. Prior to commencement of construction, the contractor shall in consultation with the Engineer-in-charge, establish several site datum bench-marks, their number depending on the extent of the site. The bench-marks shall be sited and constructed so as to be undisturbed throughout the period of construction.
- 23.26. The Engineer-in charge might have got the soil investigation done and if so, copy of the report will be handed over to the

contractor for their scrutiny upon specific request by the Contractor. The contractor shall however inspect the site and study the findings from the trial pits or bores in order to assess the problems involved in and methods to be adopted for excavation and earthwork. The contractor shall ascertain for himself all information concerning the sub-soil conditions, ground water table levels and intensity of rainfall, flooding of the site and all data concerning excavation and earthwork. The KMSCL shall not be responsible for any later claims of the contractor for any extra work required to be done on account of this and shall not pay any extra amount in this regard.

23.27. The contractor shall set out the works using Total Station and during the progress of the building shall amend at his own cost any errors arising from inaccurate setting out. During the execution of the work contractor must cross check his work with the drawings. The contractor shall be responsible for all the errors in this connection and shall have to rectify all defects and/or errors at his own cost, failing which the Engineer-in charge serves the right to get the same rectified at the risk and cost of the contractor.

23.28. Cleaning up and handing over:- Upon completion of the work all the areas should be cleaned. All floors, doors, windows, surface, etc. shall be cleaned down in a manner which will render the work acceptable to the Engineer-in-charge. All rubbish due to any reason, shall be removed daily from the site and an area of up to ten metres on the outer boundaries of the premises will be cleaned by the contractor as a part of the contract. Upon completion of the project, the contractor shall turn over to the Engineer-in charge the following:

- a) Written guarantee and certificates
- b) Maintenance manuals, if any, and
- c) Keys.

23.29. Samples :- The contractor shall submit to the Engineer-in charge samples of all materials for approval and no work shall commence before such samples are duly approved. Samples of materials for concrete works, masonry units, building insulation, finished hardware, door and windows, flooring materials etc. and every other work requiring samples in the opinion of the Engineer-in charge shall be supplied to the Engineer-in-charge, and these samples will be retained as standards of materials and workmanship. The cost of the samples shall be borne by the contractor. Throughout this specification, types of material may be specified by manufacturers' name in order to establish standard of quality, price and performance and not for the purpose of limiting competition. Unless specifically stated otherwise, the tenderers may assume the price of 'approved equivalent' except that the burden is upon the contractor to prove such equality, in writing.

23.30. Tests :- All materials and methods of tests shall conform to the latest rules, regulation and/or specifications as per the provisions laid out in the PWD Quality manual and Laboratory Manual. The Engineer-in charge will have the option to have any of the materials tested and if the test results show that the materials do not conform to the specifications, such materials shall be rejected. A reasonable number of representative tests will be deemed to be included in the rates tendered.

23.31. Mode of Measurements:- All measurements will be taken in accordance with IS 1200 latest issue unless otherwise specified. The method of measurements shall be as detailed in clause

23.32. The rates tendered by a Bidder for the work shall include the cost of :

- a) All labour and supervision thereof, all materials, tools, implements and plant of every description, ladders, cordage tackle, etc. as well as the provision of safe and substantial scaffolding required for the proper execution of the work in conformity with the various items of work;
- b) Supplying the requisite agency with necessary equipments, to set out the work as well as to afford facilities for such examination of the work as the KMSCL Officers may at any time consider desirable, as also to count, weigh and assist in the measurement or check measurement of the work or materials;
- c) Providing and maintaining all temporary fences, shelters, lights , watchmen and danger signals and such other precautions as are necessary for the protection of the work or materials, as well as to protect the public and those connected with the work from accidents at the site of, or on account of the work;
- d) All sheds, mortar mills and mixing platform of every kind required for the proper execution of the work according to the specifications;



e) All fees and royalties of materials and

f) Finally clearing away of all rubbish, surplus materials, plant etc. on completion of the work and dressing and leveling of and restoring the site to a tidy condition, prior to handing over the work to the KMSCL or his authorized assistant and also its maintenance until so taken over.

23.33. In the case of supplies of materials such as rubble, broken stones, gravel, sand etc. which may have to be measured prior to being used on the work, the Bidder must always stack or arrange them neatly on level ground or on ground cleared and levelled by him for the purpose in such manner as may be ordered by the Engineer -in-charge so that they may be easily susceptible of inspection and measurement, the cost of such clearing, leveling and stacking or arranging being included in the rates for work. Each stack must be straight and of uniform section throughout and of the dimensions specified by the Engineer -in-charge. Materials not stacked or arranged in accordance with instructions issued will not be measured and paid for.

23.34. Unless otherwise specifically provide for in the contract, the Bidder shall at his own cost keep all portions of the work free from water whether due to springs, or inclement weather and neat and sanitary condition and shall also see that drainage and sewage are prevented from entering the site of work or accumulating therein.

23.35. The Bidder shall be responsible for the proper use and bear the cost of protection of materials made over to him by the Department for use on the work and bear any loss from deterioration of from faulty workmanship or any other cause. The cost of materials thus allowed to deteriorate amounting as it does to and excess issue over sanctioned quantities, will be recovered at rates 20 percent over the actual cost.

23.36. The Bidder shall be responsible to see that the level or the other pegs, profiles, bench, marks masonry pillars or other marks set up by the KMSCL for guidance in the execution of the work are not disturbed, removed or destroyed, the will be replaced by the KMSCL at the cost of Bidder.

23.37. Any materials brought to the site of work, or any work done by the Bidder but rejected by the Engineer -in-charge as being not up to the specifications shall in the case of materials supplied be then and there removed from or broken up at the site of work, and in the case of work done, the dismantled or rectified at the expense of the Bidder, as may be ordered by the Engineer -in-charge.

23.38. In all cases whether so specified in the contract or not , the work shall be executed in strict accordance with the Bidder's accepted tender and these specifications and with such further drawings and specifications and orders as may from time to time be issued by the PWD.

23.39. Whenever the Bidder is ordered by the KMSCL or Engineer – in - Charge to execute any item of work which is not in the tender, it shall be the Bidder's duty to get a special price arranged for any item and to see that it is written in the work spot order book and that this order is initiated and dated by the Bidder and entered in the work spot order book and initialed both by the Bidder and the Engineer - in - charge ordering such extra item that Bidder shall have not claim for extra payment.

#### LIST OF APPROVED MAKE

1	Cement	Malabar, Ultra tech, Zuari, Ramco, ACC, India Cements or equivalent as approved
2	Steel	TATA, SAIL, TISCO, IISCO, VIZAG or equivalent as approved
3	Teak Wood	Best Quality Plantation teak
4	Hard wood	Best Quality treated jack, sal wood, Irul, Anjili, Thambakom
5	Vitrified tile	RAK, Johnson, Khajaria, Asian, Orient
6	Ceramic Tiles	RAK, Johnson, Khajaria, Asian, Orient
7	Cement Concrete floor tiles	Eurocon Tiles, Ultra Tiles , Excello or equivalent as approved
8	Integrated water proofing	India water proofing or equivalent as approved
9	Water proofing compound	Roffe, Fosroc, Sika, Pidilite or equivalent as approved
10	Paint, Distemper	ICI, Berger, Asian, Jotun, Garwar or equivalent as approved
11	Water Proof Cement paint	Super Snowcem, Supercem or equivalent as approved
12	Sealers	ICI, Berger, Asian or equivalent as approved
13	Wall Putty	Altek, NCL, Berger, ICI or equivalent as approved
14	Primer	Altek, Berger, Asian, ICI or equivalent as approved
15	Melamine Polish	Duco, MRF, ICI or equivalent as approved
16	Rolling shutter	Kaniampuram, Jacobs Engg. Works or equivalent as approved
17	Sanitary fittings	Hindware, Parryware , Cera or equivalent as approved

