

Sr. No.	Description of Item	Per / Unit	Specification Detail
	<b>E3 &amp; E3a Electric &amp; Electronic Estimate</b>		
	LIBRARY		
1	Point wiring for secondary light point with 2-1.5 sq.mm & earthwire of 1.5 sq.mm (green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multistrand copper wires, in following type of pipe to be erected concealed in / flushed on wall/ceiling, complete with earth continuity and necessary connection with primary light with accessories erected on Metal / PVC box covered with 3 mm thick PC(Polycarbonet) / Acrylic sheet for open / concealed wiring. with necessary Lamp holder / ceiling rose / H.D.Connector as directed. Note:- Maximum up to 6 mtrs length, excess will be considered as Mains for Secondary Point. (f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete Cat. III	Pt.	The Relevant specification of item No.- 1 to 11 Page No.-17-19 shall be followed from 'Specification for Electrical work and item No. - 1 to 2.4.4 section F -2A shall be followed from Specification for Ele. Installation in building Page No.34-35 # The rate shall be for a unit of Point.
2	Point wiring in Copper (Modular) Point wiring for Light / Bell with 2-1.5 sq.mm & earth wire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multistrand copper wires, in following type of pipe to be erected concealed in/ on surface on wall/ceiling complete with 6A Modular type switch / bell push & accessories and earth continuity of following type, erected on PVC / Metallic box, single mounting base frame covered with textured/metallic front plate modules erected on / in wall / ceiling as per pipe erected, with necessary Lamp holder/ceiling rose / H.D.Connector as directed. (f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete Cat. III	Pt.	The Relevant specification of item No.- 1 to 11 Page No.-17-19 shall be followed from 'Specification for Electrical work and item No. - 1 to 2.4.4 section F -2A shall be followed from Specification for Ele. Installation in building Page No.34-35 # The rate shall be for a unit of Point.
3	Point wiring for FAN with 2-1.5 sq.mm & earth wire of 1.5 sq.mm (Green) both are of .ISI marked 1.1 KV Grade FRLS PVC insulated multistrand copper wires, in following type of pipe to be erected concealed in / flushed on wall/ceiling complete with 6A Modular type switch and hum free EME four or more step type electronic fan regulator with separately mounted and accessories with earth continuity of following type erected on PVC / Metallic box, single mounting base frame covered with textured/metallic front plate modules erected on / in wall / ceiling as per pipe erected. with necessary ceiling rose / H.D.Connector as directed (f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete Cat-III	Pt.	The Relevant specification of item No.- 1 to 11 Page No.-17-22 shall be followed from 'Specification for Electrical work and item No. - 1 to 2.4.4 section F -2A shall be followed from Specification for Electrical Installation in building Page No.34-35 # The rate shall be for a unit of Point.
4	Point wiring for Individual Plug with & earth wire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multistrand copper wires, in following type of to be erected concealed in / on surface of wall / ceiling complete with Modular type switch & 5 pin Plug erected on PVC / Metallic box covered with appropriate front plate modules erected on / in wall / ceiling as per pipe erected with following type of accessories. [I] For 6A Plug with 2-1.5 sq.mm Cu. Wire (f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete Cat-III	Pt.	The Relevant specification of item No.- 1 to 11 Page No.-17-19 shall be followed from 'Specification for Electrical work and item No. - 1 to 2.4.4 section F -2A shall be followed from Specification for Ele. Installation in building Page No.34-35 # The rate shall be for a unit of Point.
5	Point wiring for Individual Plug with & earth wire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multistrand copper wires, in following type of to be erected concealed in / on surface of wall / ceiling complete with Modular type switch & 5 pin Plug erected on PVC / Metallic box covered with appropriate front plate modules erected on / in wall / ceiling as per pipe erected with following type of accessories. [II] For 16A Plug with 2-2.5 sq.mm Cu. Wire (f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete (FRLS) CAT III	Pt.	The Relevant specification of item No.- 1 to 11 Page No.-17-19 shall be followed from 'Specification for Electrical work and item No. - 1 to 2.4.4 section F -2A shall be followed from Specification for Ele. Installation in building Page No.34-35 # The rate shall be for a unit of Point.
6	Point wiring for Individual Plug with & earth wire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multistrand copper wires, in following type of to be erected concealed in / on surface of wall / ceiling complete with Modular type switch & 5 pin Plug erected on PVC / Metallic box covered with appropriate front plate modules erected on / in wall / ceiling as per pipe erected with following type of accessories. [III] For 16A Plug with 2-4 sq.mm Cu. Wire (f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete (FRLS) CAT III	Pt.	The Relevant specification of item No.- 1 to 11 Page No.-17-19 shall be followed from 'Specification for Electrical work and item No. - 1 to 2.4.4 section F -2A shall be followed from Specification for Ele. Installation in building Page No.34-35 # The rate shall be for a unit of Point.
7	Point wiring for Looped Plug with 6A Modular type switch & 5 pin socket erected on PVC / Metallic box, single mounting base frame covered with textured / metallic front plate modules erected on / in wall / ceiling with following type accessories. Single mounting base-frame & Textured / Metallic front plates. Cat-III	Pt.	The Relevant specification of item No.- 1 to 11 Page No.-17-19 shall be followed from 'Specification for Electrical work and item No. - 1 to 2.4.4 section F -2A shall be followed from Specification for Ele. Installation in building Page No.34-35 # The rate shall be for a unit of Point.
8	Point wiring for Two Way Controlled Light Point with 2-1.5 sq.mm & earth wire of 1.5 sq.mm (green) both are of .ISI marked 1.1 KV grade FRLS PVC insulated multistrand copper wires, in following type of pipe to be erected concealed in / flushed on wall/ceiling, complete with 6A Modular type switches and following type of accessories erected on PVC / Metallic box, single mounting base frame covered with textured / metallic front plate modules erected on / in wall / ceiling as per pipe erected. with necessary batten/angle holder or ceiling rose or H.D.Connector as directed. (f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete Cat-III	Pt.	The Relevant specification of item No.- 1 to 11 Page No.-17-19 shall be followed from 'Specification for Electrical work and item No. - 1 to 2.4.4 section F -2A shall be followed from Specification for Ele. Installation in building Page No.34-35 # The rate shall be for a unit of Point.
9	Providing following type of Modular Type Accessories mounted with pvc / metallic box, single mounting base frame covered with textured / metallic front plate , modules erected with necessary connection. As desired by Engineer In charge (4) TV Co-axial Socket outlet Cat-III	Ea.	The Relevant specification of item No.- 1 to 11 Page No.-17-19 shall be followed from 'Specification for Electrical work and item No. - 1 to 2.4.4 section F -2A shall be followed from Specification for Ele. Installation in building Page No.34-35 # The rate shall be for a unit of Each.
10	Providing following type of Modular Type Accessories mounted with PVC / metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate , modules erected with necessary connections as per site situation directed by Engineer In charge. (3) Two Pin/R)-11 Telephone Socket [A] For One Gang Cat-III	Ea.	The Relevant specification of item No.- 1 to 11 Page No.-17-19 shall be followed from 'Specification for Electrical work and item No. - 1 to 2.4.4 section F -2A shall be followed from Specification for Ele. Installation in building Page No.34-35 # The rate shall be for a unit of Each.

Sr. No.	Description of Item	Per / Unit	Specification Detail
11	Providing following type of Modular Type Accessories mounted with pvc / metallic box, single mounting base frame covered with textured / metallic front plate , modules erected with necessary connection. As desired by Engineer In charge (7) Blank Plate Single Cat-III	Ea.	The Relevant specification of item No.- 1 to 11 Page No.-17-19 shall be followed from 'Specification for Electrical work and item No. - 1 to 2.4.4 section F -2A shall be followed from Specification for Ele. Installation in building Page No.34-35 # The rate shall be for a unit of Each.
12	Providing following type of Modular Type Accessories mounted with pvc / metallic box, single mounting base frame covered with textured / metallic front plate , modules erected with necessary connection. As desired by Engineer In charge Decorative call bell Ting-tong box type 250 volts complete erected	Ea.	The Relevant specification of item No.- 1 to 11 Page No.-17-19 shall be followed from 'Specification for Electrical work and item No. - 1 to 2.4.4 section F -2A shall be followed from Specification for Ele. Installation in building Page No.34-35 # The rate shall be for a unit of Each.
13	Providing following type of Modular Type Accessories mounted with PVC / metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate , modules erected with necessary connections as per site situation directed by Engineer In charge. (8) Computer RJ-45 socket . cat-III	Ea.	The Relevant specification of item No.- 1 to 11 Page No.-17-19 shall be followed from 'Specification for Electrical work and item No. - 1 to 2.4.4 section F -2A shall be followed from Specification for Ele. Installation in building Page No.34-35 # The rate shall be for a unit of Each.
14	Providing & erecting Switch board for Computer or electric apparatus consisting of following items in single board erected on PVC / Metal board with 3 mm thick PC (Polycarbonate) / Acrylic sheet erected as directed 1 no. 6A/16A universal plug-switch combined. 3 nos. 6A Switch 3 nos. 6A 5 pin Plug [B] For Modular Type Accessories Cat III	Ea	The Relevant specification of item No.- 1 to 11 Page No.-17-19 shall be followed from 'Specification for Electrical work and item No. - 1 to 2.4.4 section F -2A shall be followed from Specification for Ele. Installation in building Page No.34-35 # The rate shall be for a unit of Each.
15	Providing and erecting ISI mark Medium class RIGID PVC PIPES of following size complete to be erected on/in wall or ceiling erected with necessary PVC fittings & Junction boxes fixed with adhesive solution & Clamps with following dia of pipes, in approved manner as directed b) 25 mm	Mtr.	The Relevant specification of item No.- 25 to 28 Page No.-23 to 26 shall be followed from 'Specification for Electrical work and item No. - 2.2.10 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 # The rate shall be for a unit of Meter.
16	Providing and erecting ISI mark Medium class RIGID PVC PIPES of following size complete to be erected on/in wall or ceiling erected with necessary PVC fittings & Junction boxes fixed with adhesive solution & Clamps with following dia of pipes, in approved manner as directed d) 40 mm	Mtr.	The Relevant specification of item No.- 25 to 28 Page No.-23 to 26 shall be followed from 'Specification for Electrical work and item No. - 2.2.10 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 # The rate shall be for a unit of Meter.
17	Providing & erecting PVC Corrugated Flexible Conduit with required nos. of coupling, PVC bushes, Check-nuts etc. complete of following sizes. (2) 25 mm	Mtr.	The Relevant specification of item No.- 25 to 28 Page No.-23 to 26 shall be followed from 'Specification for Electrical work and item No. - 2.2.10 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 # The rate shall be for a unit of Meter.
18	(A) Supplying and laying UPVC cable trunking system comprising unplasticised polyvinyl, chloride rigid material with ignition free & flame proof confirming BS .All necessary accessories and measuring of following sizes. (1) 75 mm x 50 mm trunking	Mtr.	The Relevant specification of item No.- 25 to 28 Page No.-23 to 26 shall be followed from 'Specification for Electrical work and item No. - 2.2.10 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 # The rate shall be for a unit of Meter.
19	Mains & Wires Mains with 1.1 KV grade FRLS PVC insulated ISI marked stranded Copper conductor wire in following type of pipe to be erected concealed in /flushed on wall/ceiling, with 1.5 sq. mm copper conductor FRLS PVC insulated stranded wire of green colour for earth continuity of following size (general wiring + in street light) (a) with medium class Rigid PVC pipe and accessories (a) 2 wire 1.5 sq. mm	Mtr.	The Relevant specification of item No.- 14 to 16 Page No.-21 shall be followed from 'Specification for Electrical work. The rate shall be for a unit of Meter.
20	Mains with 1.1 KV grade FRLS PVC insulated ISI marked stranded Copper conductor wire in following type of pipe to be erected concealed in /flushed on wall/ceiling, with 1.5 sq. mm copper conductor FRLS PVC insulated stranded wire of green colour for earth continuity of following size (general wiring + in street light) (a) with medium class Rigid PVC pipe and accessories (b) 2 wire 2.5 sq. mm (FRLS)	Mtr.	The Relevant specification of item No.- 14 to 16 Page No.-21 shall be followed from 'Specification for Electrical work. The rate shall be for a unit of Meter.
21	Mains with 1.1 KV grade FRLS PVC insulated ISI marked stranded Copper conductor wire in following type of pipe to be erected in / on wall / ceiling with 2.5 sq. mm copper conductor FRLS PVC insulated stranded wire of green colour for earth continuity of following size (FRLS) (a) with medium class Rigid PVC pipe and accessories (a) 2 wire 4 sq. mm	Mtr.	The Relevant specification of item No.- 14 to 16 Page No.-21 shall be followed from 'Specification for Electrical work. The rate shall be for a unit of Meter.
22	providing and erecting Mains with 1.1 KV grade FRLS PVC insulated ISI marked stranded Copper conductor wire in following type of pipe to be erected in / on wall / ceiling with 2.5 sq. mm copper conductor FRLS PVC insulated stranded wire of green colour for earth continuity of following size (A) with medium class Rigid PVC pipe and accessories (b) 2 wire 6 sq. mm	Mtr.	The Relevant specification of item No.- 14 to 16 Page No.-21 shall be followed from 'Specification for Electrical work. The rate shall be for a unit of Meter.
23	providing and erecting Mains with 1.1 KV grade FRLS PVC insulated ISI marked stranded Copper conductor wire in following type of pipe to be erected in / on wall / ceiling with 2.5 sq. mm copper conductor FRLS PVC insulated stranded wire of green colour for earth continuity of following size (A) with medium class Rigid PVC pipe and accessories (H) 4 wire 6 sq. mm	Mtr.	The Relevant specification of item No.- 14 to 16 Page No.-21 shall be followed from 'Specification for Electrical work. The rate shall be for a unit of Meter.

