Central Pollution Control Board
(Ministry of Environment & Forests, Govt. of India)
Parivesh Bhawan, East Arjun Nagar
Delhi – 110032

Corrigendum

The NIT published for "Renovation of Air and Treatability Laboratory" in Central Pollution Control Board, Parivesh Bhawan, on 21.10.2010 is hereby amended as details given below:-

Amended date of sale of all documents	**Amended date of receiving of tender documents**	**Amending date of opening of tender documents**
29.11.2010 to 30.11.2010 from 10.00 a.m. to 5.00 p.m.	02.12.2010 up to 3.00 p.m.	02.12.2010 at 3.30 p.m.

The firm those had already purchased the tender documents needs not to purchase it again and they will submit their offer before 3.00 p.m. on 02.12.2010.

The corrigendum and tender document can be seen on CPCB website www.cpcb.nic.in. The other terms and conditions will remain unchanged.

Member Secretary
Central Pollution Control Board

Central Pollution Control Board
(Ministry of Environment & Forests, Govt. of India)
Parivesh Bhawan, East Arjun Nagar
Delhi – 110032.

Notice inviting Tender

Member Secretary, Central Pollution Control Board invites sealed tenders for the following works:-

Name of Work : - "Renovation of Air and Treatability Laboratory" in Central Pollution Control Board, Parivesh Bhawan,

Description of Tenders	**Estimated cost (Rs.)**	**EMD (Rs.)**	**Cost of tender (Rs.)**
Civil, Electrical and Networking work	97,59,762/-	1,95,195/-	1000/-
Air Conditioning, Exhaust and Ventilation work	94,24,314/-	1,88,486/-	1000/-
Seating system and Modular furniture	33,61,775/-	67,236/-	1000/-
Lab furniture	44,46,240/-	88,925/-	1000/-
Fume Hood	51,24,176/-	1,24,049/-	1000/-
Fire detection system	14,65,736/-	29,315/-	500/-

Cost of tender : - Non refundable demand draft/FDR in favour of Central Pollution Control Board, Delhi as detailed above.

Sale of tender :- 15.11.2010 to 17.11.2010 from 10.00 am to 5.00 p.m in the office of I/c, Building.

Last date of receipt of tender : - 19.11.2010 up to 3.00 p.m.

Opening of tender :- 19.11.2010 at 3.30 p.m.

The eligibility criteria and other details can be seen from CPCB website i.e. www.cpcb.nic.in

Note: The tender will be issued to the firms/contractors those meeting the eligibility criteria laid down in respective tender.

Member Secretary
Central Pollution Control Board

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NOTICE INVITING TENDER

1. The Central Pollution Control Board (CPCB) invites sealed tenders from eligible contractors registered in appropriate class in CPWD/MES/State PWD or other Govt departments for "Renovation of Air and Treatability Lab-Civil and Electrical works" at 4th floor in Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi-110032. The total estimated costs of the works is given below:

   Estimated Cost Rs. 97,59,762/-
   Earnest Money Rs. 1,95,195/- (to be submitted as Demand Draft/FDR in favour of the Central Pollution Control Board, Delhi)

2. The tender document will be available for sale from 15.11.2010 to 17.11.2010 from 10.00a.m. to 5.00 p.m. The tenders, which should always be placed in sealed cover with "Renovation of Air and Treatability Lab-Civil and Electrical works" written on the envelopes, will be submitted upto 3.00 p.m. on 19.11.2010 in the Tender box lying at Ground floor near reception in Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi - 110 032 and will be opened on the same day at 3.30 p.m. at the same address.

3. The tender will be issued to the interesting firms/contractors fulfilling the following requirements:-

(i) Should have valid registration in CPWD, PWD, MES or other Govt. Departments in the appropriate class.
(ii) Should have completed atleast one work of similar nature not less than Rs.1.00 crore in the last five year. (list to be enclosed)
Or
Completed two works of similar nature not less than Rs.60 Lakh each during last five years (list to be enclosed).
(iii) Should have valid Income Tax Clearance certificate & Sale Tax registration certificate as well as sale tax clearance certificates.

4. The tender document can be seen from CPCB website *www.cpcb.nic.in*.

5. MODE OF SUBMISSION OF TENDER

I. The tender shall be submitted in two separate sealed covers, duly completed in all respects viz. one for "earnest money", the second for "price bid". The name of the work and the words "earnest money" and "price bid only", as the case may be shall be clearly written on the top of the respective sealed covers. All the two bids, along with the letter for submitting tender shall be put in a sealed cover and the name of the work "Renovation of Air and Treatability Lab-Civil and Electrical works" shall be clearly written on top of the sealed cover.

II. The technical bid shall be complete in following:-
a) Complete tender document as purchased from CPCB should be duly signed (each page) for acceptance of all terms and conditions.
b) All the documents as mentioned above point 3 (i) to (iii) of the tender document for fulfilling the eligibility criteria.

6. Earnest money amounting to Rs. 1,95,195/- (Rupees One Lacs Ninety Five Thousand One Hundred Ninety Five only) as Demand Draft/FDR in favour of the Central Pollution Control Board, Delhi must be accompanied in each tender application.

7. The site for the work is available/or the site for the work shall be made available for inspection on all working days except on Saturday, Sunday and Public Holidays.

III. a) The contractor should quote in figures as well as in words the rate, and amount tendered by them. The amount for each item should be worked out and the requisite totals given.
b) Special care should be taken to write the rates in figures as well as in words, and the amounts in figures only in such a way that interpolation is not possible. The total amount should be written both in figures and in words. In case of figures, "Rs." should be written before the figures of rupees and "P" after the decimal figures, e.g. Rs. 2.15 P and in case of words, the word 'Rupees' should precede and the word "Paise" should be written at the end. Unless the rates is in only rupees and followed by the words 'only' it should invariably be upto two decimal place. While quoting the rate in schedule of quantities, the words 'only' should be written closely following the amount and it should not be written in the next line.
c) Rates quoted by the contractor in item rate tender in figures and works shall be accurately filled in so that there is no discrepancy in the rates figures and words. However, if a discrepancy is found the rates which correspond with an amount worked out by the contractor shall be taken as correct.
d) If the amount of an item is not worked out by the contractor it does not correspond with the rate written either in figure or in words than the rate quoted by the contractor in words shall be taken as correct.

e) Where the rates quoted by the contractor in figures and in words tally but the amount is not worked out correctly the rate quoted by the Contractor will be taken as correct and not the amount.

IV. The contractor, whose tender is accepted (unless exempted) will be required to furnish by way of security deposit for the fulfillment of his contract such sum as will amount at the rate of 10% of the estimated cost put to tender subject to a maximum upto Rs. 10.00 lakhs.

The security deposit will be collected by deductions from the running bills of the contractor at the rate of 10%. The earnest money deposited at the time of tenders will be released after completion of work, no interest will be paid on it.
The security deposit will be released after the 'defects liability period' subjects to verification of defects. However, the security will be released if the firm/contractor submits the FDR of the said security amount in favour of Central Pollution Control Board valid upto defect liability period.

V. The acceptance of a tender rests with the CPCB, which does not bind itself to accept the lowest tender and reserves itself the authority to reject any or all of the tenders received without assigning any reason. All tenders in whom any of the prescribed conditions are not fulfilled or are incomplete in any respect are liable to be rejected.

CPCB reserves itself the right to accepting the whole or any part of the tender and the tenderer shall be bound to perform the same at the rate quoted.

VI. Canvassing in any form in connection with tender is strictly prohibited and the tenders submitted by the contractors who resort to be canvassing will be liable to rejection.

VII. All rates to be quoted in the proper form in the tender.

VIII. Any item rate tender containing percentage below/above will be summarily rejected. However, where a tenderer voluntarily offers rebate or payment within a stipulated period, this may be considered.