18	Plumbing Fixtures	Nova, Essco, Gem, Jaquar or equivalent as approved
19	Polyethylene Storage tank	Sintex or equivalent as approved
20	Door handles	Ozone, Godrej, Dorset or equivalent as approved
21	Door Hinges (Heavy Duty brass oxidized)	Hafele, Godrej (or) ozone equivalent as approved
22	Auto Closer Hinges	Blum, Hafele (or) ozone equivalent as approved
23	Draw sliders	Blum, Mepla, Grass (or) ozone equivalent as approved
24	Door closer, Floor Spring	Everite, Dyna, ozone, Door King (or) equivalent as approved
25	Anchor Fasteners	HILTI, Fischer or equivalent as approved
26	RCC Hume Pipe	Thuluvilanickal/Thirunelveli Spun Pipe, Michel & Michel or equivalent as approved
27	Gypsum	Saint Gobain Gypsum or equivalent as approved
28	Manhole cover	Neco, Areco or equivalent as approved
29	GI pipe & specials	Tata, Zenith, Jindal or equivalent as approved
30	PVC, CPVC, PPR pipe specials	Supreme, Finolex or equivalent as approved
31	CI pipe & specials	Electro steel, SAIL or equivalent as approved
32	CI valve	Kirlosker, L & T, Leader or equivalent as approved
33	MS pipe & specials	Tata, Zenith, Jindal or equivalent as approved
34	HDPE pipe & specials	Hashti, Manikya, Kodoor or equivalent as approved
35	Stainless steel sink	Diamond or equivalent as approved
36	SS Hand Rails	D Line, Sky Port or equivalent as approved
37	Galvalume Roofing sheet	LLOYD Insulations (India) Ltd, Tata Blue Scope, InterarchCrilColour Roof (India ) Ltd or equivalent as approved
38.	Clypboard false ceiling and suspension system	India Gypsum Ltd or equivalent as approved
39	Metallic Hardener	Kironite or equivalent as approved
40	Ball bearings	SKF, FAG, KOYO or equivalent as approved
41	Laminate	Formica, Greenlam, National, Century, Decolam, or equivalent as approved
42	Pre engineered Building system	Kirby, Tata Blue Scope Lloyd Insulation (India) Ltd or equivalent as approved
43	Plain float glass & Mirror	Saint Gobain, Asahi, Modiguard, Athul or equivalent as approved
44.	Marine Plywood & Veneer	Century, Tata Consowood, Kitply, Anchor, Green ply or equivalent as approved
45	Mortice locks/locks, Latch	Godrej, Hafele , ozone ,ECIE equivalent as approved,
46	Aluminium composite panel	Durabuild, Alcomex (Dongshine) or equivalent as approved
47	Polycarbonate	GE Lexan, Macrolux or equivalent as approved
48	Suncontrol firm	Garware, 3M or equivalent as approved
49	Bison board	Bison panel, PE or equivalent as approved
50	Aluminium extensions/sheets	Hindalco or equivalent as approved
51	Epoxy	Fosroc, STP Ltd, Cera-chem or equivalent as approved
52	Secondary Reinforcement	Recron3S or equivalent as approved
53	Silicon Sealant	Dow corning, GE Silicon or equivalent as approved
54	Particle board	Novapan (Exterior Grade) Jacksons (Exterior grade) or equivalent as approved
55	Steel Windows, Ventilators	Seccolor ECO 3000 Series, Madhu Industries or equivalent as approved
56	Aluminium Ceiling Panels	Armstrong or equivalent as approved
57	Centrifugal roof mounted fans	Kruger, System air Nicotra or equivalent as approved

## TECHNICAL SPECIFICATIONS – ELECTRICAL

### QUALITY OF MATERIALS

The contractor shall use only equipment and materials of approved make and quality in the work with ISI certificate. In case of items for which ISI certification is not available, the approval of KMSCL shall be obtained before arranging supply and installation. The equipment, Switchboards, Cables, Cable racks, Supports, Wiring conduits etc., should be installed as per IE rules, IS specifications

& standards.

#### Conformity to Standards

All components shall conform to relevant Indian Standard Specification, wherever existing. However, for conduits, wiring cables, piano switches and socket outlets, ISI marked materials shall only be permitted.

(b) The Indian Standards, including amendments or revisions thereof upto the date of tender acceptance, shall be applicable. All electrical works shall be carried out in accordance with the provisions of Indian Electricity Act, 1910 and Indian Electricity Rules, 1956, amended up to date.

(c) The works shall also conform to relevant Indian Standard Codes of Practice (COP) for the type of work involved.

(d) In all electrical installation works, relevant safety codes of practice shall be followed.

#### LT Panel Boards

##### General

The switch boards are to be fabricated by a firm having CPRI test certificate for short circuit rating and IP classification/temperature rise etc for similar panels.

##### Switch Board Construction

The switch boards are to be manufactured/assembled as per the latest BIS specifications, IP42 classification, Indian electricity rules, including special requirements of state/ Central Electrical Inspectorate and the detailed specifications mentioned. This shall be floor mounted, free standing type, suitable for indoor installation in dust, vermin and weather proof construction.

##### Housing Details

The SB shall be fabricated out of 14 SWG sheet steel. It shall be provided with hinged doors on the front with necessary handles and earthed using flexible copper conductor. The doors shall be provided with neoprene gaskets. Suitable channel base frame should be provided for the panel board.

Detachable gland plates of 3mm thick shall be provided at the bottom and top of the cable chamber, suitable for the termination of cables with compression type glands to the sizes as specified. Adequate space should be provided in the cable chamber for safe bending and termination of cables.

The enclosure shall be provided with lifting hooks, supporting legs and double earth terminals with double washers.

The switch board shall be in cubicle design (each feeder components are housed in individual cubicle) and fully compartmentalized having total segregation between each cubicle. Suitable cable and busbar alleys as well as separate metering and relaying compartments shall be provided. All components of the switch board shall be approachable from front. The Busbar chamber cover should be bolted type. The maximum operating handle/push button height of any feeder shall not be more than 1800 mm with reference to panel bottom. Supporting arrangement for dressing of power and control cables in cable alleys also shall be provided. The front openable/lockable door shall act as a cover for the switch boards. The busbar should be extendable at both ends. No busbar should be protruded in the cable alley.

##### Powder coating

All metal sheets shall undergo 7 tank metal treatment, thorough derusting-rinsing-degreasing-rinsing- phosphating-rinsing and then passivation. All metal surfaces shall be thoroughly cleaned and degreased to remove all scales, rust, grease and dirt. Fabricated structures shall be pickled and treated to remove any trace of acid. The undersurface shall be made free from all imperfections before undertaking powder coating.

Contractor shall obtain details of approved colour from the Engineer-in-charge before powder coating.

Panel finish shall be free from imperfections like pin holes, orange peels, run-off paint, etc.

All unpainted steel parts shall be cadmium plated or suitably treated to prevent rust, corrosion, etc.

Insulation resistance to earth:

This is to be measured with all fuse links in place, all switches, all lamps and appliance in position by applying a voltage not less than twice the working voltage (subject to a limit of 500V). Insulation resistance of the whole or any part of the installation to earth must not be less than 50 Megaohms divided by the number of outlets. In any case it should not be less than 1 Megaohm for the whole installation.

Insulation resistance between conductors:

Test to be made between all the conductors connected to one pole or phase conductor of the supply and all the conductors connected to the middle wire or neutral or the other pole or phase conductors of the supply. For this test, all lamps shall be removed and all switches put on. The result of the test must be 50 Megaohms divided by the number of outlets (point and switch positions). In any case it should not be less than 1 Megaohm for the whole installation.

Busbar sizing connection and supports:

The busbars shall be made from high conductivity electrolytic grade aluminium conductor conforming to IS 5082. The busbars and supports shall be capable of withstanding the rated and short circuit current as per the single line diagram/ feeder details. Minimum size of main power bus bars shall be of incomer switch rating and interconnecting busbar to feeders should be rated to switch rating. Maximum current density permissible for Aluminium bus bars shall be 0.8 Amps/Sq.mm without considering derating factors. An earthing busbar of minimum 150 sq.mm section copper shall be provided outside panel at bottom throughout the length of the panel.