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24	Providing and erecting XLPE(IS:7098)(I)-88 ISI armoured cable multistrand Aluminium conductor for 1.1 KV. to be laid on wall with necessary clamps or in existing trench / pipe of following size of cables (B) 3 1/2 core 35 Sq. mm ( 16 Sq. mm 1/2 core)	Mtr.	The Relevant specification of item No.- 25.1.2 to 28 Page No. 23 shall be followed from 'Specification for Electrical work and item No. - 2.5 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Meter.
25	Providing and erecting XLPE (IS:7098)(I)-88 ISI armoured cable multistrand Aluminium conductor for 1.1 KV. to be laid on wall with necessary clamps or in existing trench / pipe of following size of cables a) 4 Core 16 Sq.mm.	Mtr.	The Relevant specification of item No.- 25.1.2 to 28 Page No. 23 shall be followed from 'Specification for Electrical work and item No. - 2.5 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Meter.
26	Providing and erecting XLPE (IS:7098)(I)-88 ISI armoured cable multistrand Aluminium conductor for 1.1 KV. to be laid on wall with necessary clamps or in existing trench / pipe of following size of cables (c) 4 core 10 Sq. mm	Mtr.	The Relevant specification of item No.- 25.1.2 to 28 Page No. 23 shall be followed from 'Specification for Electrical work and item No. - 2.5 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Meter.
27	Supplying and erecting Flexible PVC insulated multi strand multi core 1.1 kv grade ISI marked copper wires of following size to be erected as directed.(e) 1.50 Sq.mm 3 core round PVC sheathed	Mtr.	The Relevant specification of item No.- 25.1.2 to 28 Page No. 23 shall be followed from 'Specification for Electrical work and item No. - 2.5 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Meter.
28	Supplying & erecting XLPE(IS:7098)(I)-88 ISI unarmoured copper cable 1.1 KV grade to be erected as directed of following size. (E) 3 core 2.5 Sq. mm	Mtr.	The Relevant specification of item No.- 25.1.2 to 28 Page No. 23 shall be followed from 'Specification for Electrical work and item No. - 2.5 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Meter.
29	Providing and, fixing heavy duty flange type brass cable gland with rubber ring for PVC insulated armoured cable complete with out going tails, insulating tape etc for following size of cables. (c) 2 to 4 core 10 Sq. mm	Ea.	The Relevant specification of item No.- 25.1.2 to 28 Page No. 23 shall be followed from 'Specification for Electrical work and item No. - 2.5 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
30	Providing and, fixing heavy duty flange type brass cable gland with rubber ring for PVC insulated armoured cable complete with out going tails, insulating tape etc for following size of cables. d) 2 to 4 Core 16 Sq.mm	Ea.	The Relevant specification of item No.- 25.1.2 to 28 Page No. 23 shall be followed from 'Specification for Electrical work and item No. - 2.5 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
31	Providing and, fixing heavy duty flange type brass cable gland with rubber ring for PVC insulated armoured cable complete with out going tails, insulating tape etc for following size of cables. (A) 3 core 35/50 Sq. mm	Ea.	The Relevant specification of item No.- 25.1.2 to 28 Page No. 23 shall be followed from 'Specification for Electrical work and item No. - 2.5 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
32	Solderless crimping type Aluminium lugs conforming to IS suitable for cable of following size evenly crimped with high pressure tool & connected to switchgear terminals with brass/cadmium plated nut bolts in an approved manner. (B) 10 Sq.mm	Ea.	The Relevant specification of item No.- 25.1.2 to 28 Page No. 23 shall be followed from 'Specification for Electrical work and item No. - 2.5 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
33	Solderless crimping type Aluminium lugs conforming to IS suitable for cable of following size evenly crimped with high pressure tool & connected to switchgear terminals with brass/cadmium plated nut bolts in an approved manner. (D) 35/50 Sq.mm. . (ISI MARKED)	Ea.	The Relevant specification of item No.- 25.1.2 to 28 Page No. 23 shall be followed from 'Specification for Electrical work and item No. - 2.5 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
34	Solder less crimping type Copper lugs conforming to IS suitable for cable of following size evenly crimped with high pressure tool & connected to switchgear terminals with brass/cadmium plated nut bolts in an approved manner. (A) 1.5/2.5 to 6 Sq.mm	Ea.	The Relevant specification of item No.- 25.1.2 to 28 Page No. 23 shall be followed from 'Specification for Electrical work and item No. - 2.5 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
35	Providing and fixing approved make Perforated C type cable tray. Made from pre- galvanized CR sheet steel. The cable tray should be bended as per IS 2062/1079 . with coupler plate / Fish plate and GI hardware like nut - bolt and washers etc. erected on existing support as per Specification and as per instruction of engineer in charge. 150 X 50 X 1.5 mm Thick	Rmt.	As per attached Annexure - 1 A
36	Providing and fixing approved make Perforated C type cable tray. Made from pre- galvanized CR sheet steel. The cable tray should be bended as per IS 2062/1079 . with coupler plate / Fish plate and GI hardware like nut - bolt and washers etc. erected on existing support as per Specification and as per instruction of engineer in charge. 100 X 50 X 1.5 mm Thick	Rmt.	As per attached Annexure - 1 A
37	Providing and fixing approved make 'T' Junction for Perforated C type cable tray. Made from pre galvanized CR sheet steel. The Junction should be bended as per IS 2062/1079. with coupler plate / Fish plate and GI hardware like nut - bolt and washers etc. erected on existing support as per Specification and as per instruction of engineer in charge.. 150 X 50 X 1.6 mm Thick 'T' Junction	Ea.	As per attached Annexure - 1 A

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38	Making trench in soft soil of suitable width of 90 cms deep for laying cable or locating the fault all over the run and backfilling the same and making the surface as normal ground.	Mtr.	The Relevant specification of item No.- 25.1.2 to 28 Page No.- 23 shall be followed from 'Specification for Electrical work and item No. - 2.5 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Meter.
39	Providing & laying approved make Double walled corrugated pipes (DWC) of polyethylene(conforming to IS 14930 II )with necessary connecting accessories of same material at required depth for laying of cable. below ground / road surface for enclosing cable and back filling the same to make ground as per original. (A)50 mm dia	Mtr.	As per attached Annexure - 1 B
40	SECTION 3.00 SWITCHGEARS & DISTRIBUTION BOARDS MINIATURE CIRCUIT BREAKERS. Miniature circuit breaker single pole 6A to 25A suitable to operate on 240 V A.C. system and having breaking capacity 10 KA to be erected in existing box. confirming to IS 8828/1996 with ISI Mark(QTY FOR MCB OF DB AND MCB OF PANEL) Cat-III	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.- 19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
41	Providing and erecting Approved make Four pole moulded case circuit breaker having breaking capacity ICU of 25 KA. at 415 V, having normal current rating up to 25 A to 100A. with Fixed thermal & magnetic release suitable to work on A.C. supply 50 c/s. with all internal connections, spreader tinned copper & complete erected in existing 16 G.M.S. housing. ICS=100% of ICU only Cat III	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.- 19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
42	Providing and erecting Approved make RCCBs conforming to IS: 12640 and having sensitivity of 30 mA and Short Circuit withstand capacity of 10 KA and suitable for operation on 3 phase and neutral 415V,50Hz. having characteristic of quick action & tripping with all advance feature & do not incorporate any electronic component for following Max. rating erected as directed. (iv) 100 Amps. FP (100 mA Sensitivity)	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.- 19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
43	Providing & erecting 415 V MCB Four Pole for Motor & Inductive Load (C Curve) having 10KA breaking capacity & confirms to IS :8828 in existing box having following capacity((QTY FOR MCB OF DB AND MCB OF PANEL)Also consider in general) (A) 6-32 Amp Cat.III	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.- 19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
44	Providing & erecting 415 V MCB Four Pole for Motor & Inductive Load (C Curve) having 10KA breaking capacity & confirms to IS :8828 in existing box having following capacity((QTY FOR MCB OF DB AND MCB OF PANEL). (B) 40 Amp Cat.III	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.- 19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
48	Providing & erecting 415 V MCB Four Pole for Motor & Inductive Load (C Curve) having 10KA breaking capacity & confirms to IS :8828 in existing box having following capacity. (c)63 Amp. Cat III	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.- 19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
45	Providing & erecting 240 V MCB double pole switch for lighting Load (B Curve) having 10 KA breaking capacity & confirms to IS : 8828 in existing box having following capacity (A) 6 to 32 Amp.	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.- 19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
46	Sheets steel powder coated enclosure suitable for incorporating One/Two nos. MCB	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.- 19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
47	Providing & erecting 415 V MCB three Pole for Motor & Inductive Load (C Curve) having 10KA breaking capacity & confirms to IS :8828 in existing box having following capacity (a) 6 to 32 Amp.	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.- 19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
48	Providing & erecting 415 V MCB three Pole for Motor & Inductive Load (C Curve) having 10KA breaking capacity & confirms to IS :8828 in existing box having following capacity (B) 40 Amp.	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.- 19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea..
49	Providing & erecting 415 V MCB three Pole for Motor & Inductive Load (C Curve) having 10KA breaking capacity & confirms to IS :8828 in existing box having following capacity (c)63 Amp. CAT III	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.- 19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
50	Providing and erecting Sheet Steel powder coated MCB distribution board - flush / surface mounted fitted with busbar, neutral link, earth bar and DIN rail, Conforms to IS 8623-1 & 3, IEC 61439-1 & 3 without MCB to house appropriate nos. of MCBs.(The DBs should be used of same company of MCB to be used) suitable for (b) sheet steel double door (IP-43) (ii) <b>6 way</b>	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.- 19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.