IX. On acceptance of the tender, the name of the accredited representative (s) of the contractor who would be responsible for taking instructions from CPCB shall be communicated to the CPCB.

X. Sales Tax or any other tax or liability in respect of this contract shall be payable by the contractor and CPCB will not entertain any claim whatsoever in this respect.

XI. The tender for works shall remain open for acceptance for a period of 3 months from the date of opening of tenders. If any tenderer withdraws his tender before the said period or marks any modifications in the terms and conditions of the tender which are not acceptable to CPCB, without prejudice to any other right or remedy, CPCB will be at liberty to go for forfeiting the said earnest money absolutely.

XII. It will be obligatory on the part of the tenderer to tender and sign the tender documents for all the components or parts and that after work is awarded, he will have to enter into an agreement for each component or part with CPCB.

XIII. The contractor should see the site and understand the work requirements and in case of doubt, obtain required particulars, which may in any way influence his tender, from the CPCB as no claim whatsoever will be entertained for any alleged ignorance thereof.

XIV. If it is found that the tender is not submitted in proper manner or contains too many corrections or absurd rates or amounts, it would be summarily rejected by CPCB.

XV. Before submitting the tender, the contractor should visit the site and satisfy himself as to the conditions prevalent there.

XVI. The Contractor shall comply with the provision of the Apprentices Act, 1961, and the rules and orders issued there under from time to time. If fails to do so, his failure will be breach of the contract and the CPCB may in his discretion cancel the contract. The contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provisions of the Act.

XVII. The contractor's responsibility for the contract shall commence from the date of issue of orders of acceptance of tender.

XVIII. Unsealed tenders shall be summarily rejected.

XIX. Before tendering, the contractor shall inspect the site to fully acquaint himself about the condition in regard to accessibility of site and nature of ground, working condition including stacking of materials, installations of T & P etc. conditions affecting accommodation and movement of labour etc. required for the satisfactory execution of the work contract. No claim whatsoever on such account shall be entertained by the department in any circumstances.

XX. The contractor shall submit list of works which have been handled by him in the previous financial year and on the works in hand (progress) in the forms given below.

Works Handled in the Previous Financial Year (2009-10)

Name of work	**Name and particulars of place where work was done**	**Value of work**	**Position of works (In progress/completed)**	**Remarks**
1	2	3	4	5

Works in Hand in the Present Financial Year (2010-11)

Name of work	**Name and particulars of place where work was done**	**Value of work**	**Position of works (In progress/ completed)**	**Remarks**
1	2	3	4	5

LETTER SUBMITTING TENDER

To
Member Secretary
Central Pollution Control Board
Parivesh Bhawan, East Arjun Nagar
Delhi – 110 032

Sir,

With reference to the tender invited by you for "Renovation of Air and Treatability Lab-Civil and Electrical works" at 4th floor in the Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi, I/We do hereby offer to execute the works under 'contract at the respective rates' mentioned in the Bill of Quantities. I/We have seen the site and read the articles of agreement, conditions of contract, specifications and special clauses forming part of the Bill of Quantities. I/We agree to finish the whole of the works within two months as specified in the tender.

I/We have deposited as Earnest Money Rs……. (Rupees …….. Only) by a Bank draft in favour of CPCB, which amount is not to bear any interest. I / We do hereby agree that this sum shall be forfeited by you in the event our tender is accepted and I /We fail to commence the contract when called upon to do so, within a period of one month after award of work.

I/We understand that you are not bound to accept the lowest or any tender that you receive.

Yours faithfully,

Name of partners of the firm.

Name of Bankers

Tenders submitted on ……..

BILL OF QUANTITIES

S. N	DESCRIPTION	Unit	Qty	Rate (Rs)	Rate in Words	Amount (Rs)
	SUPPLY, INSTALLATION, TESTING, COMMISSIONING & HANDING OVER OF THE FOLLOWINGS					
A	**DRAINAGE SYSTEM**					
1.0	Providing & fixing UPVC Soil & Waste pipes ISI marked,/SWR jointed with solvent cement/rubber ring joints and further protected with Fibreglass paste. including all specials such as bends, tees, clean out plugs, reducers with or without door as required, including any cutting & making good of floors/walls that may be necessary, clamps and stays as per requirements.					
a	32mm	m	76.00			
b	40mm	m	12.00			
c	50mm	m	87.00			
d	65mm	m	RO			
e	75mm	m	145.00			
2.0	VENT PIPES					
a	32mm	m	46.00			
b	40mm	m	24.00			
c	50mm	m	60.00			
	HDPE U/G PIPES					
3.0	Providing and fixing to wall, ceiling and floor, high density polythylene pipes 6.00 kgf/sq.cm working pressure outside diameter with special flange, compression type fittings, wall clips, making good the wall, ceiling and floor including cost of all materials, labour charges, HOM of equipements and testing complete as per specifications.					
a	75mm	m	RO			
b	110mm	m	20.00			
4.0	**Multy Traps for Lab drain (Sinks / working Benches)**					
	All traps shall be two piece tubular construction with minimum of 50 mm deep water seal. The joint between the waste outlet and the trap shall be made with PTFE tape and rubber sealing washer.Trap has provision of 32mm, 50mm outlet					
a	100x75mm, with option of 32mm & 50mm drain outlet for In side Lab working bench	Nos	10.00			
b	100x75mm, with option of 32mm & 50mm drain outlet for Shower	Nos	2.00			
4.0	**Vent cowl**					
	50mm	Nos	4.00			
	75mm	Nos	4.00			
B	**COLD WATER SUPPLY SYSTEM**					
1.0	PPR pipes (8077 or 8078) for cold water supply with Malleable Specials suchas tees, elbows, check nuts, unions, flanges, nipples, etc					
a	15 mm dia	m	82			
b	20 mm dia	m	102			
c	25 mm dia	m	32			
d	32 mm dia	m	82			
e	40 mm dia	m	RO			

1.1	PPR Fittings (Cold Water Supply)					
	40 mm dia Elbow	Nos	RO			
	32 mm dia Elbow	Nos	2			
	25 mm dia Elbow	Nos	36			
	20 mm dia Elbow	Nos	6			
	15 mm dia Elbow	Nos	11			
	TEES					
	40 mm dia	Nos	RO			
	32 mm dia	Nos	2			
	25 mm dia	Nos	3			
	20 mm dia	Nos	7			
	15 mm dia	Nos	4			
	PPR pipes (8077 or 8078) for Hot water supply with Malleable Specials suchas tees, elbows,check nuts, unions, flanges,nipples, etc					
a	15 mm dia	m	82			
b	20 mm dia	m	102			
c	25 mm dia	m	64			
d	32 mm dia	m	R0			
e	40 mm dia	m	RO			
2.2	PPR Fittings (Hot Water Supply)					
	40 mm dia Elbow	Nos	RO			
	32 mm dia Elbow	Nos	RO			
	25 mm dia Elbow	Nos	3			
	20 mm dia Elbow	Nos	6			
	15 mm dia Elbow	Nos	11			
	TEES					
	40 mm dia	Nos	RO			
	32 mm dia	Nos	RO			
	25 mm dia	Nos	2			
	20 mm dia	Nos	7			
	15 mm dia	Nos	4			
2.0	VALVES					
	Providing & fixing cPVC Ball valves with Handle tested to 20 kg/sq.cm , with necessary unions etc complete.,					
a	15 mm dia	Nos	8			
b	20 mm dia	Nos	12			
c	25 mm dia	Nos	6			
d	32 mm dia	Nos	4			
3.0	Providing & fixing Non Return valves tested to 20 kg/sq.cm of approved make, with necessary					
a	15 mm dia	Nos	RO			
b	20 mm dia	Nos	3			
c	25 mm dia	Nos	1			
d	32 mm dia	Nos	RO			
4.0	Automatic air vents dia 25mm					
	15 mm dia	Nos	6			
	20 mm dia	Nos	RO			
5.0	Water hammer arrester					
	Water hammer arrester, piston-type, L copper arrester body, Polypropylene piston with two EPDM o-rings, Dow-Corning, 111 FDA approved silicone compound. Water hammer arresters shall be ANSI/ASSE 1010 1996 certified. Arresters size will be match with 6-12 fixture units.	Nos	5			
		TOTAL				