The busbars shall be provided with heat shrinkable PVC insulating sleeve. Supports for busbars shall be made of suitable size cast resin ribbed insulators and these should be adequate in number so as to avoid any sag in the busbars. (Hylam supports may not be used)

Minimum clearance between phase to phase shall be 32mm and that between phase to neutral/ earth shall be 26 mm.

Power Connection

a) For power interconnections within the panel board

Rigid Aluminium conductor, with PVC insulation, of adequate cross section i.e., current carrying capacity not less than the outgoing switch rating shall be used. Cable lugs/ sockets of suitable size and type shall be used for all interconnections.

For incoming and outgoing feeders of the switch boards, Aluminum conductor cable will be used and hence the panel has to be designed for receiving these and wherever required cable boxes shall be provided in panel by removable gland plates and shall be provided on top/bottom of panel, for cable entries.

In case of panel boards having busduct as incomer, the panel board should be designed to accommodate proper connection/termination of the bus duct.

To prevent accidental contacts, all interconnecting cables/ busbars and all terminals also shall be shrouded.

Provision for clamping the cables inside the cable alley should be provided.

Standard colour code of red, yellow and blue for phases and black for Neutral to be followed for all busbars/conductors.

b) Auxiliary wiring and Terminals

Wiring for all controls, protection, metering, signaling, etc. inside the switchboard shall be done with 650 volts grey colour HFFR (Halogen free fire retardant) copper conductor cables. Minimum size of these conductors shall be 2.5 sq.mm. Control wiring to components fixed on doors shall be flexible type.

The complete panel would be sub-divided into different sections and each section shall have its own control circuit with fuse and indication.

All control wiring should be provided with necessary cable sockets/ lugs at both ends. Conductors shall be terminated using compression type lugs. Each termination shall be identified at both the ends by PVC ferrules.

The identification termination numbers should match with those on the drawings.

## Component of switch boards

The panel shall be provided with MCCBs, SDFUs, fuses, meters, relays and instruments, etc. of size, capacity as specified in schedule of requirements and specification. The switch gears should be positioned inside the panel board as per manufacturers standards.

## Moulded Case Circuit Breakers

### General

Moulded case circuit breakers (MCCBs) shall be incorporated wherever required and shall be of current limiting type and preferably double break. MCCBs shall conform to IS 13947-1/IEC 60947-1 for general rules and IS 13947-2/IEC 60947-2 for circuit breakers in all respects. MCCB shall be suitable for isolation as per standard, single phase 240V or three phase 415 V, 50Hz, AC and shall have a rated insulation voltage of 750 V AC. The MCCBs shall have thermal memory and shall have no Line-Load restriction. All the breakers shall have tropicalisation as a standard feature.

### Construction

The MCCB case & cover shall be made of high strength heat resistant and flame retardant thermosetting insulating material.

The operating handle shall be quick make, quick break trip free type. The operating handle shall have suitable 'ON', 'OFF', 'TRIPPED' indicators.

In order to ensure suitability for isolation complying with IS13947-2/IEC 60947-2, the operating mechanism shall be designed such that the toggle or handle can only be in 'OFF' position.

Three phase MCCBs shall have a common operating handle for simultaneous operation and tripping of all the three phases.

### Rating & Breaking Capacity:

The rating of the circuit breaker shall be as per the drawings and schedule of quantities.

The MCCB shall have Service Breaking Capacity (Ics) equal to Ultimate Breaking capacity (Icu).

### Protection

All breakers of 250A and above shall have micro-processor based trip unit with adjustable overload protection from 40% to 100% of the nominal current( $I_n$ ). The short circuit protection should be adjustable from 2 to 10 times the rated current( $I_r$ ) with tripping time fixed. The Instantaneous Short Circuit protection to be fixed, without any time delay at 11 times the nominal current( $I_n$ ). MCCBs upto 250A shall be thermal magnetic with adjustable overload protection or as specified in BOQ.

The microprocessor control unit shall have - true RMS sensing, Electromagnetic compatibility (EMC), thermal memory. The mP release shall be immune to harmonics.

630A MCCBs shall have fault indication of (O/C, S/C and E/F).

The MCCBs shall be possible to fully co-ordinate the over-load & short-circuit tripping of the circuit breakers with the upstream and downstream circuit breakers to provide Total Discrimination.

MCCB should have the flexibility of connecting the load either on the top or on the bottom side without deration.

### Accessories

MCCBs shall be provided with the following accessories and all these devices shall be fittable at site. The accessories shall be separated from Power circuit. Preferably the Shunt trip release and undervoltage release shall be snap-in type and fitted with terminal blocks.

### Shunt trip

Auxiliary switch

Extended rotary Handle.

Interlocking

MCCBs shall be provided with the following interlocking devices for interlocking the door of the switchboard.

Handle interlock to prevent unnecessary manipulations of the breaker.

Door interlock to prevent door being opened when breaker is in ON position.

Door-interlock defeat to open the door even if the breaker is in ON position.

Front operated rotary handle should have OFF-position pad-locking facility.

#### Indicating Lamps

Type : Panel mounting wide band LED type  
with in built surge suppressor to  
protect LED against switching surges  
and built-in low voltage glow  
protection of 25V.

Standards applicable : IEC 947-5-1

Diameter : 22mm

Operating voltage : 240V AC

Illumination Level : Minimum 100 lux on the front face of the lens.

Colour of lamps : as per standards

#### Measuring instruments

These shall be of square pattern having dimensions of 96x96 mm flush mounting type. Instruments like ammeter, Voltmeter, frequency meter etc. and instrumental transformers/ transducers etc. are also included in the scope of supply.

All AC meters shall be of class 1 accuracy.

Voltmeter shall be suitable for direct line connection. Voltmeters shall be connected through MCBs only.

All voltmeters shall be provided with selector switches.

Ammeters shall be CT operated.

#### Contactors

Contactors shall comply with IS 13947 :1 for general rules and IS13947-4-1 for standards pertaining to contactors and motor starters. The contactor shall be capable of withstanding breaking & making capacities per following:

AC4 Category

Making Current - 12 times rated current

Breaking current - 10 times rated current

Contactors shall be capable of withstanding an impulse voltage of 8 kV and have an insulation voltage of 1000V.

Contactors shall be suitable for copper terminations with a maximum permissible temperature rise of 65°C at the terminals with an ambient temp of 50°C.

The coil shall have 3 terminals and the insulation class shall be preferably H class. The auxiliary contact block shall have a switching capacity of 440V at 2A.

Contactors shall have one auxiliary in-built and it shall be possible to have additional NO & NC contacts in steps of two.

The power contactors for capacitor switching should be of capacitor duty type with provision for reducing inrush current through a resistor, which closes prior to closing of the main contact.

#### Capacitors

Capacitor should be of heavy duty double dielectric poly propylene type.

All capacitors shall be of loss less than 0.5 W / kVAr, suitable to withstand + 10% voltage variation and rated for operating temperature up to 70°C.

Capacitor units shall be provided of rating specified in BOQ with externally mounted discharge resistors to reduce the residual voltage to less than 50 volts in one minute of switching off. Timer shall be provided in the circuit so that supply is not restored before discharge of the capacitor Bank.

Each capacitor unit shall be capable of operating continuously at 10% over voltage over and above the rated RMS voltage.

#### Current Transformers (CTs)

CTs shall be cast resin insulated type. Primary and secondary terminals shall be marked indelibly. CTs shall preferably be mounted on stationery parts. CT rating and ratios shall be as per feeder ratings. These shall be capable of withstanding momentary short circuit and symmetrical short circuit current for 1 second. Neutral side of CTs shall be earthed. Protection CTs shall have low reactance, accuracy class "5P" and an accuracy limit factor greater than "10". Instrument CTs shall be of accuracy class "1.0" and accuracy limit factor less than "5.0".