Sr. No.	Description of Item	Per / Unit	Specification Detail
51	Providing and erecting Sheet Steel powder coated MCB distribution board – flush / surface mounted fitted with busbar, neutral link, earth bar and DIN rail, Conforms to IS 8623-1 & 3, IEC 61439-1 & 3 without MCB to house appropriate nos. of MCBs.(The DBs should be used of same company of MCB to be used) suitable for <b>(B) three phase incoming and single phase horizontal type outgoing Per phase isolation type (PPI) (b) sheet steel double door (iii)8 way</b>	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.- 19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
52	Providing and erecting Sheet Steel powder coated MCB distribution board – flush / surface mounted fitted with busbar, neutral link, earth bar and DIN rail, Conforms to IS 8623-1 & 3, IEC 61439-1 & 3 without MCB to house appropriate nos. of MCBs.(The DBs should be used of same company of MCB to be used) suitable for <b>(B) three phase incoming and single phase horizontal type outgoing Per phase isolation type (PPI) (b) sheet steel double door (ii)6 way</b>	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.- 19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
53	Providing and erecting Sheet Steel powder coated <b>Vertical MCB distribution board (VTPN) – flush / surface mounted double door (IP54)</b> fitted with insulated copper busbar, isolated neutral link, earth bar and DIN rail, confirming to IS 13032 and BS 5486-1986,IP-54 suitable for 63/100 AMP TPN MCCB + RCCB as incomer and three phase outgoing as per following .(The DBs should be used of same company of MCB to be used) <b>(D)12 way outgoing</b>	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.- 19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
54	EARTH LEAKAGE CIRCUIT BREAKERS. Approved make ELCBs / RCCBs conforming to IS: 12640 and having sensitivity of 30 mA and Short Circuit withstand capacity of 6 KA and suitable for operation on single phase 240 V. having characteristic of quick action & tripping with all advance feature & do not incorporate any electronic component.for following Max. rating erected as directed Cat-III (ii) 40Amps. DP	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.- 19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
55	Approved make ELCBs / RCCBs conforming to IS: 12640 and having sensitivity of 30 mA and Short Circuit withstand capacity of 6 KA and suitable for operation on single phase 240 V. having characteristic of quick action & tripping with all advance feature & do not incorporate any electronic component.for following Max. rating erected as directed (i) 25 Amps.DP Cat-III	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.- 19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
<b>SECTION 4.00 LIGHTFIXTURE AND FAN</b>			
56	Supplying and erecting LED indoor fittings with LEDs of wattage 0.2 Watt to 0.5 Watt assembled on single MCPB, with housing used as a heat sink shall be made of thick sheet Steel conforming to IS: 513/CRCA/ aluminium die cast powder coated and high U.V. & corrosion resistance with diffuser with company mark/name 160V to 270V, Power Factor more than 0.9, THD < 15%, CCT 3000 K to 6500K, Luminaire efficacy> 85 lumens/watt ,LED LED driver efficiency > 85 % ( fitting required LM-79 & LM-80 Certificates)(NOTE: Below description have shown ranges of Wattage capacity of LED fittings.The Engineer incharge may select any wattage capacity between the ranges shown.)(A) Tube Light with integral driver (v) 36-40 Watts, Surge-2 KV, IP-20, conventional 4 feet Cat-III	Nos.	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 2.8 section F -2A shall be followed from Specification for Electrical Installation in building Page No.39 # The rate shall be for a unit of Nos.
57	(A) Providing 45 to 50 cms. 16 SWG conduit pipe down rod white painted with ball sockets and nipple for suspension of fluorescent fitting complete erected with lead wires.	Mtr	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 2.8 section F -2A shall be followed from Specification for Electrical Installation in building Page No.39 # The rate shall be for a unit of Meter.
58	(B) Extra for every additional 100 mm. long double down rod.	Mtr	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 2.8 section F -2A shall be followed from Specification for Electrical Installation in building Page No.39 # The rate shall be for a unit of Meter.
59	(C) Square shaped Surface/Recessed Mount Downlight with provision for spring loaded mounting clips complete.IP20 (iii) 16-20 watts, Surge-2 KV. Cat-III	Ea.	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 2.8 section F -2A shall be followed from Specification for Electrical Installation in building Page No.39 # The rate shall be for a unit of Nos.
60	(B) LED Panel Light with provision for Plane front frame with translucent cover fixed to housing complete.IP20 (v) 24 watts, 12" x 12" , Surge-2 KV	Ea.	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 2.8 section F -2A shall be followed from Specification for Electrical Installation in building Page No.39 # The rate shall be for a unit of Nos.
61	(H) Mirror Light 9 Watts, wall mounted minimum 1 feet long	Ea.	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 2.8 section F -2A shall be followed from Specification for Electrical Installation in building Page No.39
62	Supplying and erecting approved make Octagonal pole made from HR sheet steel. The pole should be made as per IS. and shall be coated with hot dip galvanizing as per IS 2629/2633/4759, suitable suspend local wind speed with integral Junction box consist of terminal plate of min 6mm Hylam sheet, standard profile 35mmX7.5mm Din-Rail for MCB Mounting, stud type terminal and arrangement for cable termination to be erected With Suitable foundation (Included) as per details given by manufacturer considering site requirement. (D) 6 Mtr. Long 70 mm Top X 135 mm bottom dia, 3 mm thickness with 200mmX200mmX12mm base plate, 4-M20 Bolts and 600mm long J-Bolt.Approx Pole weight 59 kg	Ea.	As per attached Annexure - 1 C
63	Providing and erecting street light pole bracket comprising main B Class GI pipe of 4.2 cm/require outside dia. complete with suitable B Class G.I sleeve tubing of approx. 45cms.length and suitable for 76.5 mm / 80mm. / require size pole top having sufficient fasteners for fixing the brackets and having spread of 1 mtr. length with suitable rise as per site condition & suitable welded stiffener reducer and nipple with check nut complete painted with one coat of Red oxide / PU base primer and two coats of Aluminium / PU paint. paint with following nos of arms.[A] Single Arm bracket 1 Mtr	Ea.	As per attached Annexure - 1 C

Sr. No.	Description of Item	Per / Unit	Specification Detail
64	Supplying and erecting LED street light fittings with High power White LEDs wattage of 3 Watt and above assembled on single MCPCB, efficiency more than 130 lm/w and corrosion free High pressure die cast aluminum housing with smooth finish powder coated and heat sink extruded aluminium with diffuser and Polycarbonate optics/ lenses, with toughened glass with company mark/name engraved or embossed 160 to 270 V,Power Factor more than 0.95, THD < 10 %, CCT 3000 K to 5700K,Uniformity ratio >0.45, Luminaire efficacy> 100 lumens/watt . LED driver efficiency > 85 %.( fittings required LM-79 & LM-80 certificates)(NOTE: Below description have shown ranges of Wattage capacity of LED fittings.The Engineer incharge may select any wattage capacity between the ranges shown.)(A) Street Light (IP-65), Surge protection -4KV integral and ,Light must have 440VAC line supply with over-voltage protection. (iii) Above 60 to 90 watts Cat-III	Ea.	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 2.8 section F -2A shall be followed from Specification for Electrical Installation in building Page No.39 # The rate shall be for a unit of Nos.
65	Supplying & erecting approved make IP 55 grade Company fabricated Timer Panel of following capacity for switch On-Off street lights on time scheduling basis made from 16G CRCA sheet duly epoxy power painted inside and outside with hinged doors and locking arrangement consisting of suitable size of 4 Pole MCB and 4 pole contactor (cat-III)with analog time switch, auto manual switch of same make and suitable input and output Bakelite terminals and with door earthing approved by Engineer in charge.(A) 32 Amp	Ea.	Item No. - 2.6.8 section F -2A shall be followed from Specification for Electrical Installation in building Page No.38 # The rate shall be for a unit of Nos.
66	Supplying and erecting LED flood light fittings with High power White LEDs wattage of 1Watt and above assembled on single MCPCB, efficiency more than 130 lm/w and corrosion free High pressure die cast aluminum housing with smooth finish powder coated and heat sink extruded aluminium with diffuser and Polycarbonate optics/ lenses with company mark/name engraved or embossed 120 to 300 V,Power Factor more than 0.95, THD < 10 %, CCT 3000 K to 5700K, Uniformity ratio >0.45, Luminaire efficacy> 100 lumens/watt . LED driver efficiency > 85 %.CREE / OSRAM / PHILIPS Lumileds / NICHIA / SEOUL/ BridgeLux (U.S.A.) make LED used for luminaire. ( fittings required LM-79 & LM-80 certificates)(NOTE: Below description have shown ranges of Wattage capacity of LED fittings.The Engineer incharge may select any wattage capacity between the ranges shown.) (A) Street Light (IP-65), Surge protection - 4KV integral and 10 kv non integral ,Light must have 440VAC line supply protection. It should withstand 48 hours for 440VAC line supply(B) Flood Light (IP-65), Surge -4KV.Light must have 440VAC line supply protection. It should withstand 48 hours for 440VAC line supply (iii) Above 60 to 90 watts Cat-II	Ea.	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 2.8 section F -2A shall be followed from Specification for Electrical Installation in building Page No.39 # The rate shall be for a unit of Nos.
67	Supplying & erecting approved make <i>SMC press moulded composite FRP</i> . loop-in, loop-out approx. 2mm thick box complete with Bakelite connector strip 5way(3P+N+E),DIN rail for mounting mob & hinged doors as per requirement having locking arrangements with mounting clamp with nuts, bolts & washers suitable for erection on pole with cable clamps& earth bolt of following size of box.( c)150mm x 125mm x 100mm [deep]	Ea.	The Relevant specification of item No.- 13 to 13.10 Page No.-19 to 21 shall be followed from 'Specification for Electrical work and item No. - 2.6 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Ea.
68	FANS & ACCESSORIS. Providing & erecting Approved make Power Saving 50 Watt Ceiling Fan with double ball bearing ISI mark with Condenser 230 volt A.C. 50 Hz 1200 mm sweep complete having 3blades with aluminium blades with , canopy & 30 cm. down rod erected with earthing.(Make shall be approved by Engineer in charge)	Ea.	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 2.8 section F -2A shall be followed from Specification for Electrical Installation in building Page No.39 # The rate shall be for a unit of Ea.
69	FANS & ACCESSORIS. Supplying and erecting 19 / 20 mm. nominal bore Medium Class M.S. Pipe down rod erected duly painted for fan complete with proper insulation without leakage and earthing.	Mtr.	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 2.8 section F -2A shall be followed from Specification for Electrical Installation in building Page No.39 # The rate shall be for a unit of Meter.
70	Supplying & erecting fan hook box of 10 mm M.S. round bar bounded to the RCC bars up to 50mm length each side and pierced through a 16 Gauge M.S. box / Heavy Duty PVC box complete erected concealed in Ceiling with necessary finishing.	Ea.	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 2.8 section F -2A shall be followed from Specification for Electrical Installation in building Page No.39 # The rate shall be for a unit of Ea.
71	Providing 2.5mm.thick laminated acrylic sheet to cover the fan hook or Fan box.	Ea.	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 2.8 section F -2A shall be followed from Specification for Electrical Installation in building Page No.39 # The rate shall be for a unit of Ea.
72	EXHAUST FANS. Supplying & erecting approved make low noise decorative exhaust fan having square frame ABS body with inbuilt lowers & square frame. 200mm with 1350RPM. Cat-II	Ea.	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 2.8 section F -2A shall be followed from Specification for Electrical Installation in building Page No.39 # The rate shall be for a unit of Ea.
73	Providing and erecting required size HOT deep Galvanised iron strip for earthing of H.T. , OCB/ ACB/ Transformer LT panel board, Motors etc. using proper clamp.	Kg.	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 1 section G shall be followed from Specification for Electrical Installation in building Page No.40 # The rate shall be for a unit of Kg.
74	Providing and erecting required size Copper strip for earthing of H.T. OCB / ACB/ Transformer, LT panel board, Motors etc. using copper clamp.	Kg.	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 1 section G shall be followed from Specification for Electrical Installation in building Page No.40 # The rate shall be for a unit of Kg.
75	Providing and erecting HOT deep Galvanised iron strip wire 8 to 16 SWG.Using for DB earthing wire 8 to 16 SWG.	Kg.	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 1 section G shall be followed from Specification for Electrical Installation in building Page No.40 # The rate shall be for a unit of Kg.