FURNISHING WORKS

S N	Particulars	Unit	Qtty	Rate	Rate in Words	Amount
1	**Aluminium Internal Full Height Partitions**					
	Providing and fixing black powder coated aluminium work for partitions with extruded built up standard tubular and other sections of approved make conforming to IS: 733 and IS : 1285, anodised trasparent or dyed to required shade according to IS : 1868, fixed with rawl plugs and screws or with fixing clips, or with expansion hold fastners including necessary filling up of gaps at junctions, at top, bottom and sides with required PVC/neoprene felt etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminium snap beading for glazing / panelling, C.P. brass / stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge. (Glazing and panelling to be paid for separately.) The powder coating provided shall be of 45-50 microns and shall have adequate scratch hardness of 3Kgs.					
	Section to be used is 38.10mm X 63.50 mm with wall thickness of 1.95mm with weight not to be less than 1.094 Kg/M.	Kgs	1905			
2	**Glazing & Pre-Lam boards in Partitions**					
	Providing and fixing glazing & Pre-Laminated board in partitions with PVC / neoprene gasket etc. complete as per the architectural drawings and the directions of engineer-in-charge . (Cost of aluminium snap beading shall be paid in basic item.)					
	8mm thick clear float glass of approved make.	Smt	355			
	6mm thick pre-laminated board of approved make.	Smt	260			
3	**Glazed shutters**					
a	Providing and fixing glazing in aluminium door, with PVC/Neoprene gasket etc., complete as per the architectural drawings and the directions of the Engineer - In - Charge. (Cost of the aluminium snap beading shall be paid in basec item)					
	With Float glass panes of 8mm thickness	Smt	136.5			
b	Providing and fixing double action hydraulic floor spring of approved brand and manufacture IS: 6315, for doors, including cost of cutting floors as required, embedding in floors and stainless steel cover plates with brass pivot and single piece MS sheet outer box with slide plate etc., complete., as per the instructions of the Engineer - In - Charge.	Each	65			
4	**Flushed Shutters**					
	Providing and fixing flushed shutters of 19mm thk BWP grade solid plywood core, finished with 1.5mm thick laminate of approved colour/shade as directed. The shutter shall be provided with 4mm clear float glass fixed with wooden beading as indicated in the drawing. The cost shall include cost of all necessary hardware like SS handles, brushed steel tower bolts, door closers, hinges etc., complete.	Smt	35			
5	**Notice Boards**					
	Providing and fixing soft board pin up board with 6mm thick BWP grade plywood backing, fixed with white cedar beading, finished with 3 coats of melamine polish with necessary surface preparation, complete etc., as per directions of the Engineer - In - Charge.	Smt	4			
	Total					

CIVIL WORKS

S N	Particulars	Unit	Qtty	Rate	Rate Availed from	Amount
	Demolition and Dismantling works					
1	Demolishing brick work including stacking of serviceable material and disposal of unserviceable material within 50 m lead in cement mortar.	Cum	73.00			
2	Dismantling doors, windows and clerestory windows (steel or wood) shutter including chowkats, architrave, holdfasts etc., complete and stacking within 50 Mts lead.					
	Of area 3 smt and below	Each	16.00			
	Of area beyond 3 sq. metres	Each	4.00			
3	Dismantling tile work in floors and on walls, laid in cement mortar including stacking material within 50 metres lead					
	For thickness of tile 10 mm to 25 mm	Smt	44.00			
4	Dismantling old plaster or skirting, raking out joints and cleaning the surface for plaster including disposal of rubbish to the dumping ground within 50 Mts. Lead	Smt	200.00			
5A	Demolishing of R.C.C work manually/by mechanical means including stacking of steel bars and disposal of unserviceable material within 50 metres lead as per direction of Engineer - In - Charge.	Cum	9.00			
5B	Extra for cutting reinforcement bars manually/by mechanical means in R.C.C work (payment shall be made on the cross sectional area of R.C.C) as per direction of Engineer - In - Charge.	Smt	62.00			
	Carriage of Materials					
6	Carriage of materials by mechanical transport including loading, unloading and stacking lead upto 1.0 kms. As per the directions of the Engineer-In-Charge. (The work for the item shall be measured based on stack measurements or based on loose stack on lorry loads. The quantity is worked out based on the stack measurement /loose stack on lorry loads shall be reduced by 20% for looseness in stacking to arrive at the net quantity for payment)					
	Lime, moorum, building rubbish					
	Dismantled brickwork etc.	Cum	126.00			
	Brick Masonry Works					
7	Brick work with FPS bricks of class designation 75 in superstructure above plinth level up to V level in all shapes and sizes					
	cement mortar 1:6 (1 cement : 6 coarse sand)	Cum	1.00			
8	Half brick masonry with bricks of class designation 75 above plinth level upto V level in FPS Bricks					
	cement mortar 1:4 (1 cement : 4 coarse sand)	Smt	36.00			
b	Extra for providing and placing in positions 2 Nos 6mm dia M.S bars at every third course of half brick masonry (with F.P.S brick)	Smt	36.00			

	Reinforced Concrete Works (Cast in Situ)		
9	Reinforced cement concrete work in beams, suspended floors, roofs having slope upto 15 degree, landings, balconies, shelves, chejjas, lintels, bands, plain windows sills, staircases and spiral staircases upto floor V level excluding cost of centring, shuttering, finishing and reinforcement with 1:1.5:3 (1cement : 1.5 coarse sand : 3 graded stone aggregates 20mm nominal size). RC Lintels	Cum	0.20
a	Centering and shuttering including strutting, propping etc. and removal of form for lintels, beams plinth beams, girders, bressumers and cantilevers	Smt	4.00
10	Reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete. Cold Twisted bars	Kgs	70
	Plastering & Finishing Works		
11	Cement Plaster		
a	12 mm cement plaster of mix:		
	b. 1:6 (1 cement : 6 fine sand)	Smt	369
12	**Painting works**		
a	Wall and ceiling painting with plastic emulsion paint of Asian brand and manufacture to give an even shade: Two or more coats on new work Surface preparation shall consist of: (i)Application of sand paper to smoothen out the surface (ii) Application of one coat of cement primer (iii) Making good of surfaces by using POP and sand paper (iv) Application of 2 coats of putty (Asian)	Smt	475
b	One or more coats on old work	Smt	940
13	**Flooring Works**		
a1	Providing and laying polished vitrified floor tiles with rectified edges, in size 1000 X 1000 mm(thickness to be specified by the manufacturer) with water absorption less that 0.08% and conforming to IS:15622 of Johnson/Kajaria/Naveen/ Euro make in all colours and shades, laid with cement based high polymer modified quick-set adhesive (Water Based conforming to IS:15477, using 5 kg adhesive per sqm of tiles area, in average 3mm thickness, with 100 mm high skirting, including grouting the joints with white cement and matching pigments etc. complete.	Smt	832
a2	Providing and laying Polythene base and Plaster of Paris (POP) covering mixed with coconut fibre, on freshly laid vitrified flooring, to form a layer of adequate thickness to avoid scratching and cleaning the flooring before final hand over.	Smt	800
14	**False Ceiling Works**		
a	Gypsum Board False Ceiling		