#### Connection

Connections to the busbars shall be made by drilling holes. However, no holes shall be left in the busbars except at the both ends of the main busbar for panel extension. The bolts & nuts used for connections to busbars shall be of Aluminium alloy of tinned forged brass. For tapping of connections from busbars suitable size PVC sleeved copper conductor (minimum size 4.0 Sq.mm) shall be used with suitable size and type of crimped lugs/cable sockets. For connection of feeder above 63 Amps only busbar links with heat shrinkable PVC shall be used. Suitable size cable boxes shall be provided for incoming/outgoing cables. For all outgoing cables, cable alleys of suitable sizes in sides and tops, as required for proper cable connections/laying inside the panel, shall be provided. Switch board shall be suitable for Aluminium conductor PVC insulated incoming and outgoing cables. Removable gland plates shall be provided for cable entries.

#### Earthing

Two independent earthing points shall be provided outside the panel near bottom and these shall be inter-connected with Cu earthing busbars of size 25 x 6 mm. All earthing points inside the distribution board shall be interconnected to these earthing points with suitable size copper conductor.

#### Name plates

Switch board/distribution board shall be provided with danger plate and name plates for all incoming and outgoing feeders. These name plates shall be of PVC (black colour base & white letters engraved) screwed to panel. PVC identification ferrule numbers shall be used for all internal wiring. The name plate shall contain the following information.

Panel Board Identification name & number

Feeder name.

Switch/ fuse rating.

Cable size.

Feeder Cable from ...../ to.....

### Supports

Busbars shall be rigidly fixed to the supports, of SMC/DMC solid block type base. Busbars shall be firmly held within the slots in sheet type supports, which in turn shall be rigidly fixed to the chamber.

### Clearances

The minimum clearances to be maintained for enclosed indoor air insulated busbars for medium voltage applications shall be as follows:

Between	Min. clearances
Phase to earth	26 mm
Phase to phase	32 mm

### Arrangement of busbars and main connections

Busbars and main connections, which are substantially in one plane, shall be arranged in the order given below:

#### AC System

a) The order of phase connections shall be red, yellow and blue.

When the run of the conductors is horizontal, the red shall be on the top or farthest away as viewed from the front.

When the run of the conductors is vertical, the red shall be on the left, or farthest away as viewed from the front.

When the system has a neutral connection in the same plane as the phase connections, the neutral shall occupy the bottom position if horizontal and extreme right if vertical, or nearest position when viewed from the front.

Unless the neutral connections can be readily distinguished from the phase connections, the order shall be red, yellow, blue and black.

### Push Buttons

- 1 Type : Manually operated spring return type.
- 2 Standard applicable : IEC947-5-1
- 3 Electric Shock protection : Class 2 (IEC 536)
- 4 Degree of protection : IP54 (IEC529)
- 5 Diameter : 22mm
- 6 Type of mounting : snap type
- 7 Color of actuator : Start PB - Green



Stop PB - Red

Test/Reset PB - Black

8 Contact configuration : 2NO+2NC

#### Approvals

The drawing showing general arrangements and detailed wiring diagram for the Panels shall be submitted to the Engineer-in-charge for approval, prior to manufacture and the same shall be got inspected, prior to despatch to project site. The complete switch board and its component shall conform to Indian Electricity Rules & Relevant IS.

#### AS-BUILT DRAWINGS

After completion of work, the contractor shall prepare and submit to the Owner all as-built drawings giving complete details of the electrical installations.

#### ERECTION OF EQUIPMENTS SUPPLIED BY THE OWNER

The cases containing the equipment (being supplied by the owner) shall be handed over to the contractor. The contractor shall make his own arrangements for the erection at site or it has to make.

#### MAKE OF MATERIALS

Sl. No	Item	Make of Materials/Equipment
1	1.1 kV grade XLPE insulated PVC sheathed Al./ Cu. Cable	CCI, NICCO, Torrent, Havells, Gloster, Finolex, KEI
2	MCCB	Siemens, Schneider, GE, L&T, C & S, Legrand,
3	Capacitor	L&T, Saha Sprague, GE, Shreem, Epcos, Schneider
4	Starters, Timer & Contactors	Siemens, L&T, Schneider, C&S, BCH, GE.
5	SDFU, Isolator, SFCOS	L&T, Siemens, Schnieder, GE.
6	Push Buttons	Teknic, Schneider, Siemens, BCH, C&S, L & T
7	Indicating lamps (LED type)	Teknic, Schneider, Siemens, BCH, C&S, L & T
8	Fuses/Fuse carriers	Siemens, L & T, Schneider, GE
10	Integrating meters	SIMCO, L&T, Siemens, AE, Schneider, Secure, Socomec
11	Instrument Transformer	AE, Intrans, Kappa, Intech, PGR, Powertech, Resitech
12	Selector switches	Reco, Essen, Kaycee, L&T, C & S, Siemens, Schnieder, BCH, Teknic
13	660/1100 volt grade stranded unsheathed wire with copper conductor	Finolex, RR Kabel, L&T, Lapp Kabel, V-Guard, Polycab
14	PVC Conduit	Konseal, Balco, Precision, Clipsal
15	TOD meter	L&T, Schneider, Secure
16	MCB, RCBO,RCCB	Legrand, Siemens, L&T, Hagger, Schneider, V- guard.
17	MCB Distribution Boards	Legrand, Siemens, L&T, Hagger, Schneider.

The regularization of the electrical additional loads to be executed by this tender with the Kerala State Electricity Board Ltd shall be under the scope of the Tenderer/Contractor. The statutory fees if any to be paid to the institution will be reimbursed by KMSCL against the original bills.

## COMMISSIONING ON COMPLETION

After the work is completed, it shall be ensured that the installation is tested and commissioned. All the test/calibration certificates, detailed operation and maintenance manual (3 sets) shall be submitted to the Engineer-in-charge before handing over of the system.

## COMPLETION DRAWINGS

On completion of works, the contractor shall submit four sets of "As – Built" drawings, one set reproducible and one set in CAD version in compact disc to the Engineer-in-charge before the submission of the final bill. The drawings shall incorporate the correction suggested by the Engineer in charge and as per the guidelines provided by the Engineer in charge. The details of the drawings would be given by the Engineer in charge.

The Contractor shall provide a comprehensive information booklet on the equipment supplied. It should be nicely bound and handed over at the time of handing over of the system and the cost shall be deemed to be included in the tendered cost. It should contain following information:

Salient features of the system, detailed write up, equipment specification details, model, makes, name plate details, details of accessories, date of installation/ commissioning, power distribution details, equipment layouts, cables / panel details, layout of the entire system executed, GA, single line, schematic diagrams, all factory test reports, Pre commissioning test reports, maintenance and operation details of the system / machineries, drawings, BOQ as executed with each item, its rate, amount, total cost etc., It shall be furnished in the following forms:

3 sets of A4 size booklet printed in laser jet printer as hard copy. It shall also include photographs / catalogues of the equipments/ panels/ system etc.

3 sets of CD containing the soft copy of the CAD drawings, write ups etc.

## INSPECTORATE APPROVAL

All the equipment to be supplied and works to be executed should conform to the Kerala State Electrical Inspectorate Standards including all protection and metering accessories.

Contractor has to obtain necessary scheme approval/power allocation from the Kerala State Electrical Inspectorate/KSEB immediately after the award of work. All drawings required in this regard are to be prepared by the contractor at his expense.

All testing/calibration, etc. are to be carried out as per the requirements of KSEI/KSEB.

On completion of the work, the contractor has to obtain necessary safety/ energization certificate from KSEI by submitting necessary completion certificates, drawings, equipment details, load details, test results, etc. before energisation.

All costs incurred in obtaining such approval/certificates "including all statutory fees etc" are to be borne by the contractor. Approval for shifting and energisation also has to be obtained. Similarly the entire statutory fee and other expenses for the temporary energisation of panels etc are to be borne by the contractor.

If the current rating of ACB/MCCB/SFU mentioned in the BOQ is not available or not in confirmation to the inspectorate standards then it shall be rated to the nearest higher rating available with the current rating/fuse rating as specified with no extra cost.

Liaison with all statutory authorities including KSEB/Electrical Inspectorate for getting sanction/approval/safety certificate/ power connection including submission of necessary forms to KSEB/ Electrical inspectorate as required is included in the scope of this work.