Sr. No.	Description of Item	Per / Unit	Specification Detail
76	Supplying & erecting in earthpit of minimum bore dia. 225mm size ASH or approved make Safe Earthing Electrode consisting Pipe-in-Pipe Technology as per IS 3043-1987 made of corrosion free G.I.Pipes having Outer pipe dia of 80 mm having 80-200 Micron galvanising, Inner pipe dia of 40 mm having 200 250 Micron galvanising, connection terminal dia of 14 mm with constant ohmic value surrounded by highly conductive compound with high charge dissipation suitable for panel earthing.[A] For electrical installation up to 440 V(c) For Electrical Installation covering Transformer Neutrals, Lightning arrester Earthing, A.C.Plant & Sensitive Computer System(like Automation, SCADA) i.e independent Earthing in normal soil. [B] For Electrical installation up to 11 KV located in other than normal soil i.e. Soft Rock, Marshy Soil etc. -Length of Pipe : 2 mtr -Back filling Compound :1 no. Bag of 25 Kg.	Ea.	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 1 section G shall be followed from Specification for Electrical Installation in building Page No.40 # The rate shall be for a unit of Kg.
77	Supplying & erecting in earthpit of minimum bore dia. 225mm size ASH or approved make Safe Earthing Electrode consisting Pipe-in-Pipe Technology as per IS 3043-1987 made of corrosion free G.I.Pipes having Outer pipe dia of 80 mm having 80-200 Micron galvanising, Inner pipe dia of 40 mm having 200 250 Micron galvanising, connection terminal dia of 14 mm with constant ohmic value surrounded by highly conductive compound with high charge dissipation suitable for panel earthing.[A] For electrical installation up to 440 V(c) For Electrical Installation covering Transformer Neutrals, Lightning arrester Earthing, A.C.Plant & Sensitive Computer System(like Automation, SCADA) i.e independent Earthing in normal soil. Length of Pipe : 3.00 mtrs Back filling Compound :2 nos Bags of 25 Kg.	Ea.	The Relevant specification of item No.- 19 to 22 Page No.-22 to 23 shall be followed from 'Specification for Electrical work and item No. - 1 section G shall be followed from Specification for Electrical Installation in building Page No.40 # The rate shall be for a unit of Kg.
78	Supplying & erecting approved make Telephone Cable electrolytic copper conductor PE insulation twisted in two pairs, & wrapped with FRLS PVC tape & sheathed with FRLS PVC or HFFR outer Jacket suitable for telephone wiring & conforming to C-DOT erected in existing pipe. of following size of conductors & nos.of pairs. With necessary connections. (b) Armoured [Jelly Filled] 1) Ten Pairs	RMT	The Relevant specification of item No.- 25.1.3 Page No.-23 to 24 shall be followed from 'Specification for Electrical work and item No. - 2.9 section F-2A shall be followed from Specification for Electrical Installation in building Page No.39 # The rate shall be for a unit of Rmt.
79	SITC of Digital / PCM / TDM EPABX System having SMT design, system with flexible universal slots. Inbuilt Auto attendant facility, Minimum 15 Nos. conference, Analog extension line, Calling GSM, E&M line, PRI / El / VOIP program me through Analog telephone digital key from Ethernet, public address cord, shall have unrestricted simultaneous dialing facility, QSIG protocol on PRI, 95 / STD / ISD / Local-Locking, Class of Service, Quick Dial-Single Digit dialing of any two external number, Once only ring device, Boss/Secretary-Do not disturb Facility, Power Down Mode, Hot Line, Hot Outward Dialing, Day Night Mode, Auto Call Back, Barge-in, Call Pick Up & Call Transfer, Call transfer while Ringing with Voice Guide System, (DISA), Caller ID (CLI), CLI Base ECF, CLI Base routing Internet Ready Port, External Music Port, Call Budgeting, Call Most Calculation (ASMDR), DID Direct Inverse Dialing, External Music Input, Fax Homing, Global Directory Printing with following capacities [A] No of Extension 16, No of Junctions 6, 8 Port IP Resource in-built, 4 Port Web base Video Conferencing, No of expandable ports : 48, Operators Console - 01 Compatible : ISDN	NO	The Relevant specification of item No.- 25.1.3 Page No.-23 to 24 shall be followed from 'Specification for Electrical work and item No. - 2.9 section F-2A shall be followed from Specification for Electrical Installation in building Page No.39 # The rate shall be for a unit of No.
80	Supplying & erecting approved make LAN cable of following size in existing pipe as per direction. [D] CAT - 6 e	RMT	The Relevant specification of item No.- 25.1.2 to 28 Page No.- 23 shall be followed from 'Specification for Electrical work and item No. - 2.5 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Meter.
81	Providing following type of Modular Type Accessories mounted with pvc / metallic box, single mounting base frame covered with textured / metallic front plate , modules erected with necessary connection. As desired by Engineer In charge (19) Modular Indicating Call Bell.Cat.III	Nos.	The Relevant specification of item No.- 16 Page No.-21 shall be followed from 'Specification for Electrical work and item No. - 2 section F -2A shall be followed from Specification for Electrical Installation in building Page No.34 to 35 # The rate shall be for a unit of Meter.
82	Providing following type of Modular Type Accessories mounted with pvc / metallic box, single mounting base frame covered with textured / metallic front plate , modules erected with necessary connection. As desired by Engineer In charge (20) Modular Buzzer.Cat.III	Nos.	The Relevant specification of item No.- 16 Page No.-21 shall be followed from 'Specification for Electrical work and item No. - 2 section F -2A shall be followed from Specification for Electrical Installation in building Page No.34 to 35 # The rate shall be for a unit of Meter.
83	Supplying and erecting approved make online Un-interruptible Power Supply system comprising flat cum boost charger, static Inverter & sealed maintenance free SMF batteries. The charger having operating capacity for input 160-270V AC & inverter having output 230V,50 Hz Ac with 0.8 load power factor with battery, over/under voltage output with over load & short circuit protection equipment. The system housed in CRC sheet duly powder coated paint with following power backup.with MS painted batteries stand, 10% Overload capacity for momentary load.(C) 3 KVA with 1Hr Backup	Nos.	As per attached Annexure - 1 E
84	Providing and erecting water cooler having storage capacity 80Ltr. & cooling capacity 40 Ltr.per hour @ an ambient temp of 45° C. The outlet temp. of the water should drop by 15° C within a hour, The water cooler should be comprising of hermetically sealed compressor, fan motor, condensing unit, water tank surrounded by evaporating coil, thermostats, relay etc. complete with necessary inlet & outlet connection. The body of water cooler will be made from Stainless Steel. °	Ea.	As per attached Annexure - 1 F
85	Supplying & erecting 5 stage single reverse osmosis water purification system with M.S. powder coated frame, prefilter housing with 'O' ring presediment filter GAC filter, carbon filter suitable buster DC pump capacity 80 psi, mention with 40 psi inline type post carbon filter auto low & high pressure switches with following size of storage tank & LPH capacity & erected as directed [C] 50 Ltr / Hr with 150 psi 2 nos booster pump	Ea.	As per attached Annexure - 1 F
86	Providing Water proof straight Joint in PVC insulated flat flexible copper cable by using insulating material, water proofing material, & making the joint complete. (A) Up to 10Sq. mm	Ea.	The Relevant specification of item No.- 25.1.2 to 28 Page No.- 23 shall be followed from 'Specification for Electrical work and item No. - 2.5 section F -2A shall be followed from Specification for Electrical Installation in building Page No.36 to 37 # The rate shall be for a unit of Meter.