	Providing & fixing false ceiling of 12.5mm thick tapered edge gypsum board (of India Gypsum make), confirming to IS:2095, including providing and fixing of framework made of special section, power pressed from MS. Sheet and galvanised in accordance with Zinc coating 600 as per IS:277 and consisting of angle cleats of size 25mm wide x 16mm thick with flanges of 22 mm and 37mm at 1200mm c/c. One flange is fixed to the ceiling with a dash fastner 12.5 mm x 40 mm long with 6 mm dia bolts to the angle hanger fixed with nut and bolts to the G.I channels 45 mm x 15 mm x 0.9 mm, running at 1200 mm c/c, to which the ceiling section 0.5mm thk, bottom wedge of 80mm with tapered flanges of 26mm each having clips of 10.5mm at 450mm c/c shall be fixed, in a direction perpendicular to the G.I channels, with connecting clips made out of 2.64 mm dia x 230 mm long G.I. wire at every junction including fixing the 27mm high section having flanges of length 20 & 30 mm. The perimeter of fixing false ceiling to the wall/partition with the help of rawl plugs at 450mm c/c with long drive screws. All screws at 230mm interval including pointing and fixing to a flush level to tapered and square edges of the Gypsum board with recommended filler, paper tapes, finish and two coats of primer suitable for gypsum board as per manufacturers specification and also including the coat of making openings for light fittings, grills, diffusers, cutouts made with frame of perimeter channels suitably fixed, as per drawing and specification and direction of the Engineer-in-charge but excluding the cost of painting.	Smt	272
b	Providing and fixing false ceiling tiles of approved materials of size 595 X 59 mm in true horizontal level suspended on interlocking metal grid of hot dipped galvanised steel section (Galvanized at 170 gsm/sqm) consisting of main "T" runners suitably spaced at joints to get required length and of size 24 x 38 mm made from 0.30mm thk (min) sheets spaced at 1200 mm c/c and cross "T" of size 24 x 25mm made of 0,30 mm thick (min) sheet, 1200 mm long spaced between main "T" @ 600mm c/c to form a grid of 1200 x 600 mm and secondary crossed "T" of length 600mm and size 24 x 25mm made of 0.30 mm thk (min) sheet to be interlocked middle of the 1200 x 600 mm panel to form grids of 600 x 600 mm and laying false ceiling tiles of approved texture in the grid including, wherever required, cutting or making opening for services like diffusers, grills, light fittings, fixtures, smoke detectors etc. Main "T" runners to be suspended from ceiling using GI slotted cleats fixed to ceiling with 6 mm dia and 50 mm long- fasteners, 4 mm GI adjustable rods with galvized level clips spaced at 1200 mm c/c long main T, bottom exposed width of 24mm of all T sections shall be prepainted with polyester paint, all complete at all heights as per secifications, drawings and as directed by the Engineer-In-charge. (The rate is excluding cost of tiles which will be paid for separately)	Smt	100
c	Cost of tiles of 600 x 600mm	Each	269
d	**Metal False Ceiling** Providing and fixing of metal tile false ceiling system. This shall be made using metal tiles 0.5mm thick held in position using suitable steel sections fixed to the true slab using suitable GI suspension system.	Smt	390

	Tiles: The tiles shall be of size 600mm x 600mm/550mmx550mm manufactured out of 0.5mm pre-coated hot dipped galvanized steel finished with powder coating of approved colour. Installation and suspension system: The metal tiles shall be fixed to each other using mild steel framework of size 25mm x 25mm made using 1mm thick MS sheet which is folded and bent to desired profile finished with powder coating.These MS framework/sections shall be inserted between two panels and fixed using self interlocking system. The mild steel framework in turn are fixed on to the true ceiling above using a suitable suspension system consisting of J bolts, nuts, hangers, 4mm GI rod and anchor fasteners.		
15	**Repairs to Windows**		
	Making repairs to existing windows including replacement of handles, sealant, beadings etc., complete wherever necessary and also providing and fixing tinted heat resistant film of 3M make etc., complete.	Each	25
16	**Cladding on window sills**		
	Providing and fixing 18mm thick gang saw cut mirror polished Premium Black Granite (premoulded & prepolished) machine cut for window sills of required size of approved shade, colour and texture laid over 20mm thik base cement mortar 1:4 (1 cement : 4 coarse sand) with joints treated with white sement, mixed with matching pigment, epoxy touch ups, including rubbing, curing, moulding and polishing to edge to give high gloss finish etc., at all levels with area of slab over 0.50 sqm. (Basic rate of granite not to exceed Rs. 1615/sqm)	Sqm	40
17	**Granite Shelves**		
	Providing and fixing 18mm thick gang saw cut mirror polished premium black granite slabs as shelves in boxing areas under all window sills, embedded in plaster including rubbing, curing, moulding and polishing to edge to give high gloss finish, etc., at all levels with area over 0.50 sqm. (Basic rate of granite not to exceed Rs.1615/sqm)	Sqm	25
18	**Aluminium double glazed windows**		
	Providing and fixing double glazed hermetically sealed glazing in aluminium windows, with 6mm thick clear float glass both side having 12 mm air gap including providing EPDM Gasket, perforated aluminium spacers, desiccants, sealant (both primary and secondary) etc., as per specifications, drawings and direction of Engineer - In - Charge.	Sqm	11
19	**Buy Back Offer**		
	Buying back and carting away all demolished items like doors, windows, reinforcement steel, plywood, wooden frames, steel/aluminium windows etc., complete. Total	Set	1

Electrical works						
SL.NO	**DESCRIPTION**	**Unit**	**Qty.**	**RATE**	**RATE IN WORDS**	**AMOUNT**
1.0	**LT SWITCH BOARDS**					
	Installation, testing and commissioning of Client supplied, 415V, 3 phase, 4W, 50 Hz floor / wall mounting type, cubicle compartmentaized LT distribution boards as per enclosed Single line diagram No: **EL-01, Rev-R0** and Specification No: **DEC/LT-SB/E-S101**					
1.1	Fourth Floor - Raw Power & HVAC Panel [LTSB -2]	Nos	1			
	LT SWITCH BOARDS					
	Installation, testing and commissioning of Client supplied, 415V, 3 phase, 4W, 50 Hz floor / wall mounting type, cubicle compartmentaized LT distribution boards as per enclosed Single line diagram No: **EL-01, Rev-R0** and Specification No: **DEC/LT-SB/E-S101**					
1.10	Third Floor - Raw Power & HVAC Panel [LTSB -1]	Nos	RO			
1.20	Lighting & Critical Panel [LTSB - 4]	Nos	RO			
1.30	UPS Outgoing Panel [LTSB - 3]	Nos	RO			
1.40	Terrace Floor - HVAC Panel [Outdoor type] LTSB - 5	Nos	RO			
1.50	Supply, Installation, testing & Commissioning of 400A, 4P, MCCB 16 SWG sheet steel enclouser with padlocking facility on door.. [To be fixed in Existing CPCB Panel at Ground Floor]	Nos	RO			
1.60	Supply, Installation, testing & Commissioning of 100A, 4P, MCCB 16 SWG sheet steel enclouser with padlocking facility on door.	Nos	RO			
2.0	**MCB DB**					
	Supplying & Fixing following way, Single Pole & Neutral, Sheet Steel, MCB Distribution board, 240V, on Surface/Recess,complete with tinned Copper Busbar,Earth bar,Din bar,Detachabke gland plate,interconnections,Phosphatized & Powder painted including Earthing etc. as required. (But without MCCB/RCCB/ISOLATOR)					
2.1	12 Way, Single Phase, MCB DB	Nos	RO			
2.2	6 Way, Three Phase, MCB DB [for Emergency Lighting, Normal Lighting (TR Lab), HUB Room & AC Power DB]	Nos	4			
2.3	8 Way, Three Phase, MCB DB [for Normal Lighting & UPS Power]	Nos	4			
2.4	12 Way, Three Phase, MCB DB [for Raw Power]	Nos	3			
3.0	**ISOLATORs / ELCBs / MCBs.**					