## Cabling

Cable network shall include power, control and lighting cables, which shall be laid in underground trenches, Hume pipes, open trenches, cable trays GI pipes, or on building structure surfaces as detailed in the relevant drawings. Cable schedules or as per the Engineer-in-charge's instructions. Supply and installation of cable trays, GI pipes/conduits, cable glades sockets at both ends, isolators, junction boxes, remote push buttons stations, etc. shall be under the scope of the Contractor.

General requirements for handling of cables

a) Before laying cables, these shall be tested for physical damage, continuity absence of cross phasing, insulation resistance to earth

and between conductors. Insulation resistance tests shall be carried out with 500/1000 volt Megger.

- b) The cables shall be supplied at site, wound on wooden drum as far as possible. For smaller length and sizes, cables in properly coiled form can be accepted. The cables shall be laid by mounting the drum of the cable on drum carriage. Where the carriage is not available, the drum shall be mounted on a properly supported axle, and the cable laid out from the top of the drum. In no case the cable will be rolled on, as it produces kinks which may damage the conductor.
- c) Sharp bending and kinking of cables shall be avoided. The bending radius for PVC insulated and sheath armoured cable shall not be less than 10 D Where 'D' is overall diameter of the cable.
- d) While drawing cables through GI pipes, conduits, RCC pipe, ensure that size of pipe is such that, after drawing cables, 40 % area is free. After drawing cable, the end of pipe shall be sealed with cotton/bituminous compound.
- e) High voltage (11 kV and above), medium voltage (230 V and above) and other control cables shall be separated from each other by adequate spacing or running through independent pipes/trays.
- f) Armoured cables shall never be concealed in walls/floors / roads without GI pipes, conduits RCC pipes.
- g) Joints in the cable throughout its length of laying shall be avoided as far as possible and if unavoidable, prior approval of site engineer shall be taken.
- h) A minimum loop of 3 M shall be provided on both ends of the cable, or after every 50 M of unjointed length of cable and on both ends of straight through cable joint. This additional length shall be used for fresh termination in future. Cable for this loop shall be paid for supply and laying.
- i) Cable shall be neatly arranged in the trenches/trays in such a manner so that criss-crossing is avoided and final take off to the motor/switchgear is facilitated. Arrangement of cables within the trenches/trays shall be the responsibility of the Contractor.
- j) All cable routes shall be carefully measured and cable cut to the required lengths and undue wastage of cables to be avoided. The routes indicated in the drawings is indicative only and the same may be rechecked with the Engineer-in-charge before cutting of cables. While selecting cable routes, interference with structures, foundations, pipeline, future expansion of buildings, etc. should be avoided.
- k) All temporary ends of cables must be protected against dirt and moisture to prevent damage to the insulation. For this purpose, ends of all PVC insulated cables shall be taped with an approved PVC or rubber insulating tape. Use of friction type or other fabric type tape is not permitted. Lead sheathed cables shall be plumbed with lead alloy.
- l) Wherever cable rises from underground/concrete trenches to motors/switchgears/push buttons, these shall be taken in GI pipes of suitable size, for mechanical protection upto 300 mm distance of concerned cable gland or as instructed by the Engineer-in-charge.
- m) Where cables pass through foundation/walls of other underground structures, the necessary ducts or openings will be provided in advance for the same. However, should it become necessary to cut holes in existing foundations or structures the electrical Contractor shall determine their location and obtain approval of the Engineer-in-charge before cutting is done.

#### Installation of Cables

- A) Wherever cables are taken through masonry works and road crossings etc., they shall be protected by running through GI pipes and Hume pipes respectively. Depth shall be 1200 mm from top of finished road surface and it shall extend for about 1070 mm on both sides of the roads.
- B) Utmost care shall be taken to avoid scratches, kinks and cuts on the conductor while transporting the cables to site or during installation. Suitable inhibiting grease shall be liberally applied to bare conductors, wherever they exist.
- C) The junction boxes, cable end boxes etc. wherever required to be provided shall have sufficient wiring spaces with regard to the sizes of cables indicated in the drawings. Wherever required, the items to be supplied for electrification shall be complete with requisite type of cable glands, cable boxes, termination etc. and other accessories which are necessary for the satisfactory installation/operation of the installations as per relevant statutory rules and regulations.
- D) Installation of all cables should be as per E.I. Standards. Fuses should be graded properly and should be selected based on the rating of cables. The cables shall be laid in trenches/overhead racks wherever available. The cables from cable trenches to the switcher shall be buried (as per standard practices and or taken through GI pipes to 1.2 m above ground/racks floor level. The cables taken over

racks/ walls/ columns/ trusses shall be properly clamped using aluminium clamps of 16 SWG 1/4 hard or 3/4 hard sheet, the width varying from 12.5 to 25 mm at intervals of 750 mm. 225 mm minimum horizontal interaxial spacing shall be maintained when more than one cable is laid in same trench. Suitable and permanent type of cable markers is to be provided indicating the route and position of joints of cable. Loops should be provided at either ends of the cable. Identification tags should be provided for each cable in the trench at a distance of 3 metres.

- E) Supply and installation of danger notice boards, where required, and other provisions under the statutory rules and regulations shall be included in the scope of this work.
- F) The Contractor has to provide materials and carry out the wiring work including earthing according to IS 3043 unless otherwise specified and get it approved before using for work, by the authorised engineer of the Purchaser.
- G) Sufficient number of earth pits shall be provided, if found necessary and inter-connected so as to have the resistance of the earthing installations not more than 0.5 ohm. In case the soil resistivity is found to be very high, a high sensitive relay may be used to co-relate the relay setting with high earth resistance.
- H) The complete installation work shall be conforming to NEC-1985 and complying with the Indian Electricity Rules and to meet the approval of the State Electrical Inspector etc. Installation of all switch boards and distribution boards should be in conformity with Rule 51(1)(c) of I.E.R. 1956. MV installation should conform to I.S. 7732.
- D) The cable terminations and earth terminations, wherever required, shall only be using compression type cable glands and suitable lugs.
- J) All the materials to be supplied for this work shall be got approved by the concerned engineer at site.
- K) The work will be considered complete only if the following tests are conducted, by the contractor at his own cost, satisfactorily in the presence of the site Engineer and are:
- Insulation test
- Earth resistance test and
- Continuity test
- L) All cable glands should be earthed using 10 SWG copper wire.

#### Laying of Cables (underground system)

- a) Cables shall be so laid in ground that these will not interfere with other underground structures. All water pipes, sewage lines or other structures, which become exposed by excavation, shall be properly supported and protection from injury until the filling has been rammed solidly in places under and around them. Any telephone or other cables coming in the way are to be properly shielded diverted as directed by the Owner. (Caution : Only manual labour should be used for excavation in Golf Course as sprinkler and other plumbing lines are passing under ground. At most care has to be taken during excavation, any damages made has to be rectified at his own cost)
- b) Cables shall be laid at minimum depth of 1000 mm in case of LT & 1200 mm in case of HT, from ground level. The width of the trench shall be sufficient for laying of required number of cables.
- c) For LT cables sand bedding 75 mm thick shall be made below and above the cables. A layer of bricks (full size) shall be laid breadth wise above sand to cover the cable completely. More than one cable can be laid in the same trench by providing a brick on edge between two cables. However the relating location of cables in trench shall be maintained till termination. The surface of the ground after back filling the earth shall be made good so as to conform in all respects to the surrounded ground and to the entire satisfaction to the Engineer-in-charge.
- d) For all underground cables, route markers should be used.

Separate cable route markers should be used for LT, HT and telephone cables.

Route markers should be grounded in ground with 1:2:4 cement concrete pedestal size 230 x 230 x 300 mm.

Cable markers should be installed at an interval not exceeding 50 M along the straight routes of cables at a distance of 0.5 M away

from center of cable with the arrow marked on the cable markers plate indicating the location of cable. Cable markers should also be used to identify change in direction of cable route and for location of every joint in underground cable.

For buried HT&LT cables Cable identification tags to be provided at an interval of 8 m.

e) RCC hume pipes for crossing road in cable laying shall be provided by Contractor. RCC hume pipe at the ends shall be sealed by bituminous compound after laying and testing of cable by electrical Contractor without may extra charge.