Sr. No.	Description of Item	Per / Unit	Specification Detail
87	Supply Installation Testing & Commissioning of 2MP IP Dome 1/2.8" Progressive CMOS, ICR, Olux with IR, 2688x1520:25fps(P)/30fps(N), 3 Streams, Slow Shutter, rue WDR, 3D Noise Reduction, Adaptive Streaming, Smart Streaming and ROI, SNR > 70 dB, H.265/H.264/MJPEG, DC12V & PoE, 3D DNR, BLC, HLC, 5 Edge Based analytics – Line crossing detection, intrusion detection, unattended baggage detection, object removal detection, Face Detection, Support Micro SD/SDHC/SDXC card upto 512GB IP	Nos	As per attached Annexure - 1 D
88	Supply Installation Testing & Commissioning of 64 Channel NVR with 16 HDD Slots (each slot 10TB), supports upto 2MP Camera, 512 Mbps throughput, ONVIF Supported	Nos	As per attached Annexure - 1 D
89	Supply Installation Testing & Commissioning of 8TB Surveillance Harddisk	Nos	As per attached Annexure - 1 D
90	SITC of 48 x 10/100/1000BASE-T ports 4 x Gigabit GbE/SFP combo ports Advanced L2 switching and security features L2+ Static Routing Optional "standard mode" or "surveillance mode" management user interface	Nos	As per attached Annexure - 1 D
91	Providing & Erecting Netwrok rack with following capacity with Necessary cooling fan,Cable manager,6A PDU,equipment rack with necessary mounting accessories. (A) 9 U	Nos	As per attached Annexure - 1 D
92	Supply, Installation, Testing and Commissioning of 32" Floor Standing LED/ LFD Digital Display with software and media player. Display: Direct LED Backlight, Full HD Diagonal screen size 32" inch Panel resolution should be full HD : 1920x1080p, Brightness : 410 cd/m², minimum Contrast ratio : 10000:1 and Aspect ratio : 16:9 Viewing angle : 178°/178°, Video In : RCA X 1, Audio In :HDMI In : HDMI : 1.4 X 2, USB Input : USB 2.0 X 1, Audio Out : RCA Pin type X 2 RS232C, VGA IN, PC AUDIO IN, Operation Hours 24 x 7, Housing: Floor Standing Housing for 32" LED panel specially design for digital Signage / Kiosks. Should be working as a standalone solution or a network solution. Monitor should be mounted in floor stand vertical condition with minimum 2.5 feet above floor level, base of floor stand should be solid in construction to take weight of 32" LED. Stand should have 240V power input All necessary standard cables required for interfacing the equipment like power cable, HDMI cable, USB cable, etc.	Nos	As per attached Annexure - 1 D
93	Providing and erecting approved make split air-conditioning unit consisting of copper condensing unit with fan motor, hermetically sealed rotary compressor with accessories etc. duly connected separately erected evaporating unit and blower motor with its accessories by means of extra supplied proper insulated copper tubing,drain PVC pipes suitable for ( cost includes powder coated Stand, Eco Friendly green gas charging, 15A plug top & Remote Control) with necessary core cutting.For 4/5 star Rating of current year (c) for 2 ton capacity	Each	As per attached Annexure - 1 G
97	Spot Light 425 Lumens, Surge-2KV (ii) 8 to 11 Watts	Each	As per attached Annexure - 1 H
98	Adjustable spot light with COB led having aluminium reflector of following wattage (iv) 30 Watts	Each	As per attached Annexure - 1 H
99	Step Light having Aluminium die cast and ABS Plastic material.(i) 5 watts, Direct/Indirect luminaire	Each	As per attached Annexure - 1 H
100	Supply, Installation, Testing and Commissioning of 10-18 Watt Spike light with adjustable head anti rust with spike with aluminium housing with black powder coated finish offers uniform light distribution with IP65 protection suitable to provide accent lighting with input voltage 220-240V, 50 Hz, 480 lumen high surge protection 2.5 KV, CCT 3000 - 6000K , long lifte of LEDs 50,000 BH, as per IEC standard safety standard (IEC60598) with driver	Each	As per attached Annexure - 1 H

## **ANNEXURE – 1A**

### **TECHNICAL SPECIFICATIONS FOR PERFORATED GI CABLE TRAY**

**1. Description of the item:**

**SCOPE:**

This specification covers the technical requirements, testing and other general requirements for the supply of Perforated GI Cable Tray.

**2) GENERAL REQUIREMENTS:**

The perforated cable trays shall be manufactured from good commercial, high grade strength sheet steel having minimum thickness of 1.5mm for Tray.

**3) DESIGN & WORKMANSHIP:**

- 3.1) The perforated cable trays shall be galvanized according to IS-2629, BS- 729-1971 or equivalent standard suitable for indoor/outdoor use having moderate humidity and air pollution.
  - 3.2.1 The zinc coating thickness shall work out by applying a 610 gm of zinc per square meter surface with an approximate thickness of 80 microns.
  - 3.2.2 The zinc coating shall be smooth, clean and uniform thickness and free from defects like ash and dross inclusions, bare patches, black spots, pimples, lumpiness, rust stains, blisters etc.
  - 3.2.3 The galvanizing shall not adversely affect the mechanical properties of the coated material
  - 3.2.4 All manufacturing process including punching, cutting, bending and welding of perforated cable trays shall be completed and burrs shall be removed before the application of galvanization process is applied.
- 3.2) The joints of two trays shall be butt construction and shall be made with the help of coupler plates by nuts and bolts. The coupler plate and nuts and bolts shall also be properly hot dip galvanized.
- 3.3) The perforated trays shall be free from sharp edges and burns etc. so that joint between two trays shall be without any clearance and matched in proper shape.
- 3.4) Coupler plate shall be fitted at each side runner at one end. The coupling plates shall be supplied with bolts, nuts and washers fitted at the other four holes for fixing to adjoining member.
- 3.5) Coupling plates shall be designed to permit longitudinal adjustment up to  $\pm 10\text{mm}$  and skew up to  $10^\circ$

**4) INSPECTION & TESTING:**

- 5.1 The Following Visual Inspection Tests shall be carried out on Perforated Trays.
  - a) Quality and thickness of Cable Trays and Tray Covers.
  - b) Dimension as per specified in SI No-4 of this specification.
  - c) Uniformity of Galvanizing Coating.
- 5.2 The supplier/ Manufacturer shall be responsible for performing all inspection and testing.
- 5.3 The Purchaser or his authorized representative shall have access to the supplier's premises at all reasonable times to the extent necessary to access compliance with the provisions of these specifications.
- 5.6 The supplier shall notify to the purchaser date and location for performing tests giving sufficient time to enable the purchaser to be present.
- 5.7 In the event of failure to meet the specification and test requirements herewith the purchaser or his authorized representative has right to reject the trays.
- 5.8 In the event of rejection, supplier shall arrange replacement within 15 days from the date of such intimation from our Stores Officer.

## ANNEXURE – 1B

### TECHNICAL SPECIFICATION FOR DWC HDPE PIPES

#### 1 Scope

This Specification covers design, manufacturing, testing, packing, supply of DWC HDPE Pipe.

#### 2 Service Conditions:

Equipment to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions.

- a) Maximum ambient temperature of air: 50°C
- b) Maximum temperature of air in shade: 4°C
- c) Maximum daily average ambient temperature: 40°C
- d) Maximum yearly average ambient temperature: 30°C
- e) Relative Humidity: up to 95%
- f) Average number of thunder storm days per annum: 15
- g) Maximum annual Rainfall: 150cm
- h) Maximum Altitude above mean sea level: 1000Meter
- i) Maximum Wind Pressure: 150 Kg/cm<sup>2</sup> (As per IS 802 latest code)
- j) Maximum soil temperature at cable depth: 30°C
- k) Maximum soil thermal resistivity: 150°C cm/watt

#### 3 Technical Parameters:

- (a) DWC high density Polyethylene pipe shall have corrugation on outer wall but inner wall shall be plain conforming to IS – 14930 Part I and II amended from time to time.
- (b) Terminology as defined in IS: 14930 shall be followed
- (c) DWC HDPE pipe to be supplied shall be 'ISI' marked.
- (d) Accessories like HDPE snap fit coupler with neoprene 'O' ring shall be part of supply to make the joints water / damp proof.

#### 4 Code & Standards:

All standards, specifications and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions as on date of opening of bid. In case of conflict between this specification and those (IS: Codes, standards, etc.) referred to herein, the former shall prevail.

- a) IS:14930Pt.-I: General requirements of Conduit System for Electrical and Communication installation
- b) IS:14930Pt.-II: Particular requirements of Conduit system for Electrical and Communication installation
- c) IS: 2530: Method for test for Polyethylene moulding material and polyethylene compounds.
- d) IS:7328: HDPE materials for moulding and extrusion
- e) IS:12063 : Classification of degrees of protection provided by Enclosures of electrical equipment
- f) ASTM D 1693: Test method for environmental stress–Cracking of ethylene plastics
- g) ASTM D638: Standard test method for tensile properties of plastic
- h) ASTM D790: Test method for flexural properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- i) ASTM D 2240: Standard Test method for Rubber property.
- j) ASTM D648: Standard Test method for deflection temperature of Plastic under flexure load in the Edge Wise Position.

- k) IS:11000(Pt-2): Glow-wire Test and guidance test methods for fire /Sec-1)  
Hazard Testing.

## **5 General Requirement:**

### **5.1 General:**

- i. The DWC HDPE pipe shall consist of two layers, the outer layer will be corrugated and the inner layer shall be plain and smooth.
- ii. DWC HDPE pipe shall be so designed and constructed that in normal use their performance is reliable and without danger to the user or surroundings.
- iii. When assembled in accordance with manufacturer's instruction as part of a conduit system, they shall provide mechanical protection to Signaling Cables' on tainted therein.
- iv. Within the conduit system there shall be no hard edge, burrs or surface projections which are likely to damage insulated conductors or cables or inflict injury to the installer or user.
- v. The protective properties of the joint between conduit and conduit fittings shall be not less than that declared for the conduit system.
- vi. The DWC HDPE pipe and fittings shall withstand the stresses likely to occur during transport, storage, recommended installation and application.
- vii. The DWC HDPE pipe shall be supplied in continuous length in coil form or straight length, suitable for shipping and handling purpose.
- viii. For conduit systems that are assembled by means other than threads, the manufacturer shall indicate whether the system can be disassembled and if, so, how this can be achieved.

### **5.2 REQUIREMENTS OF RAW MATERIALS USED FOR THE DWC HDPE PIPE**

- i. The base HDPE resin used for the outer and inner layer of the DWC HDPE Pipe shall conform to any designation of IS: 7328 or to any equivalent standard meeting the requirements given in Table No.1, when tested as per the standards given therein. However, the manufacturers shall furnish the designation for the HDPE resin as per IS: 7328 as applicable.
- ii. The anti-oxidants used shall be physiologically harmless.
- iii. None of the additives shall be used separately or together in quantities as to impair long term physical and chemical properties of the duct.
- iv. Single pass rework material of the same composition produced from the manufacturer's own production may be used and it shall not exceed 10% in any case.
- v. The raw material used for extrusion shall be dried to bring the moisture content to less than 0.1%.
- vi. Suitable UV stabilizers shall be used only for manufacture of the non-black colored HDPE duct to protect against UV degradation, when stored in open for minimum 8 months' period. The purchaser may ask for UV content test. The test result for UV Content test by FTIR method from any recognized laboratory shall be accepted and the Hindered Amine Light Stabiliser shall be minimum 0.15 %. UV Content test need not to be conducted in case of UV Stabilized raw material is used.

### **5.3 REQUIREMENT OF DWC HDPE PIPE**

- i. Visual Requirement: The Pipe shall be checked visually for ensuring good workmanship that the ducts shall be free from holes, breaks and other defects. The ends shall be cleanly cut and shall be square with axis of the ducts.
- ii. Colour: The colour of the pipe viz. Green, Orange, Blue, Yellow, Brown, Violet, Grey and Red. The purchaser shall specify the colour of the duct at the time of ordering.