3.1	**ISOLATORs as Incomer**					
a	40A, Two Pole Isolator for SPN MCB DB incomers	Nos	RO			
b	40A, Four Pole Isolator for TPN MCB DB incomers	Nos	12			
c	63A, Triple pole Isolator for TPN MCB DB incomers	Nos	10			
3.2	**RCCBs for Phase segregation**					
a	40A, 300mA, 2 pole, RCCB [For Power]	Nos	9			
b	40A, 100mA, 2 pole, RCCB [For Lighting]	Nos	6			
3.3	**MCBs as outgoing**					
a	6 to 32A, SP, ' C ' curve MCB [for Normal & Emer. Ltg.]	Nos	84			
b	6 to 32A, SP, ' B ' curve MCB [for Raw Power, Ac Power & UPS Power]	Nos	223			
c	6 to 32A, TP, ' C ' curve MCB	Nos	RO			
d	Single Pole, Blanking Plate	Nos	RO			
3.0	**LT CABLES**					
	1.1 kV/660V grade, Aluminum/copper conductor PVC insulated armoured PVC sheathed LT power/control cables placed at different locations and different lengths in cable trays, complete with all necessary consumables, fixing clamps, identification tags. Etc.					
A	**Aluminium conductor cables**					
3.1	3.5C x 240 Sq.mm XLPE	Mtrs.	RO			
3.2	3.5C x 185 Sq.mm XLPE	Mtrs.	RO			
3.3	3.5C x 150 Sq.mm XLPE	Mtrs.	170			
3.4	3.5 x 95 Sq.mm XLPE	Mtrs.	RO			
3.5	3.5 x 70 Sq.mm XLPE	Mtrs.	RO			
3.6	3.5 x 50 Sq.mm XLPE	Mtrs.	RO			
3.7	3.5 x 35 Sq.mm XLPE	Mtrs.	RO			
3.8	4C x 25 Sq.mm XLPE	Mtrs.	462			
3.9	4C x 16 Sq.mm AYFY	Mtrs.	RO			

4.0	4C x 10 Sq.mm AYFY	Mtrs.	RO			
4.1	4C x 6 Sq.mm AYFY	Mtrs.	RO			
3.10	3C x 6 Sq.mm AYFY	Mtrs.	RO			
3.11	3C x 4 Sq.mm AYFY	Mtrs.	RO			
B	**Copper conductor cables**					
3.12	1C x 300 Sq.mm copper conductor cable	Mtrs.	RO			
3.13	1C x 240 Sq.mm copper conductor cable	Mtrs.	RO			
3.14	1C x 185 Sq.mm copper conductor cable	Mtrs.	RO			
3.15	1C x 150 Sq.mm copper conductor cable	Mtrs.	RO			
3.16	1C x 120 Sq.mm copper conductor cable	Mtrs.	RO			
3.17	1C x 95 Sq.mm copper conductor cable	Mtrs.	RO			
3.18	1C x 70 Sq.mm copper conductor cable	Mtrs.	RO			
3.19	1C x 50 Sq.mm copper conductor cable	Mtrs.	RO			
3.20	1C x 35 Sq.mm copper conductor cable	Mtrs.	RO			
3.21	1C x 25 Sq.mm copper conductor cable.	Mtrs.	210			
3.22	1C x 16 Sq.mm copper conductor cable	Mtrs.	110			
3.23	4C x 25 Sq.mm YWY	Mtrs.	RO			
3.24	4C x 16 Sq.mm YWY	Mtrs.	345			
3.25	4C x 6 Sq.mm YWY	Mtrs.	RO			
3.26	3C x 6 Sq.mm YWY	Mtrs.	RO			
3.27	3C x 4 Sq.mm YWY	Mtrs.	RO			
4.0	**CABLE TERMINATION**					

	Copper conductor cables 1.1kV grade type YRY Cables termination using double compression brass cable glands with earth tags, crimping type tinned copper lugs, earthing clamps consumables for the following size of cables.					
A	**Aluminium conductor cables**					
4.1	1C x 400 Sq.mm XLPE	Nos.	RO			
4.1	3.5C x 300 Sq.mm XLPE	Nos.	RO			
4.2	3.5C x 240 Sq.mm XLPE	Nos.	RO			
4.3	3.5C x 185 Sq.mm XLPE	Nos.	RO			
4.4	3.5 x 150 Sq.mm XLPE	Nos.	4			
4.5	3.5 x 120 Sq.mm XLPE	Nos.	RO			
4.6	3.5 x 95 Sq.mm XLPE	Nos.	RO			
4.7	3.5 x 50 Sq.mm XLPE	Nos.	RO			
4.8	3.5 x 35 Sq.mm XLPE	Nos.	RO			
4.10	4C x 25 Sq.mm XLPE	Nos.	14			
4.11	4C x 16 Sq.mm AYFY	Nos.	RO			
4.12	4C x 10 Sq.mm AYFY	Nos.	RO			
4.13	4C x 6 Sq.mm AYFY	Nos.	RO			
4.14	3C x 6 Sq.mm AYFY	Nos.	RO			
4.15	3C x 4 Sq.mm AYFY	Nos.	RO			
B	**Copper conductor cables**					
4.16	1C x 300 Sq.mm copper conductor cable	Nos.	RO			
4.17	1C x 240 Sq.mm copper conductor cable	Nos.	RO			
4.18	1C x 185 Sq.mm copper conductor cable	Nos.	RO			
4.19	1C x 150 Sq.mm copper conductor cable	Nos.	RO			

4.20	1C x 120 Sq.mm copper conductor cable	Nos.	RO			
4.21	1C x 95 Sq.mm copper conductor cable	Nos.	RO			
4.22	1C x 70 Sq.mm copper conductor cable	Nos.	RO			
4.23	1C x 50 Sq.mm copper conductor cable	Nos.	RO			
4.24	1C x 35 Sq.mm copper conductor cable	Nos.	RO			
4.25	1C x 25 Sq.mm copper conductor cable.	Nos.	8			
4.26	1C x 16 Sq.mm copper conductor cable	Nos.	RO			
4.27	4C x 25 Sq.mm YWY	Nos.	RO			
4.28	4C x 16 Sq.mm YWY	Nos.	8			
4.29	4C x 6 Sq.mm YWY	Nos.	RO			
4.30	3C x 6 Sq.mm YWY	Nos.	RO			
4.31	3C x 4 Sq.mm YWY	Nos.	RO			
5.2	**POWER RECEPTICALS**					
	Supplying & Fixing following modular switch / socket on the existing modular plate & switch box including connections but excluding modular plate etc., as required.					
5.3	3 Nos, 5/15A, decorative Plate switch socket with safety shutters controlled by One 16A, Single pole switch. (for UPS sockets), Colour of the switch plate shall be gray.	Sets	40			
5.4	2 Nos, 5/15A, decorative Plate switch socket with safety shutters controlled by One 16A, Single pole switch. (for UPS sockets), Colour of the switch plate shall be gray.	Sets	32			
5.5	3 nos, 6A, decorative Plate switch socket with safety shutters controlled by One 16A, Single pole switch. (for UPS sockets), Colour of the switch plate shall be gray.	Sets	111			
5.6	2 nos, 6A, decorative Plate switch socket with safety shutters controlled by One 16A, Single pole switch. (for UPS sockets) Colour of the switch plate shall be gray.	Sets	20			
5.7	1 Nos, 6A, decorative Modular switch socket with safety shutters controlled by One 6A, Single pole switch.(for Raw power sockets)Colour of the switch plate shall be white.	Sets	56			