#### Laying of Cables under Floors

a) GI class B pipe shall be used for laying of outgoing cables from distribution boards to various equipment. Preferably one cable shall be drawn through one pipe. Size of pipe shall be such that after drawing of cable 40 % area is free. If length of pipe is more than 30 M, free area may be increased to 50 %.

b) Use of elbows is not allowed at all and number of bends shall be kept minimum. Instead of using bends with sockets, pipe bending machine shall be used for making long smooth bends at site.

c) Ends of pipe shall be sealed temporarily while laying with cotton/jute/rubber stopper etc. to avoid entry of building material.

d) Exact locations of equipment shall be ascertained prior to laying of pipe.

#### Laying of Cable in Masonry Trenches

a) More than one tier of cables can be provided in the same trench if the number of cables is more.

b) Entry of cables in trenches shall be sealed with bituminous MASTIC compound to stop entry of water in trenches without any extra cost.

c) After laying of cables the trench cover/ slab has to be properly placed /closed. The opening and closing of the trench cover/slab etc. shall be in the scope of the Contractor.

#### Laying of Cables in Cable Racks

Cable Racks to be used for cables laid indoors except for single cables. The cable racks shall be of ladder type fabricated out of structural steel, MS, GI or aluminium perforated as indicated. The cable racks shall be of adequate strength to carry the weight of cables with out sagging. Structural bracket grounded in the build up trenches to support the cable such supports shall be at intervals of not less than 750 mm centres. All the structural steel work shall be finished with two coats of paint over primer.

Spacing of cable support for self supported cables on wall, ceiling or trenches shall be as follows:

	Horizontal run	Vertical run
Upto 10 sq.mm	350 mm	450 mm
16 to 95 sq.mm	450 mm	500 mm
120 to 400 sq.mm	700 mm	900 mm

Cables shall be fixed in cable trays in single tier formation and cables shall be clamped with aluminium flat clamps and galvanised bolts/unit.

Earthing flat/wire can also be laid in cable tray along with cables.

After laying of cables minimum 20 % area shall be spare.

#### 1.10.2.7 Laying of Cables on Building Surface/Structure

a) Such type of cable laying shall be avoided as far as possible and will be allowed only for individual cables or small group of cables which run along structure.

- b) Cables shall be rigidly supported on structural steel/masonry using individual cast/malleable iron galvanised saddles and these supports shall be approximately 400 to 500 mm for cables upto 25 mm overall diameter and maximum 1000 mm for cables larger than 25 mm. Unsightly sagging of cables shall be prevented. Only aluminium/GI clamps with GI bolts/nuts shall be used.
- c) If drilling of steel structure must be resorted to, approval must be secured from the Engineer-in-charge and steel must be drilled where the minimum weakening of the structure will result.

#### Termination and Jointing of Cables

##### A) Use of Glands

All cables upto 1.1 kV grade, armoured or unarmoured shall be terminated at the equipment/junction box/ isolators/push buttons/control accessories, etc. by means of suitable size compression type cable glands armour of cable shall be connected to earth point. The Contractor shall drill holes for fixing glands wherever necessary. Wherever threaded cable gland is to be screwed into threaded opening of different size, suitable galvanised threaded reducing bushing shall be used for approved type.

In case of termination of cables at the bottom of the panel over a cable trench having no access from the bottom, a close fit holes should be drilled in the bottom plate for all the cables in one line, then bottom plate should be split in two parts along the centre line of holes. After installation of bottom plate and cables with glands, it shall be sealed with cold sealing compound.

##### B) Use of Lugs/Sockets

All cable leads shall be terminated at the equipment terminals, by means of crimped type solder less connectors unless the terminals at the equipment ends are suitable for direct jointing without lugs/sockets.

The following is the recommended procedure for crimped joints and the same shall be followed:

- i) Strip off the insulation of the cable end with every precaution, not to sever or damage any strand. All insulation to be removed from the stripped portion of the conductor and ends of the insulation should be clean and square.
- ii) The cable should be kept clean as far as possible before assembling it with the terminal/socket. For preventing the ingress of moisture and possibility of re-oxidation after crimping of the aluminium conductors, the socket should be fitted with corrosion inhibiting compound. This compound should also be applied over the stripped portion of the conductor and the palm surface of socket.
- iii) Correct size and type of socket/ferrule/lug should be selected depending on size of conductor and type of connection to be made.
- iv) Make the crimped joint by suitable crimping tool.
- v) If after crimping the conductor in socket/lug, same portion of the conductor remains without insulation the same should be covered sufficiently with PVC tape.

##### C) Dressing of Cable inside the Equipment

After fixing of cable glands, the individual cores of cable shall be dressed and taken along the cableways. Cable shall be dressed in such a manner that small loop of each core is available inside the panel.

For motors of 20 HP and above, terminal box if found not suitable for proper dressing of an aluminium cables, the Contractor shall modify the same without any additional cost.

Cables inside the equipment shall be measured and paid for.

##### D) Identification of Cables/Wires/Cores

Power cables shall be identified with red, yellow & blue PVC tapes for trip circuits identification, additional red ferrules shall be used only in the particular cores of control cable at the termination points in the switchgear/control panels and control switches.

In case of control cables all cores shall be identified at both ends by their wire numbers by means of PVC ferrules or self sticking cable markers, wire numbers shall be as per schematic/connection drawing. For power circuit also wire numbers shall be provided if required as per the drawings of switchgear manufacturer.

## Testing of Cables

- a) Before energising, the insulation resistance of every circuit shall be measured from phase to phase and from phase to ground. This requires 3 measurements if one side is grounded and 6 measurements for 3 phase circuits.
- b) Where splices or terminations are required in circuits rated above 650 volts, measure insulation resistance of each length of cable before splicing and/or terminating. Report measurements after splices and/or terminations are complete.
- c) DC High Voltage test shall be made after installation on the following:
  - i) All 1100 Volts grade cables in which straight through joints have been made.
  - ii) All cables above 1100 V grade.

For record purposes test data shall include the measured values of leakage current versus time.

The DC High Voltage test shall be performed as detailed below:

Cables shall be installed in final position with the entire straight through joints complete. Terminations shall be kept unfinished so that motors, switchgear, transformer etc. are not subjected to test voltage.

The test voltage and duration shall be as per relevant codes and practices of Indian Standards Institution.

## Earthing

### Scope

The scope of this section shall cover the following:

### Earthing station

### Earthing conductors

### Earthing of equipment and installation

### Standards

The following standards shall be applicable:

IS : 3043 COP for earthing

IS : 5216 Safety procedures & practice in electrical work

### Earth Station

The earth station shall be made by excavating the ground to required depth and the excess earth after back filling shall be removed from site.

### Electrodes

### Various types of electrodes

- i) Pipe electrode shall be buried in the ground vertically with its top at not less than 20 cm below the ground level. The installation shall be carried out as per IS: 3043 and as directed by the Engineer-in-charge.
- ii) Plate electrode shall be buried in ground with its face vertical, and its top not less than 2 m below the ground level. The installation shall be carried out as directed by the Engineer-in-charge.
- iii) When more than one electrode is to be installed, the distance between pipe electrodes shall be 5m and that between plates shall be 8m.



iv) The strip or conductor electrode shall be buried in trench not less than 0.5 m deep.

b) If conditions necessitate the use of more than one strip or conductor electrode, they shall be laid as widely distributed as possible, in a single straight trench where feasible, or preferably in a number of trenches radiating from one point or as directed by the Engineer-in-charge.