- iii. Dimensions: The dimensions of the DWC HDPE pipe shall be as per requirement / BOQ.
- iv. Standards Length: Duct up to 50 mm OD nominal size shall be supplied in standard length of 100 mtr.  $\pm 1\%$  or 6 mtr  $\pm 1\%$  and all other sizes will be supplied in standard length of 6 mtr.  $\pm 1\%$
- v. Compression Strength: The conduit system shall have adequate mechanical strength. Conduits when bent or compressed either during, or after, installation according to manufacturer's instructions, shall not crack and shall not be deformed to such an extent that introduction of the insulated conductors or cables becomes difficult or that the installed insulated conductors, or cables are likely to be damaged while being drawn in. Compliance may be checked with the application of force which shall be at least 450 N, when reaching the deflection of 5%.
- vi. Impact Strength: The conduit system shall have adequate mechanical strength.
- vii. Conduits when exposed to impact either during, or after, installation according to manufacturer's instructions, shall not crack and shall not be deformed to such an extent that introduction of the insulated conductors or cables becomes difficult or that the installed insulated conductors, or cables are likely to be damaged while being drawn in. Compliance may be checked by ensuring there shall be no crack allowing the ingress of light or water between the inside and outside after the test.
- viii. Bending Strength: The conduit system shall have adequate mechanical strength. Conduits when bend either during, or after, installation according to manufacturer's instructions, shall not crack and shall not be deformed to such an extent that introduction of the insulated conductors or cables becomes difficult or that the installed insulated conductors, or cables are likely to be damaged while being drawn in. During the test sample shall not flatten Compliance shall be checked by passing a ball having a diameter equal to 95% minimum inner diameter of the sample declared by the manufacturer, through the sample whilst it is bent around the test apparatus.
- ix. Oxidation Induction Test (OIT): The OIT in a qualitative assessment of the level (or degree) of stabilization of material.
- x. Resistance to Flame Propagation: Non flame propagating ducts shall have adequate resistance to flame propagation. Samples of DWC HDPE Ducts shall be checked by applying a 1KW flame.
- xi. Anti-Rodent Properties: Safety of ducts from the direct attack of subterranean organism anti rodent material is of utmost importance. These ducts shall be evaluated for their safety against rodents before laying them in the fields.
- xii. Resistance to External Influences on DWC HDPE Duct Accessories: The accessories in Clause 11.5.4 shall be tested for external influences as per IS-12063 for ingress of dust & ingress of water. DWC Duct systems when assembled in accordance with the manufacturer's instructions shall have adequate resistance to external influences according to the classification declared by the manufacturer with a requirement of IP 67.
- xiii. Marking Identification: The conduit shall be prominently marked at regular intervals along their length of preferably 1m but not longer than 3m using indelible ink with following.  
 Manufacturers name  
 Specification No.  
 Name of the duct with size  
 Lot No. of the Product  
 Date of manufacture

Product Length

Purchaser's Name/symbol

#### **5.4 DWCHDPE PIPEACCESSORIES**

- i. The following accessories are required for jointing the ducts and shall be supplied along with the ducts against specific orders. The manufacturers shall provide complete procedure and method for installation of the accessories. The required quantities of accessories are to be mentioned by the purchasing authority in the purchase order.
- a. Plastic Coupler:  
The coupler shall be of Push-fit type with O-ring. It is used for jointing two or more ducts. The design of this shall be simple easy to install and shall provide air tight and water tight joint between the two ducts. The coupler shall insure that the two ducts are butted smoothly without any step formation in the inner surface. The coupler may be straight, bands, T-joints type as per requirements of purchaser.
- b. End Cap:  
This cap made of suitable plastic material shall be fitted on the both ends of duct, coil after manufacturing the duct. This shall avoid entry of dust, mud and rain water into the duct during the transit & storage.

#### **5.5 Selection of pipe for different sizes Cables**

Following guide of the pipe fill shall be used for sizing the pipe Size:

- a. 1 cable in pipe - 53% full
- b. 2 cable in pipe - 31% full
- c. 3 or more cables - 43% full
- d. 4 Multiple cables - 40% full

### **6 Tests**

The following tests shall be carried out in accordance with IS or the latest version thereof:

#### **a. TYPE TESTS**

- i) Visual.
- ii) Requirement of Colour.
- iii) Dimension
- iv) Standard Length
- v) Compression Strength
- vi) Impact Strength
- vii) Bending Strength
- viii) Oxidation Induction Test
- ix) Resistance to Flame Propagation
- x) Anti-Rodent
- xi) Resistance to External influence on DWCHDPE Pipe

#### **b. ACCEPTANCE TESTS**

The following tests be carried out by the manufacturer after 240 hrs of manufacture: -

- i) Visual Requirement
- ii) Requirement of Colour.
- iii) Dimension
- iv) Standard Length
- v) Compression Strength
- vi) Impact Strength
- vii) Bending Strength
- viii) Resistance to Flame Propagation

**c. ROUTINE TESTS**

The following tests be carried out by the manufacturer after 240 hrs of manufacture: -

- i) Visual Requirement
- ii) Requirement of Colour.
- iii) Dimension
- iv) Standard Length
- v) Compression Strength
- vi) Impact Strength
- vii) Bending Strength
- viii) Resistance to Flame Propagation

**7 Tests Procedure**

**a) COMPRESSION TEST**

- i. Conduits are subjected to a compression test as per IS: 14930 (Pt-II). The tests for conduits shall not be rated until 240 hrs after manufacture.
- ii. Samples shall be 200 ±5mm long.
- iii. Before the test the outside and inside diameters of the samples shall be measured as described in clause above.
- iv. The samples shall be compressed between two flat steel plates having minimum dimensions (100x200x15mm), the length 200mm being along the length of the sample. The sample shall be compressed at a rate of 15±0.5mm/min and the load recorded at the vertical deflection equivalent to 5% of the average value of the original inside diameter of the sample.
- v. When reaching the deflection of 5 %, the applied force shall be at least 450N
- vi. After the test there shall be no crack allowing the ingress of light or water between the inside and the outside.
- vii. The deflection is calculated with the inner diameter but the measurement of the outside diameter may be sufficient. In case of doubt, it will be necessary to measure the inner diameter.

**b) IMPACT TEST**

- i. Twelve samples of the duct each 200±5mm in length or fittings are subjected to an impact test as per IS: 14930(Pt-II) by means of the apparatus shown Figure-1.
- ii. The test apparatus shall be placed on a firm flat surface. The samples shall be conditioned in a cold chamber at a temperature of -5±1°C for 2h. The samples shall be removed from the cold chamber and placed on the vee block holder of the impact tester as shown in figure 1.
- iii. The striker shall fall once on each sample. The time between removal of the sample from the cold chamber and completion of impact shall not exceed 10 seconds. The impact height and mass shall be as follows.

Nominal Size of Conduit	Mass of Striker (+1%/-0%)kg	Fall Height (+0%/-1%)(mm)	Energy Joules
Upto 60 mm	5	300	15
61 to 90 mm	5	400	20
91 to 140 mm	5	570	28
Above 140mm	5	800	40

- iv. The test sample shall be made on the weakest part of the Duct fittings except that it shall not be applied within 5mm of any sample entry. Samples of ducts are tested on

the center of their length.

- v. After the test, at least in nine of the samples, there shall be no crack allowing the ingress of light or water between the inside and the outside.

**c) BENDING TEST**

- i. This test shall be carried out on pliable conduits.
- ii. The test is made on six samples having an appropriate length as per IS: 14930 (Pt II). Three samples shall be tested at room temperature; the other three shall be tested at  $5 \pm 1^\circ\text{C}$ . For the test at  $-5^\circ\text{C}$ , the sample shall be conditioned in a cold chamber for 2 hours. The test apparatus as shown in Figure-2 shall allow bending the duct with a bending radius equal to the minimum bending radius values specified by the manufacturer. One of the ends of the samples shall be fixed. The sample is then bent to approximately 90 degrees (right angle) and held.
- iii. During the test, the sample shall not flatten. Compliance shall be checked by passing a ball having diameter equal to 95% minimum inner diameter of the sample declared by the manufacturer, through the sample whilst it is bent around the test apparatus.

**d) OXIDATION INDUCTION TEST PROCEDURE**

- i. A short length of completed duct (approximately 30cm) shall be sealed at the end and placed in an oven at temperature of  $68 \pm 1^\circ\text{C}$  for 8 hours. The sample shall then be allowed to cool at room temperature for at least 16 hrs. The samples shall be clean and dry. The sample shall then be tested by means of a Differential Scanning Calorimeter (DSC) or by Differential Thermal Analyzer (DTA).
- ii. Instrument Test Procedure:
  - Cell Cleaning: The cell shall be held at approximately  $400^\circ\text{C}$  for 10 minutes in Nitrogen. The cell shall be cleaned after standing over night and between testing of different formulations.
  - Temperature Calibration: This has to be done according to the instrument manual. The temperature scale should be adjusted until the determined melting point of pure Indium metal is  $156.6^\circ\text{C}$  at a heat rate of  $5^\circ\text{C}$  per minute or any other heat rate as indicated in the manual of the equipment is permitted.
  - Aluminum Pan Preparation: Standard aluminum DSC pans as per ASTM D 4565 are required to hold specimens during testing. A fresh pan shall be used for each test.
  - Sample preparation: Take the sample weighing about 5mg from the duct conditioned as indicated above. Position the sample in the center of the pan.
  - Nitrogen Purge: Place the sample pan and reference pan in instrument cell. Flush for 5 minutes with cylinder of nitrogen (99.6% extra dry grade) at  $60 \pm 10$  cc per minute.
  - Oxidation Test: Rapidly increase the temperature of the sample ( $20^\circ\text{C}$ /min or greater) from  $100^\circ\text{C}$  or lower initial temperature to  $199 \pm 1^\circ\text{C}$ . After thermal equilibrium is obtained (steady recorder signal) switch to  $80 \pm 20$  cc per minute oxygen flow and simultaneously start time-base recording. The oxygen used for the test should be equivalent to or better than 99.6% extra dry grade.
  - Induction Period: The oxygen induction point shall be recorded as time zero, and the chart speed shall be sufficient to provide a clearly discernible loop at the start of the exothermic reaction. The test in the pure dry oxygen atmosphere shall continue until the exothermic peak is produced. The intersection of the tangent of the exothermic sloped line with the extended base line will be drawn. The time from time zero to this intersection point is read from the base line and recorded as the oxidative induction time.