5.8	1 Nos, 6/16A, decorative Plate switch socket with safety shutters controlled by One 16A, Single pole switch.(for Raw sockets) Colour of the switch plate shall be white.	Sets	121			
5.10	**Metal clad socket outlets**					
	Supply and installation of following flush mounting type plug & socket outlets for AC units & lab equipments.					
a	1 No, 240V, 20A, SP, MCB in suitable enclosure. The unit shall be of MDS or Equivalent. (For AC equipments)	Nos.	RO			
	-					
b	1 No, 415V, 32A, TP, MCB in suitable enclosure. The unit shall be of MDS or Equivalent. (For AC equipments)	Nos.	RO			
	-					
c	1 No, 415V, 63A, TP, MCB in suitable enclosure. The unit shall be of MDS or Equivalent. (For AC equipments)	Nos.	RO			
d	1 No, 240V, 20A, 3 Pin and earth industrial type socket outlet with 2 pole& earth metal enclosured plug top along with 20A SP, MCB in sheet enclosure	Nos.	8			
e	1 No, 240V, 32A, 3 Pin and earth industrial type plug. The unit shall be similar to Mennakes make modle no : **260** or Equivalent.	Nos.	1			
f	1 No, 240V, 32A, 3 Pin and earth industrial type Connector. The unit shall be similar to Mennakes make modle no : **522** or Equivalent.	Nos.	1			
	Floor / Table mounting Pop-up Boxes.					
5.10	Supply & Installation of Floor service box suitable for fixing 1 Set of UPS power (1x13A socket controlled by 1no, 16A switch) & 1 Set of 1 x 13A, Raw power socket in one compartment & in other compartment place provision for mounting Data / Voice points. (The rate to exclude cost of sockets) The unit shall be similar to Electrax make modle No: CR2004 or equivalent.	Nos	3			
5.11	Supply, Installation and testing of Aluminium floor adaptor of 3+3 module, pop-up boxes suitable for housing One number 5A, socket outlet with switch & Data sockets. The unit shall be similar to Legrand make item No: **650349** or equivalent with switch and socket & Data sockets. The rate shall also include necessary boxes to fix the above item.	Nos	RO			
6.2	**LUMINAIRES:**					
	Supply, installation, Testing and Commissioning of following Fluorescent Luminaires, complete with 1 / 2 x 36 Watts, truelite,higly efficient lamps and with electronic ballast. The rate shal linclude all necessary consumables.					
6.3	2 x 13W, Recess mounted Spot Lighting luminaries, The fitting shall be Similar to Philips make FBH 145/213 or or LD Square make Equivalent, with 2 X 13W, CFL lamp.	Nos	RO			

6.4	1 x 18W, Recess mounted Spot Lighting luminaries, The fitting shall be Similar to Philips make FBH 145/118 oror LD Square make Equivalent, with 1 X 18W, CFL lamp.	Nos	168			
6.5	2 x 18W, Recess mounted Spot Lighting luminaries, The fitting shall be Similar to Philips make FBH 145/218 oror LD Square make Equivalent, with 2 X 18W, CFL lamp.	Nos	RO			
6.6	3 x 14W, Recess mounted luminaries suitable for Armstrong ceiling, The fitting shall be Similar to Philips Make TBS 669/314 MDGN HF or Equivalent, with 3 X 14W, High Lumen output FTL (T5) lamp(600mm).	Nos	22			
6.7	3 x 14W, Recess mounted luminaries suitable for Armstrong ceiling, The fitting shall be Similar to Philips Make TBS 669/314 MDGN HF or Equivalent, with 3 X 14W, High Lumen output FTL (T5) lamp(550mm).	Nos	68			
6.8	2 x 36W, Recess mounted luminaries suitable for Armstrong ceiling, The fitting shall be Similar to Philips Make FBS 450/236 P5 AG HF or or LD Square make Equivalent with 2 X 36 W, High Lumen output CFL lamp.	Nos	RO			
6.9	4 Feet, 1x 36 W, Fluorescent luminaire with lamp, Similar to Philips make TMC501 /136 HPF or Equivalent. (Indirect Lighting)	Nos	RO			
7.0	1 x 28W, Surface mounted Luminaries with Lamp and low loss 5.5W ballast. The fixture shall be similar to Philips Make WFC51 or or LD Square make Equivalent	Nos	10			
7.1	1 x 50 Watts, Recessed mounted, Eye Ball tillable Halogen Down Lighter luminaries with suitable type of Halogen lamp and control gear. The fitting shall be similar to Wipro make : WCQ-22150 or Philips make : DN 652 oror LD Square make Equivalent	Nos	RO			
6.10	**LIGHTING CONTROL SYSTEM**					
a.	Presence detector sensors for lighting control for cabins, The unit shall be similar to **Honeywell Make K4 015** or equivalent. The minimum coverage distance should not be less than 6meters (Diameter). The unit shall also have timer to control.	Nos	12			
F	**SUB TOTAL**					
7.2	**<u>CIRCUIT WIRING</u>**					
	Circuit wiring from MCB DB / LT Board to switchboxes / powersockets / MCB DBs with all wiring materials , P.V.C insulated FRLS grade fire retardant copper wires, necessary draw boxes and accessories.					
7.3	2 Runs of 2.5 sq.mm + 1Run of 2.5 sq.mm fire resistant FRLS wires in already laid conduit. (For Lighting circuits and 6 Amps Power points)	Mtrs.	RO			

7.4	3 Core - 2.5 sq.mm flexible copper conductor cables for lighting circuit in already laid conduit / wire way trunking.	Mtrs.	2912			
7.5	2 Run of 4 sq.mm + 1Run of 4 sq.mm fire resistant FRLS wires in already laid conduit. (For 16 Amps Power points and UPS sockets)	Mtrs.	RO			
7.6	3 Core - 4 sq.mm flexible copper conductor cables for lighting circuit in already laid conduit / wire way trunking. (For 16 Amps Power points and UPS sockets)	Mtrs.	5492			
7.7	3 Core - 4 sq.mm flexible copper conductor cables for IDF room circuits (Colour for cable Black & White for source 1 & 2 respectively)	Mtrs.	210			
7.8	1 Run of 6 sq.mm fire resistant FRLS wires in already laid conduit.	Mtrs.	100			
7.9	1 Run of 10 sq.mm fire resistant FRLS wires in already laid conduit.	Mtrs.	160			
8.2	**POINT WIRING**					
	Wiring for light point / exhaust fan point / call bell point with 1.5sq.mm FR PVC insulated copper conductor single core in surface/recessed steel conduit, with piano type switch, phenolic laminated sheet, suitable size MS box & earthing the point with 1.5sq.mm FR PVC nsulated copper conductor single core cable etc. as required.					
8.3	One light point controlled by one 6A decorative switch.	Nos.	35			
8.4	Two light point controlled by one 6A decorative switch.	Nos.	25			
8.5	Three light point controlled by one 6A decorative switch.	Nos.	9			
8.6	Four light point controlled by one 6A decorative switch.	Nos.	12			
8.7	Five light point controlled by one 6A decorative switch.	Nos.	5			
8.8	Six light point controlled by one 6A decorative switch.	Nos.	8			
8.9	Seven light point controlled by one 6A decorative switch.	Nos.	RO			
9.0	Eight light point controlled by one 6A decorative switch.	Nos.	RO			
9.1	Nine light point controlled by one 6A decorative switch.	Nos.	RO			
7.10	Ten light point controlled by one 6A decorative switch.	Nos.	RO			
7.11	One light point controlled by 2 Way 6A decorative switch.	Nos.	RO			