#### Earthing Conductor (Main earthing lead)

The earth conductors shall be fixed to the wall/columns etc. at every 500 mm centres with 10 mm spacers. The total earthing system shall be mechanically and electrically connected to provide independent path to earth.

i) In the case of plate earth electrode, the earthing conductor shall be securely terminated on to the plate with two bolts, nuts, checknuts and washers.

ii) A double C-clamp arrangement shall be provided for terminating tape type earthing conductor with GI watering pipe coupled to the pipe earth electrode. Galvanised "C" shaped strips, bolts, washers, nuts and checknuts of adequate size shall be used for the purpose.

iii) The earthing conductor from the electrode upto the building shall be protected from mechanical injury by a medium class, 15 mm dia. GI pipe in the case of wire, and by 40 mm dia. medium class GI pipe in the case of strip. The protection pipe in ground shall be buried atleast 30 cm deep to be increased to 60 cm in case of road crossing and pavements). The portion within the building shall be recessed in walls and floors to adequate depth in due co-ordination with the building work.

iv) The earthing conductor shall be securely connected at the other end to the earth stud/earth bar provided on the switch board by bolt, nut and washer.

#### Earth bus and main earthing terminal

i) The Main Earth bus shall be laid as directed by the Engineer-in-charge.

ii) Following conductors shall be terminated into the main earthing terminal/earth bus.

a) Earth connection from the Sub station.

b) Earthing conductor from electrode.

c) Protective conductors;

d) Equi-potential bonding conductors.

#### Protective (Loop earthing/earth continuity) Conductor

i) Earth terminal of every switch board in the distribution system shall be bonded to the main earth bus.

ii) Two protective conductors shall be provided for a switchboard.

iii) A protective conductor shall securely connect the earth connector in every distribution board (DB) to the earth bus.

iv) All metallic switch boxes and regulator boxes in a circuit shall be connected to the earth connector in the DB by protective conductor.

v) The earth pin of socket outlets as well as metallic body of fan regulators shall be connected to the earth stud in switch boxes by protective conductor.

#### Marking

i) Earth bars/terminals at all switch boards shall be marked permanently, either as E or as

ii) Main earth terminal shall be marked "Safety Earth – Do Not Disconnect".

#### WIRING IN BUILDINGS FOR LIGHT, FAN AND POWER

All materials supplied shall have ISI marks and if ISI marks are not available, they shall be of approved make and quality approved by the KMSCL. The enclosures for switches, sockets, regulators, outlets etc., shall be of recessed /surface mounted type as required. The enclosure shall be made of sheet-steel and painted. Best quality switches, plugs, mounting plates, metal boxes etc., as specified in the schedule alone shall be permitted to be used.

Single core stranded copper conductor, FRLS PVC insulated, unsheathed 1100V grade, shall be used for wiring.

Wiring shall be done as per following:-

Circuit wiring	:	1.5 Sq. mm
Light/Fan/6A plug points	:	1.5 Sq. mm
16 Amps, 230 V plug points	:	2.5 Sq. m
20 Amps 230V/440V/AC plug points	:	4.0 Sq. mm
Flexible cord for connecting		
Light/Fan etc.	:	0.5 Sq. mm

Red, Blue and Yellow wires shall be used for the phases, black for the neutral and green for covered earthing conductor.

The number of wires in conduits shall not exceed those permitted by the relevant BIS code of practice.

Conduit size shall be so selected that the maximum number PVC insulated cibles including earth conductor that drawn in one conduit shall not exceed the numbers shown in the table below. Maximum number of PVC insulated 650V/1100V Grade Aluminium/Copper Conductor cable as per IS-1990.

Normal cross section area of conductor in Sq mm	20mm	25mm	32mm	38mm
	S B	S B	S B	S B
1.50	5 4	10 8	18 12	
2.50	5 3	8 6	12 10	
4.00	3 2	6 5	10 8	
6.00	2	5 4	8 7	
10.00	2	4 3	6 5	8 6
16.00	2	3 3	6 5	10 7

Note:

- i) Column headed 's' apply to runs of conduits which have distance not exceeding 4.25mm between draw in boxes and which do

not deflect from straight by an angle of more than 15 degrees. the columns headed 'B' apply run of conduits which deflect from the straight by an angle of more than 15 degree.

ii) The minimum size of conduit shall be 20mm for lighting and 25mm for power wiring.

The total load on a lighting sub circuit shall be 800 Watts. Number of points shall not exceed 10. And the total load on a power sub circuit shall be 3000 Watts and there shall not more than 2 outlets in a power sub-Circuit. And there shall be separate circuit for power and lighting. Separate circuit should be provided for all power socket outlets of 20 Amps or higher.

The total load on any distribution board shall be, as far as possible equally distributed over the three phases.

Only ISI marked rigid PVC conduit and accessories shall be used for wiring.

Only three point ceiling roses shall be used. One run of 1.5/2.5/4.0 Sq.mm PVC insulated copper wire as earth continuity conductor along with the circuit wiring inside the conduit and 1.5/2.5/4.0 Sq.mm FRLS PVC insulated copper as earth continuity conductor along with the point wiring shall be installed in the system. All non-current carrying metal parts of the wiring and fixtures shall be earthed using this wire.

Circuit wiring shall include wiring from distribution board up to the control board.

Point wiring shall include wiring from the control board up to all the outlets in the point. Wiring shall be carried out by the looping back system. All connections shall be done only inside the inspection boxes, junction boxes or enclosures at an accessible position. No running joints shall be made in the wiring.

#### AS-BUILT DRAWINGS

After completion of work, the contractor shall prepare and submit to the Owner all as-built drawings giving complete details of the electrical installations.

#### ERECTION OF EQUIPMENTS SUPPLIED BY THE OWNER

The cases containing the equipment (being supplied by the owner) shall be handed over to the contractor. The contractor shall make his own arrangements for the erection at site or it has to make .

**EXHAUST FAN:** Supply, conveyance, installation, testing and commissioning of the following sizes of exhaust fans, fixing necessary bolt and nuts, making good the damages etc. as required including giving connections with required length of 24/0.20mm PVC insulated and PVC sheathed 3 core round copper conductor flex wire conforming to relevant ISS. 350mm single phase, light duty with self opening lovers

**FIRE EXTINGUISHER:** Supply and installation of ABC type dry powder fire extinguisher of 4 kg. Capacity complete with initial charges and installation brackets.

#### MAKE OF MATERIALS

Sl.No	Item	Make of Materials/Equipment
1	1.1 kV grade XLPE insulated PVC sheathed Al./ Cu. Cable	CCI, NICCO, Torrent, Universal, Havells, Gloster, Finolex, KEL.
2	MCCB	Siemens, Schneider, GE, L&T, C & S, Legrand.
3	Capacitor	L&T, Saha Sprague, GE, Shreem, Epcos, Schneider.
4	Starters, Timer & Contactors	Siemens, L&T, Schneider, C&S, BCH, GE.
5	SDFU, Isolator, SFCOS	L&T, Siemens, Schnieder, GE.
6	Push Buttons	Teknic, Schneider, Siemens, BCH, C&S, L & T.
7	Indicating lamps (LED type)	Teknic, Schneider, Siemens, BCH, C&S, L & T.
8	Fuses/Fuse carriers	Siemens, L & T, Schneider, GE.
10	Integrating meters	SIMCO, L&T, Siemens, AE, Schneider, Secure.

11	Instrument Transformer	AE, Intrans, Kappa, Intech, PGR, Powertech, Resitech.
12	Selector switches	Reco, Essen, Kaycee, L&T, C & S, Siemens, Schnieder, BCH, Teknic
13	660/1100 volt grade stranded unsheathed wire with copper conductor	Finolex, RR Kabel, L&T, Lapp Kabel, V-Guard, Polycab.
14	PVC Conduit	Konseal, Balco, Precision, Clipsal.
15	TOD meter	L&T, Schneider, Secure.
16	Exhaust Fans	Almonard, Crompton, Polar, Khaitan, Bajaj.
17	Light Fittings	Philips, Wipro, Crompton Greaves.
18	LED light fixtures	Philips, Crompton greaves, Wipro.
19	LED Chip	CREE, Philips, Nichia.
20	Modular type switches, sockets, bell push, fan regulator etc.	Crab Tree(Athena), Legrand(Mosaic), Wipro (Northwest), Kolors (krest).
21	Ceiling fan	Crompton Greaves, Polar, Usha, Khaithan
22	Metalclad plug/socket/contactor	Legrand, C & S, Schnieder, Hagger,
23	Thermoplastic industrial type plug/ socket / contactor	Hensel, MK
24	MCB, RCBO,RCCB	Legrand, Siemens, L&T, Hagger, Schneider, V- guard.
25	MCB Distribution Boards	Legrand, Siemens, L&T, Hagger, Schneider.