e) **RESISTANCE OF LAME PROPAGATION TEST PROCEDURE**

- i. Samples of DWC HDPE Ducts shall be checked by applying 1KW flame.
- ii. As sample of length  $675 \pm 10$  mm is mounted vertically in a rectangular metal enclosure with one open face, as shown in Figure-3-2 in an area substantially free from draughts. The general arrangements is shown in Figure-3 Mounting is by means of two metal clamps approximately 25mm wide spaced  $550 \pm 10$ mm apart and approximately equal distance from the ends of the sample. A steel rod of  $16 \pm 0.1$  mm is passed through the sample. It is rigidly and independently mounted and clamped at upper end to maintain the sample in a straight and vertical position. The means of mounting is such as not to obstruct drops from falling on to the tissue paper. A suitable piece of white pine wood board, approximately 10 mm thick, covered with single layer of white tissue paper is positioned on the lower surface of the enclosure.
- iii. The assembly of sample, rod and clamping apparatus is mounted vertically in the center of the enclosure, the upper extremity of the lower clamp being  $500 \pm 10$ mm above the internal allowed surface of the enclosure.
- iv. The burner is supported so that its axis is  $45 \pm 20^\circ$  to the vertical. The flame is applied to the samples that the distance from the top of the burner tube to the sample measured along the axis of the flame is  $100 \pm 10$ mm and the axis of the flame intersects with the surface of the samples at a point  $100 \pm 5$  mm from the upper extremity of the lower clamp, and so that the axis of the flame intersects with the axis of the sample.
- v. The test is carried out on three samples. During the application of the flame, it shall not be moved except to remove it at the conclusion of the period of the test. After the conclusion of the test and after any burning of the sample has ceased, the surface of the sample is wiped clean by rubbing with a piece of cloth soaked with water.
- vi. All three samples shall pass the test. If the sample is not ignited by the flame, it shall be deemed to have passed the test.  
If the sample burns, or is consumed without burning, the sample shall be deemed to have passed the test if after burning has ceased, and after the sample has been wiped in accordance with 1.3 there is no evidence of burning or charring within 50mm of the lower extremity of the upper and also within 50mm of the upper extremity of the lower clamp.  
If the sample burns, it shall be deemed to have failed the test if combustion is still in progress 30 seconds after removal of the flame.  
If the tissue paper ignites, the sample shall be deemed to have failed the test. For the parts of the same below the burner, the presence of molten material on the internal or external surfaces shall not entail failure if the sample itself is not burned or charred.
- vii. Compliance of DWC HDPE Duct fittings is checked by using the glow wire test IS: 11000 (Part 2/Sec 1). The glow wire shall be applied once to each sample in the most unfavorable position of its intended use, with the surface tested in vertical position, at a temperature of  $750 \pm 5^\circ\text{C}$ . The sample is deemed to have passed this test if there is no visible flame or sustained glowing or inflames or glowing extinguishes within 30 seconds of removal of the glow wire.

f) **ANTI-RODENT TEST PROCEDURE:**

The test against rodent may be conducted as per following procedures:

The ducts are to be laid underground in fields and also near urban or rural settlements. Therefore, they should be exposed to 3-4 most predominant rodent species in habiting these locations. The test rodent species may include the lesser bandicoot rat, *Bandicota bengalensis*, The Indian gerbils, *Tatera indica*, the soft furred field rats, *Millomys* and the house rats, *Rattus rattus*.

The test ducts should be exposed to the serodent species housed individually in iron mesh cages under laboratory conditions. Only freshly capture rodent are to be utilized for the study. The rodent sare first acclimatized in laboratory cages for 7-10 days and then the tests be initiated. For each trial, 3-4 rodents of uniform body weight are to be used for the trial. Two different types of testes may be under taken for all the ducts.

Choice Tests: In this trial the ducts of 15-30 cm length (ones ample each of treated and untreated/ control sample) are exposed to the test rodents along with food, thus the roden thada choice between the food and the test duct. This test may be run for longer periods (30-45days). Tap water should be provided adlibitum to the rodents.

NO Choice Test: The rodents are exposed to the test ducts only and no food is given to the rodents during the period of trial. The test ducts (one sample each of treated and untreated/control sample) are to the exposed to the test rodents. This trail may be run for 5-7 days depending upon the health status of starved test rodents. Tap water should be providing dad labium other rodents.

Observation on tooth marks, rodent behavior toward exposed ducts, and relative extent of damage in treated and untreated samples should be computed for both types of ducts. Health status of test animals in choice and no choice test must also be monitored for their cordanyill effect of exposure of treated/ control ducts on these animals. Number of cases and the extent of rodent bites/scratch marks in control and anti-rodent treated ducts may indicate the relative deterrent/repellent properties of the test ducts.

## **ANNEXURE – 1C**

### **TECHNICAL SPECIFICATION FOR OCTAGONAL POLE**

#### **SPECIFICATION:**

The pole should be made as per IS. and shall be coated with hot dip galvanizing as per IS 2629/2633/4759, suitable suspend local wind speed with integral Junction box consist of terminal plate of min 6mm Hylam sheet, standard profile 35mmX7.5mm Din-Rail for MCB Mounting, stud type terminal and arrangement for cable termination to be erected With Suitable foundation (Included) as per details given by manufacturer considering site requirement. (B) 4 Mtr. Long 70 mm Top X 130 mm bottom dia, 3 mm thickness with 200mmX200mmX12mm base plate, 4-M16 Bolts and 450mm long J-Bolt.Approx weight 37 kg

The pole shall be provided with Street light Bracket suitable for Pendant type lighting luminaires.

The color of the pole shall be Graphite Gray or as confirmed by Client.

The materials of the pole as follows:

Base Plate: E 250 conforming to IS 226 / IS 2062

Foundation bolts: as per IS 1367

Galvanization: - The poles shall be hot dip galvanized as per IS 2629 / IS 2633 / IS 4759 standards with average coating thickness of minimum 65 micron. The galvanizing shall be done in single dipping. The zinc Ingot raw material shall be 99.99% pure and procured from reliable sources with Quality Test Certificates.

The pole manufacturing & galvanizing unit shall be ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection.

Entire Pole and its accessories shall be given an extensive three stage treatment with PU based etch primer and paint prescribed for such surfaces to make it absolutely rust and corrosion proof, as well as giving it a pleasing appearance.

The Lighting pole & overhang shall be painted with two coat of approved colour and shade with synthetic enamel paint after GI coating.

Electrical connections - Four-way connectors shall be provided along with Slide lock suitable for connecting 1.1 kV grade, Al cable. It shall also house 1 no. DP MCB, connectors for looping with Copper wires for connecting to the luminaires through 1.1 kV grade PVC insulated copper conductor flexible un-armoured Cable from the terminal block to the fixtures within the pole.

All the cables laid through the pipe shall be without any joint.

The poles shall have integrated Junction box with openable door of adequate size. The pole shall be adequately strengthened at the location of the door to compensate for the loss in section.

The door of the Junction Box shall permit clear access to the components inside viz., termination strips, connectors, MCBs, cables etc. There shall also be suitable arrangement for the purpose of earthing.

Two nos. Earth Boss shall be provided at the bottom of the pole (diagonally opposite) suitable for connecting GI/ CU earth strip GI wire for earthing of the poles. Similar Earth Boss suitable for connecting shall be provided on the control plate inside the Junction Box for earthing of the electrical components.

## **ANNEXURE – 1D**

### **CCTV System**

**1.)** The Closed Circuit Television System (CCTV system) shall provide an on-line display of video images on monitor. Cameras with suitable lenses shall be used to view specific areas of interest. The primary objective of implementing a CCTV system is to ensure effective surveillance of an area and also create a record for post event analysis. The CCTV System shall comprise of Dome Cameras, Digital Multiplex Recorder and other associated accessories.

### **2.) Equipment**

The CCTV System shall comprise of Dome Cameras, Digital Multiplex Recorder and other associated Accessories.

### **3.) Dome Camera.**

#### **IP Dome/Bullet Camera**

Image Sensor 1/3" progressive scan CMOS  
Min. Illumination Color: 0.01Lux @ (F1.2,AGC ON),0.028Lux @ (F2.0, AGC ON)  
Shutter Speed 1/3s to 1/100,000 s  
Slow Shutter Yes  
Auto-Iris No  
Day &Night IR cut filter  
DNR (Digital Noise Reduction) 3D DNR  
WDR (Wide Dynamic Range) DigitalWDR  
Angle Adjustment (Bracket) Pan: 0° to 360°, tilt: 0°to 180°, rotation:0° to 360°  
Lens  
Focal length 2.8 mm, 4 mm, 6 mm  
Aperture F2.0  
Focus No  
FOV 2.8 mm, horizontal FOV 100°, vertical FOV 55°, diagonal FOV 117°  
4 mm, horizontal FOV 77°, vertical FOV 42°, diagonal FOV 88°  
6 mm, horizontal FOV 51°, vertical FOV 28°, diagonal FOV 58°  
Lens Mount M12  
IR  
IR Range Up to 30 m  
Wavelength 850nm  
Compression Standard  
Video Compression Main stream:H.265/H.264  
Sub stream:H.265/H.264/MJPEG  
H.264 Type BaselineProfile/Main Profile/High Profile  
H.264+ Main stream supports  
H.265 Type Main Profile  
H.265+ Main stream supports  
Video Bit Rate 32Kbps to8Mbps  
Smart Feature-set  
Region of Interest 1 fixed region for main stream and sub-stream  
Image  
Max. Resolution 2560×1440  
Main Stream 50Hz: 20fps (2560 × 1440, 1920 × 1080, 1280 × 720)  
Max. Frame Rate 60Hz: 20fps (2560 × 1440, 1920 × 1080, 1280 × 720)

Sub-stream 50Hz: 20fps (704 × 576, 352 × 288, 640 × 480, 320 × 240)

Max. Frame Rate 60Hz: 20fps (704 × 480, 352 × 240, 640 × 480, 320 × 240)

Image Enhancement BLC, 3D DNR

Image Setting Saturation, brightness, contrast, sharpness, AGC, white balance

Adjustable by client software or web browser

Day/Night Switch Auto, scheduled

Network

Network Storage NAS (NFS, SMB/CIFS)

Alarm Trigger Motion detection, video

Tampering alarm, illegal login

Protocols TCP/IP, ICMP, HTTP, HTTPS, FTP, DHCP, DNS, DDNS, RTP, RTSP, RTCP,

NTP, UPnP, SMTP, SNMP, IGMP, 802.1X, QoS, IPv6UDP, Bonjour

General Function Anti-flicker, heartbeat, mirror, password protection, privacy

Mask, watermark, IP address filter

- **24 Port Giga Switch**

- Compliant with IEEE802.3, IEEE802.3u, IEEE802.3X, IEEE802.3ab Ethernet standards
- 16/24\*10/100/1000Mbps auto-negotiation RJ45 ports
- Auto MDI/MDIX
- 8K MAC address and MAC address learning
- IEEE 802.3x full duplex flow control, and Backpressure half duplex flow control
- 32 Gbps/48 Gbps backplane bandwidth for non-blocking line-speed forwarding
- LED indicators for indicating working status and troubleshooting
- Built-in power supply system with 4000V common mode and 4000V differentiate mode lightning immunity
- 1U standard height suitable for desktop and rack installation
- Ports all with 4000V common mode lightning immunity
- IP camera connection

**15) Audio System**

Supply, Installation, Testing & Commissioning of Audio System including its various components as given in the BOQ complete in all respect with all required hardware, accessories, supports etc

**1.) Material**

**2.) Workmanship**

As per IS & instruction of engineer in-charge / consultant. Proper screwing shall be done so as to avoid gaps and maximum area overlap is available.

**3.) Mode of measurement**

The rate shall be as specified in BOQ complete.