7.12	Two light point controlled by 2 Way 6A decorative switch.	Nos.	RO			
9.2	**EARTHING**					
	EARTH PITS					
9.3	Supply, Preparation and testing of G.I pipe electrode type earth station as per IS:3043 complete with 40 mm Class`B' GI pipe, funnel, test link, brick masonry chamber with hinged cover etc.,for safety earthing and Panel earthing.	Nos	2			
9.4	Providing and fixing of earth electrode earth station complete with brick masonary chamber, GI cover, GI frame, GI watering funnel etc. The GI frame / chamber shall be of 300 x 300 x 300 size. The rate shall also include necessary back filling componds for each earth pit as per manufacturer's gidelines. The unit shall be similar to T39 of Ashlok earthpit of height 3000mm and outer dia of 80mm .	Nos	2			
9.5	**Earthing Conductors**					
a	40 x 6 mm GI earth strip.	Mtrs.	140			
	-					
b	40 x 6 mm Copper earth strip.	Mtrs.	RO			
	-					
c	25 x 6 mm GI earth strip.	Mtrs.	170			
	-					
d	25 x 6 mm Copper earth strip.	Mtrs.	260			
	-					
e	25 x 3 mm GI earth strip.	Mtrs.	RO			
	-					
f	25 x 3 mm Copper earth strip.	Mtrs.	RO			
	-					
g	8 SWG tinned copper wire, with terminations on both the ends (for MCB DB earthing)	Mtrs.	RO			
h	Antistatic floor earthing with 25 x 0.05mm thick copper film	Mtrs.	0			
i	Busbar of 0.5 Mtr length made out of 50x6 mm GI Strip with drill holes of M8 at 25mm interval mounted on Insulators.	Nos	5			
j	300mm long, 75 x 6 Copper, Earth bus suitable for terminating 8 SWG copper wire with holes at regular intervals connected to main bus. The same need to be mounted in MS box with transperent cover.	Nos	6			
k	PVC insulating tapes of 19mm width in rolls of 10 meters for Neutral taping earth strips	Nos	0			
9.6	**Copper conductor cables [Yellow color with Green strip]**					
a	1C x 240 Sq.mm copper conductor cable (Unarmoured)	Mtrs.	RO			

b	1C x 120 Sq.mm copper conductor cable (Unarmoured)	Mtrs.	RO			
c	1C x 95 Sq.mm copper conductor cable (Unarmoured)	Mtrs.	RO			
d	1C x 50 Sq.mm copper conductor cable (Unarmoured)	Mtrs.	400			
e	1C x 25 Sq.mm copper conductor cable (Unarmoured)	Mtrs.	RO			
f	1C x 16 Sq.mm copper conductor cable (Unarmoured)	Mtrs.	300			
g	1C x 10 Sq.mm copper conductor cable (Unarmoured)	Mtrs.	380			
9.7	**Copper conductor cable terminations**					
a	1C x 240 Sq.mm copper conductor cable (Unarmoured)	Nos.	RO			
b	1C x 120 Sq.mm copper conductor cable (Unarmoured)	Nos.	RO			
c	1C x 95 Sq.mm copper conductor cable (Unarmoured)	Nos.	RO			
d	1C x 50 Sq.mm copper conductor cable (Unarmoured)	Nos.	20			
e	1C x 25 Sq.mm copper conductor cable (Unarmoured)	Nos.	RO			
f	1C x 16 Sq.mm copper conductor cable (Unarmoured)	Nos.	10			
g	1C x 10 Sq.mm copper conductor cable (Unarmoured)	Nos.	30			
10.2	**FLOOR RACEWAYS**					
10.3	Floor raceways of following sizes made out of 1.6 mm thick Pregalvanised sheet complete with screwed type cover of thickness as specified with counter sunk type screws. The dimension of the same shall be as follows. The cover should be of 2 mm thick.					
	Note : The rate quoted shall include providing earthing for the Wireway trunking. (Usage of jumper wire at joining is acceptable) & complete with necessary supports, bends, access boxes, Tap off boxes & Cross over as per specification and site requirement.					
a	100mm x 40mm GI raceway with 2mm thick cover	Mtrs.	150			
b	150mm x 40mm GI raceway with 2mm thick cover	Mtrs.	35			
c	200mm x 40mm GI raceway with 2mm thick cover	Mtrs.	84			
d	250mm x 40mm GI raceway with 2mm thick cover	Mtrs.	25			
e	300mm x 40mm GI raceway with 2mm thick cover	Mtrs.	35			

f	450mm x 40mm GI raceway with 2mm thick cover	Mtrs.	10			
g	600mm x 40mm GI raceway with 2mm thick cover	Mtrs.	0			
h	Additional cost for providing partition in trunking of size more than 300mm wide.	Mtrs.	0			
i	**POWDER COATED TRUNKING FOR DATA CENTER**					
	Providing and Fixing of 2mm thick steel sheet factory fabricated post galvanized raceways to be laid in the ceiling for Data center & IDF room area with cutouts for installation of MCB and Industrial socket outlets as indicted in Item No : 5.9 (f). The rate to include providing 2 mm thick GI cover fixing accessories, Earthing with 8SWG copper wire, complete with necessary supports, bends, access boxes, Tap off boxes & Cross over as per specification and site requirement.					
a	400 mm Wide x 75 mm Deep Raceways with 2 mm thick GI cover	Mtrs.	15			
b	200 mm Wide x 125 mm Deep Raceways with 2 mm thick GI cover	Mtrs.	RO			
c	200 mm Wide x 75 mm Deep Raceways with 2 mm thick GI cover	Mtrs.	10			
10.4	**JUNCTION BOXES**					
	Electrogalvanised junction boxes with 2mm cover withcounter sunk type screws for floor raceways of the following sizes.The dimension of the same shall be as follows. The dimension of the same shall be as follows.					
a	110 x 110 x 40mm GI floor junction box with 2 mm thick cover.	Nos	45			
b	160 x 160 x 40mm GI floor junction box with 2 mm thick cover.	Nos	5			
c	220 x 220 x 40mm GI floor junction box with 2 mm thick cover.	Nos	15			
d	260 x 260 x 40mm GI floor junction box with 2 mm thick cover.	Nos	3			
e	310 x 330 x 40mm GI floor junction box with 2 mm thick cover.	Nos	13			
f	440 x 440 x 40mm GI floor junction box with 2 mm thick cover.	Nos	4			
g	550 x 550 x 40mm GI floor junction box with 2 mm thick cover.	Nos	2			
10.5	**FLOOR CHIPPING FOR REACEWAYS**					
	Cutting of floor screeding for accomadating the floor raceways / conduits for the above size of raceways / conduits, The rate shall include closing of extra gap with cement, machine cutting and making good to the original level & also cleaning the debris.	Rmt	60			
11.2	**EMPTY PVC CONDUITS**					

	2 mm thick PVC conduits of followingsizes for open / enclosed wiring complete with all necessary accessories (Tentative qty)					
a	19 mm Dia, 2 mm thick, FRLS type PVC conduit	Mtrs.	RO			
b	25 mm Dia, 2 mm thick, FRLS type PVC conduit	Mtrs.	3781.67			
c	40 mm Dia, 2 mm thick, FRLS type PVC conduit	Mtrs.	150			
12.2	**CABLE TRAYS**					
	Ladder type cable tray					
	Fabricating and installing following size of galvanised ladder type cable tray made of suitable type of angles / sheets, including horizontal and vertical bends, reducers, tees, cross members and other accessories as required and suspended from the ceiling.					
	Note: The rate shall include all necessary supporting structure / supports as required.					
a	150 mm wide cable tray	Mtrs.	25			
b	300 mm wide cable tray	Mtrs.	30			
c	450 mm wide cable tray	Mtrs.	30			
d	600 mm wide cable tray	Mtrs.	RO			
A	**PART - A [SUB TOTAL]**					
B	**PART - B [MISCELLANIOUS & SAFTEY ITEMS]**					
13.2	**SAFETY ACCESSORIES AND MISCELLANIOUS ITEMS**					
a	415V enameled type danger boards 150 x 150mm. Size	Nos.	2			
b	6mm thick, 900mm wide x 1800mm long rubber mats ISI approved with test certificates of Jyoti make.	Nos.	2			
c	Shock treatment chart duly framed and laminated	Nos.	2			
d	Laminated drawing board suitable (A1) size drawing	Nos.	2			
e	Preparation of As-Built drawings (Minimum 6 Sets + CD)	Nos	2			
f	4.5 Kg class CO2 Type portable fire extinguishers with fixing brackets & hardware.	Nos	3			