The regularization of the electrical additional loads to be executed by this tender with the Kerala State Electricity Board Ltd shall be under the scope of the Tenderer/contractor. The statutory fees if any to be paid to the institution will be reimbursed by KMSCL against the original bills.

Technical specifications of Air Conditioning Works

Supply, Conveyance testing and commissioning of 1/1.5/2 Ton split AC unit with Copper Tube Condenser and Evaporating coils, 4/5 star rating inverter type Bluestar/Hitachi/LG/Carroer/Mitsubishi etc Brands including the installation works such as powder coated outdoor stand, additional drain and Copper Pipes, Wide Range Voltage Stabilizer(V-Guard/V-Stab/Microtek).

Air Conditioner – 1 Ton

Should be Split Inverter type Air Conditioner

BEE Star rating : 4/5 Star

Cooling Capacity(KW/hr): above 3000KW/hr

Material of condenser coil: Copper

Compressor Type: Inverter/Dual Inverter (Rotary/Scroll type)

Compressor warranty: 5 years

Air circulation(CFM H/M/L): above 300/250/200

Refrigerant :- R32/ R410A/ R132A

Moisture Removal(L/hr): above 1

IDU Noise level(dBA) : ? 45/40/35

Control : Microprocessor controlled codeless remote

Power Source (V/Hz/Ø) : 230V /50Hz / single phase

Display : LED/LCD

Remote control distance : Min 10 meters

Voltage Stabilizer

Voltage Stabilizer Wall mount type with Time delay, High& low voltage & Thermal overload protection.

Capacity: 4 KVA

Input voltage: 170-220 V

Output Voltage : 200-240 V

High Voltage Cut Off : 240

Efficiency: >95%

Frequency : 50Hz

Items to be supplied along with :

3 mtr copper piping with superlon insulation for suction line

3 mtr copper piping with superlon insulation for Discharge line

1 mtr HDPE PVC piping for drain

Indoor – Outdoor unit connecting power cable and required cable from power socket to stabilizer and from stabilizer to AC Unit

Base plate for hanging indoor unit

Suitable 3 pin plug top shall be provided

Air Conditioner – 1.5 ton

Should be Split Inverter type Air Conditioner

BEE Star rating : 4/5 Star

Cooling Capacity(KW/hr): above 4500KW/hr

Material of condenser coil: Copper

Compressor Type: Inverter/Dual Inverter (Rotary/Scroll type)

Compressor warranty: 5 years

Air circulation(CFM H/M/L): above 450/350/300

Moisture Removal(L/hr): above 1.5

Refrigerant :- R32/ R410A/ R132A

IDU Noise level(dBA) : ? 55/50/45

Control : Microprocessor controlled codeless remote

Power Source (V/Hz/Ø) : 230V /50Hz / single phase

Display : LED/LCD

Remote control distance : Min 10 meters

Voltage Stabilizer

Voltage Stabilizer Wall mount type with Time delay, High & low voltage & Thermal overload protection.

Capacity: 4 KVA

Input voltage: 170-220 V

Output Voltage : 200-240 V

High Voltage Cut Off : 240

Efficiency: >95%

Frequency : 50Hz

Items to be supplied along with :

3 mtr copper piping with superlon insulation for suction line

3 mtr copper piping with superlon insulation for Discharge line

1 mtr PVC piping for drain

Indoor – Outdoor unit connecting power cable and required cable from power socket to stabilizer and from stabilizer to AC Unit

Base plate for hanging indoor unit

Suitable 3pin plug top shall be provided

Air Conditioner – 2 ton

Should be Split Inverter type Air Conditioner

BEE Star rating : 4 Star (Year 2020)

Cooling Capacity(KW/hr): above 6000KW/hr

Material of condenser coil: Copper

Compressor Type:- Inverter/Dual Inverter (Rotary/Scroll type)

Compressor warranty: 5 years

Air circulation(CFM H/M/L): above 500/450/350

Moisture Removal(L/hr): above 1.8

Refrigerant :- R32/ R410A/ R132A

IDU Noise level(dBA) : ? 55/50/45

Control : Microprocessor controlled codeless remote

Power Source (V/Hz/Ø) : 230V /50Hz / single phase

Display : LED/LCD

Remote control distance : Min 10 meters

Voltage Stabilizer

Voltage Stabilizer Wall mount type with Time delay, High & low voltage & Thermal overload protection.

Capacity: 5 KVA

Input voltage: 170-220 V

Output Voltage : 200-240 V

High Voltage Cut Off : 240

Efficiency: >95%

Frequency : 50Hz

Items to be supplied along with :

3 mtr copper piping with superlon insulation for suction line

3 mtr copper piping with superlon insulation for Discharge line

1 mtr PVC piping for drain

Indoor – Outdoor unit connecting power cable and required cable from power socket to stabilizer and from stabilizer to AC Unit



Base plate for hanging indoor unit

Suitable 3pin plug top shall be provided

Installation of AC Units – Points to Remember

All refrigerant pipe bends should be as gentle as possible. (Bending radius should be 30 to 40mm or larger.)

All Pipes must be restrained to the walls by proper saddles.

The drain hose should point downward with adequate slope for easy drain flow.

In cases where the outdoor unit is installed below the indoor unit

Tape the piping, drain hose and connecting cable from down to up.

Secure the tapped piping along the exterior wall using saddle or equivalent

In cases where the Outdoor unit is installed above the Indoor unit

Tape the piping and connecting cable from down to up.

Secure the taped piping along the exterior wall. Form a trap to prevent water entering the room.

Fix the piping onto the wall by saddle or equivalent.

Separately wire power supply cord and connecting cable

Use heat-proof electrical wiring (FRLS Wires 2.5 Sq mm/ 4 Sq mm ) capable of withstanding temperature up to 75°C(167°F)

Use outdoor and waterproof connection cable rated more than 300V for the connection between indoor and outdoor unit. (Colour codes and standards of wiring as per KSEI shall be followed)

Installation of Indoor Unit – Location Selection.

Ensure that the interval between a wall and the left (or right) of the unit is more than 10cm (3.9in). The unit should be installed as high as possible on the wall, allowing a minimum of 20cm(7.9in) from ceiling

Such a place where is permitting easy connection with the outdoor unit.

Such a place where is 1m or more away from other electrical appliances such as television, audio device, etc.

Avoid a location where there is heat source, high humidity or inflammable gas.

Do not use the unit in the immediate surroundings of a laundry, a bath, a shower or a swimming pool

Installation of outdoor Unit – Location Selection.

Ensure that the space around the back and sides is more than 30cm (11.8in). The front of the unit should have more than 70cm(27.6in)of space

The foundation must be solid enough to bear the weight and vibration unit.

The space around the unit is adequate for ventilation.

The location is not close to any flammable gases.

The location is sufficiently isolated so that the running noise and the hot exhaust air do not disturb the user.

Easy access to Service and Maintenance.

To prevent heat loss and wet floors due to dripping of condensation, both tubes must be well insulated with a proper insulation material

NB:- Star rating of AC units issued by BEE during the period of tendering shall be applicable during the time of installation, any further revision shall not be applicable.

NB:- Only the extra Copper Pipes, Drain pipes, Cabling required as per the site conditions will be measured under the item :- Supply, conveyance, installation testing and jointing Copper Pipe including insulation protection having heat resistant for extending the length to condenser including suitable size 3 core wire complete.

#### Approved Makes of Items

1. Split AC Units – 4/5 Star rated Inver type Carrier/LG/Hitachi/Mitsubishi/Bluestar/Voltas
2. Stabilizer - V-Guard/Voltas
3. UPVC Pipe - Any ISI marked
4. Pipe Insulation - Totaline/K-flex/Armacell
5. Refrigerant Piping - Totaline/Mandev/Piyush
6. Motors - Siemens/Kirloskar/Crompton/Bharath/Bijlee /ABB /Alsthom