## **ANNEXURE – 1E**

### **Technical specification of 3KVA UPS along with SMF Battery**

S N	TECHNICAL PARAMETERS	PARAMETER DESCRIPTION
1.0	Type	Single phase, IGBT based, Online UPS
2.0	Input	240V±10% V AC, 50±5% Hz, Single phase-three wire (Phase+Neutral+Ground)
3.0	Output :	
3.1	Output	5.0KVA
		230V±10% V AC, 50±5% Hz, Single phase-three wire (Phase+Neutral+Ground)
3.2	Output Waveform	Sinusoidal
3.3	Voltage Regulation	≤ ±2%
3.4	Inverter Efficiency	≥ 80%
3.5	Overload Capability	110% for ≥10 Minutes
3.6	Total Harmonic distortion (THDI)	<5% at Full load
3.6	Transient response	Less than ±10% voltage variation at sudden application/removal of full load and it shall recover within 500msec.
4.0	Environment	Approx.:0-50°C & 95% RH
5.0	Charger	Charging mode shall be provided
		Battery Charging Voltage & Current shall be adjustable
		Line & load Regulation: ≤ ±2%
		Output Ripple : ≤ 3%
6.0	Battery	Battery shall be of Sealed Maintenance (SMF) or VRLA type
		Battery Backup shall not be less than 4Hrs.at full load
7.0	Functional Test certificates	<ul style="list-style-type: none"> <li>• Insulation Resistance &amp; HV test</li> <li>• Load Regulation &amp; Transient response test</li> <li>• Efficiency</li> <li>• Ripples</li> <li>• Battery capacity test</li> <li>• UPS Functional Test</li> <li>• Spare PCBs/Cards Test Reports</li> </ul>
8.0	User Manual	One set of User Manual (It shall include Specification, Operating Procedure, BOM, Alarm-annunciations, PCB Functions details, PCB Circuit diagrams & Trouble shooting) shall be provided with each UPS

## **ANNEXURE – 1F**

### **SPECIFICATION OF WATER COOLER AND RO**

#### **WATER COOLER**

Internal Storage: 80 Litre

Cooling Capacity: 40 litre per hour

Dimension (l x b x h) in mm: 665 x 485 x 1210

Weight (Kg): 65

No. of Faucets: 1 Normal+ 1 Cold

Refrigerant: R-134 A

Current: 2 .5 AMPS

Type Of Compressor: RECIP

Body and Tank Material: Stainless Steel 304

#### **REVERSE OSMOSIS WATER PURIFICATION**

Operation: 5 stage single reverse osmosis water purification system

Frame: M.S. powder coated with carbon filter suitable buster

Permeate Flow Rate: 50 Ltr /Hr.

Operating Pressure: 12 Bar

DC pump capacity: 80 psi mention with 40 psi inline

Booster Pump: 150 psi 2 nos. booster pump

## **ANNEXURE – 1G**

### **Technical specification of Split Air-conditioning Unit**

<b>S N</b>	<b>TECHNICAL PARAMETERS</b>	<b>PARAMETER DESCRIPTION</b>
<b>1.0</b>		Comfortable Air Flow, Power Air Flow Dual Flaps, Multi Air Flow, Automatic Air Flow Adjustment (Adjust, Power Dual), Double Swing Automatic 3D, Air flow - High m <sup>3</sup> /hr:1120
<b>2.0</b>	<b>Air Flow Direction</b>	2 Way Direction
<b>3.1</b>	<b>Dehumidification</b>	No
<b>3.2</b>	<b>Operating Mode</b>	Coil Dry, Dry Function, Economy Mode, Powerful Mode
<b>3.3</b>	<b>Turbo Mode</b>	No
<b>3.4</b>	<b>Other Convenience Features</b>	Program Timer, Sleep Timer, Quiet Mode
<b>3.5</b>	<b>Additional Features</b>	Connection Pipe Size (Gas/Liquid)(mm): 5/8, 1/4, Pipe Length Max (Pre-charged)(m):20 (7.5), Height Difference(m):8
<b>3.6</b>	<b>Front Panel Display</b>	No
<b>3.6</b>	<b>Body Design Features</b>	Condenser Fin Type:Blue Fin
<b>4.0</b>	<b>Control Console</b>	Remote Control
<b>5.0</b>	<b>Compressor</b>	Hyper Tropical Rotary
<b>6.0</b>	<b>Operating Current</b>	8.3 Am pere
<b>7.0</b>	<b>Moisture Removal</b>	2.2 Litres/Hr
<b>8.0</b>	<b>Cooling Capacity</b>	6500 Watts
<b>9.0</b>	<b>Power Requirements</b>	AC 220 - 240 V, 50 Hz
<b>10.</b>	<b>Power Input</b>	1850 Watt

## **ANNEXURE – 1H**

### **SPIKE LIGHT:**

WATTAGES: 10-18W

PROTECTION: IP65

INPUT VOLTAGE: 220-240 V

FREQUENCY: 50 Hz

SURGE PROTECTION: 2.5 KV

LUMENS: 3000 to 6000K

IEC standard: IEC60598

### **WALL LIGHT: 5W**

Intended use : OUT DOOR FITTINGS

Total lumen output fixture: 360

Bulb technology: LED

Light color: 4000K

Wattage bulb included: 5W

Class of protection: CLASS 1

Color rendering index (CRI) : 80

Material: ALUMINIUM

### **SPOT LIGHT: 8-30W**

Intended use :IN/OUT DOOR FITTINGS

Total lumen output fixture: 360

Bulb technology: LED

Wattage bulb included: 5W

Color rendering index (CRI) :>75

Light color: 4000K

POWER FACTOR : 0.5

### **STEP LIGHT:**

WATTAGES: 5W

INPUT VOLTAGE: 220-240 V

FREQUENCY: 50 Hz

SURGE PROTECTION: 2.5 K

MAKE LIST FOR ELECTRICAL WORKS		
SR.NO.	ITEM	STANDARD MAKE
1	LT PANELS	CPRI / ERDA APPROVED PANEL BUILDER. 70 KA SHORT CIRCUIT WITHSTAND STRENGTH. ACCESSORIES AS PER MENTIONED IN MAKE LIST. L&T / SIEMENS / SCHNIDER
2	DISTRIBUTION BOARDS	LEGRAND/ SCHNIEDER/ HAVELLS/ SIEMENS/ L & T
3	VOLTAGE STABILIZER	SERVO / HINDUSTAN STABILIZER /V-GUARD /SUVIK
4	CABLE TRAY ( ALL TYPE )	UNIVERSAL/ INDIANA/ KEW/ RUSHAB / PRECISION/ THINKTRECK
5	LT SWITCHGEAR (ALL RANGE)	AS PER SPECIFIED PANEL DISCRIPTION IN BOQ. MODEL AS PER SPECIFIED IN BOQ
6	MCCB	LEGRAND/ SCHNIEDER/ HAVELLS/ SIEMENS/ L & T
7	MCB, ELCB	LEGRAND/ SCHNIEDER/ HAVELLS/ SIEMENS/ L & T
8	SFU	LEGRAND/ SCHNIEDER/ HAVELLS/ SIEMENS/ L & T
9	LT CONTACTORS	LEGRAND/ SCHNIEDER/ HAVELLS/ SIEMENS/ L&T
10	CHANGE OVER SWITCH	LEGRAND/ SCHNIEDER/ HAVELLS/ SIEMENS/ L&T
11	STARTER (STAR-DELTA / DOL)	LEGRAND/ SCHNIEDER/ HAVELLS/ SIEMENS/ L&T
12	SUBMERCIBLE MOTOR/MONOBLOCK PUMP SET	CROMPTON / KIRLOSKAR / LUBI/GRUNDFORE
13	METERS (DIGITAL)	ENERCON / CONZERVE / SCHNEIDER / AE / SECURE / ABB
14	LOAD MANAGER	ENERCON / SEM / KRYKARD/CONZERVE/ NIPPEN/L & T
15	RELAYS- EARTH FAULT	LEGRAND/ SCHNIEDER/ HAVELLS/ SIEMENS/ GE
16	INDICATING LAMP	SIEMENS / SCHNEIDER ELECTRIC / BINAY / ABB / MG / KAPPA/ PRECIFINE/ TEKNIC
17	ELECTRIC TIMER	SIEMENS / TORRENT / LEGRAND/CONSERVE / EAPL
18	ROTARY SWITCH	SIEMENS / SCHNEIDER ELECTRIC / KEYCEE / SALZER
19	PUSH BUTTON AND PUSH BUTTON SET	SIEMENS / SCHNEIDER ELECTRIC / BINAY / ABB / MG / BCH / RAAS CONTROL / C&S
20	SELECTOR SWITCH	KEYCEE / SALZER / C&S / SCHNEIDER / SIEMENS
21	ANNUNCIATOR	PROTON / EAPL
22	LUGS	DOWELL'S / 3D /HMI / (ISI MARKED)
23	BIMETALLIC LUGS	DOWELL'S/ HMI /3D (ISI MARKED)
24	CABLE GLAND	3D / COMET / HMI (ISI MARKED)
25	PVC CONDUITS AND ACCESSORIES	PRECISION / ANCHOR / POLYCAB/NIHIR
26	CASING CAPING	PRECISION / NIHIR / POLYCAB
27	MODULAR SWITCHES, SOCKETS & OTHER ACCESSORIES	MK / LEGRAND /HAVELLS / ANCHOR
28	KEY TAG PANEL WITH CONTROL SWITCH	MK / LEGRAND / HAVELLS / ANCHOR
29	METAL CLAD SOCKET WITH MCB	LEGRAND / SIEMENS
30	PVC TAPE	STEEL GRIP
31	PVC JUNCTION BOX	SINTEX /MK / PRECISION / ANCHOR / POLYCAB/NIHIR
32	CABLE	FINOLEX / POLYCAB / KEI / RR KABLE/JOHNSON/ADCAB
33	WIRE	FINOLEX / POLYCAB / WONDER/ RR KABLE
34	LED LIGHT FIXTURES	LIGHTING TECHNOLOGIES / PHILIPS /BAJAJ / JAGUAR / HAVELLS) AS PER MODEL SPECIFIED IN BOQ
35	CEILING FAN / EXHAUST FAN	CROMPTON/ USHA / HAVELLS / ORIENT AS PER MODEL SPECIFIED IN BOQ
36	AIR CONDITIONER	LLOYD/DAIKIN/VOLTAS/HITACHI/MITSUBISHI
37	CMS	MK / LEGRAND
38	EARTHING & LIGHTNING ARRESTOR	GREEN WIRE / ASHLOK /OBO
39	SMC PRESS BOX	SINTEX / EPP
40	DWC PIPE	REX POLY EXTRUSION LTD / VEC ENGINEERING / GEMINI
41	BUSDUCT	LEGRAND/ SCHNEIDER ELECTRIC/C&S / L&T
42	DG SET	KIRLOSKAR / JAKSON/KOEL/SUPERNOVA
43	FIRE EXTINGUISHER	CEASEFIRE/ECO FIRE/HAPPESTOP/KANEX
44	LIGHTING POLE	RR ISPAT / VOLMONT / TRANSRAIL / BAJAJ/AMBICA
45	WATER COOLER	VOLTAS / USHA / BLUESTAR / EUREKA FORBS
<b>Special Note:-</b>		
1	Client have right to check the challans of supplier.	
2	The MCB and MCB DB s must be of same make.	
3	Approve all the make of material from Client / PMC before execution.	
4	The Client/ Consultant / PMC reserve the right to select the manufacture or approved make from the above list.	
5	Any make not mentioned in the above lists must be approved from Client/Consultant before execution.	
6	All the material should be ISI and as per standards mentioned in specifications and BOQ.	
7	Vendor needs to mockup for approve makes and will be finalized by clinet only.	