	CEIG approval for the installation					
13.3	Obtaining CEIG approval for the installations as required by statutory norms. The offered price shall include preparation of required docuements, followups etc.	Ls	2			
14.2	**TEMPORARY POWER - FOR CONSTRUCTION**					
14.3	Providing temporary power supply for Construction work. The required power will be made available at one point. [From DG set area] The vendor shall draw necessary wire in Conduit / Armored cable required for the same with proper fixing and safety.	Ls	2			
a)	The rate quoted shall include providing suitable Distribution board with ELCB for Incomer and suitable ratings of MCB for Outgoings for following equipments.					
b)	The rate quoted shall include providing Minimum 4 Nos, of 6/16A, Socket outlet with individual switch at every column. (Max : 15Nos / floor)					
c)	Providing separate circuits with suitable socket for 2 Nos, Single phase Welding Machines in each floor					
d)	Providing separate circuits with suitable socket for 2 Nos, Two phase Welding Machines in each floor					
e)	Providing adequate lighting for Interior work with 2 feet Flourecent fixtures. (The lux level should not be less than 150 Lux)					
f)	Providing 4 Nos, of self contained battery Emergency Light fixtures.					
g)	Providing earthing for the system, by either by 8SWG GI wire or wires.					
h)	Supplying & providing of 50 Nos, 5 A, Plug tops.					
l)	UP-Keeping and maintaining the entire system till end of the project.					
j)	Providing (separate) man power to maintain the temporary power system.					
k)	Removing of all material used for temporary setup out of site.					
l)	Supplying of 2 No, 5kG, CO2 and 2 No. ABC type fire extinguishers					
m)	Providing 4 Sets of Spike buster with suitable protection for desk top PCs (For site office)					
	-					
B	**PART - B [SUB TOTAL]**					
C	**PART - C [DATA & NETWORKING]**					
Sl.No	**Item Description**	**Unit**	**Qty**	**RATE**	**RATE IN WORDS)**	**AMOUNT**
	CAT6 Copper Components for DATA					
1	4-pair, Cat6 UTP Cable, roll of 305m,Grey	Box	15			
2	CAT6 UTP Jack with Strain relief and bend limiting boot (SL Series), Blue, The rate to include testing and Documentation.	Nos	98			
3	4-port 110-style faceplate, White	Nos	8			
4	2-port 110-style faceplate, White	Nos	68			
5	Blank insert for 110-style faceplate	Nos	90			

6	Cat6 24port Jackpanel **Straight Unloaded**	Nos	12			
7	CAT6 UTP Jack (SL Series), Blue for JP	Nos	164			
8	Cat6 RJ45 UTP Patch Cords, with snagless boots, color matched, Blue - 7 ft, Equipment & Rack End and Work location end	Nos	196			
9	CAT6 RJ45 UTP Patch Cords, with snagless boots, color matched,ORANGE, 10 Ft (Server Connectivity)	Nos	10			
	AMP CAT6 Copper Components for VOICE					
10	4-pair, Cat6 UTP Cable, roll of 305m,Grey	Nos	14			
11	Cat6 UTP Jack with Strain relief and bend limiting boot (SL Series), YELLOW	Nos	91			
12	Cat6 24port Jackpanel **Straight Unloaded**	Nos	10			
13	Cat6 UTP Jack (SL Series), YELLOW for JP	Nos	240			
14	Cat6 RJ45 UTP Patch Cords, with snagless boots, color matched, YELLOW 7 ft	Nos	91			
	VOICE RESOURCE					
15	24-port Cat5e loaded Jack Panel, 1U, Voice Resource	Nos	10			
16	100 Pair riser cable	Mtrs	100			
17	100 Pair Krone Module with MDF Box	Nos	2			
	RACKS & ACCESSORIES					
18	1 x Basic OPEN RACK/45U/Powder Coated (OP-45-PC), 2 x High Density Vertical Cable Organiser/6 inch (HDVCO-6), 1 x Run-Way Kit-16Inch (RWK-16),10 x Mounting Hardware/ OR/ Pk-20 (ORA0001), 2 x Power Dist.Unit/ Horz/5Soc/5-15A/3KVA 9PDU-H-5-5-15-3)	Set	2			
19	Horz. Cable Organiser/1U/ CHL ON FR	Nos	32			
20	Outstation Rack Delivery Charges	Nos	2			
	ACTIVE COMPONENTS					
29	HP Procurve 48 Port Switch - 2510-48, Layer 2	Nos	3			
	PART - C [SUB TOTAL]					
-	-	-	-	-	-	
	GRAND TOTAL [PART - A + PART - B+PART-C]					

The drawings are attached with the tender document and will be issued at the time of purchase of tender. However, interested bidder can see the drawings in the office of I/c, building before purchase of tender.

The detailed specifications given herein after are for the items of works described in the schedule of quantities attached herein, and shall be guidance for proper execution of works to the required standards. It may also be noted that the specifications are of generalized nature and these shall be read in conjunction with the description of items in the schedule of quantities and drawings. The work also includes all minor details of construction which are obviously and fairly intended and which may not have been referred to in these documents, but are essential for the entire completion in accordance with standard engineering practices.

Unless specifically otherwise mentioned, all the applicable codes and standards published by the Bureau of Indian Standards, latest revision and all other standards that may be published by them before the date of receipt of tenders, shall govern in all respects of design, workmanship, quality and properties of materials and methods of testing, method of measurements etc. In case there is no ISI (BIS) specification for the particular work, such work shall be carried out in accordance with instructions in all respects, and requirements of the client/consultant.

The contractor shall maintain, in perfect condition, all works executed till the completion of the entire work allotted to him. Where phased deliveries are contemplated, this provision shall apply to each phase.

The contractor shall clear the site of all scaffolding materials and rubbish, etc., left out of this work to the satisfaction of the client/consultant before the work is considered as complete.

In case of any difference or discrepancy between the specifications/drawings and the description in the schedule of quantities, the schedule of quantities shall take precedence. In case of any difference or discrepancy between specifications and drawing, the specifications shall take precedence.

SITE BOOKS/REPORTS:

For the purpose of quick communication between the client/consultant and the contractor, or his agent or representative, site instruction books shall be maintained at site in the manner as described below.

Any communication, relating to the works, may be conveyed through records in the site instruction books. Such communication from the consultant to the contractor shall be deemed to have been adequately served in terms of the contract. Each site instruction book shall have machine numbered pages in triplicate and shall be carefully maintained and preserved by the contractor. Any instruction or other orders that the client/consultant may like to issue to the contractor may be recorded by him in the site instruction book and one copy thereof issued to the contractor.

FURNISHING OF REPORTS, STATEMENTS, RETURNS, ETC., BY CONTRACTOR:

All reports, statements, returns, diagrams, or drawings, etc., which the contractor is required to submit during the progress of the works to the client/consultant shall unless otherwise directed, shall be furnished in triplicate and at expense of the contractor.

CONTRACTOR TO VERIFY SITE MEASUREMENTS:

The contractor shall check and verify all the site levels and measurements whenever requested by other specialized contractors to enable them to prepare their own shop drawings and pass on the information with sufficient promptness, so as to not delay the works in any way. A copy of all such information passed on, shall be given to the client/consultant.

MATERIALS AND SAMPLES:

1. Materials to be new.

All materials/fittings/equipment employed in connection with the permanent work shall be new and of the best quality and description of their respective kinds and shall confirm to the relevant code (latest applicable standard) and to the approval of the client/consultant. The contractor shall be responsible to ensure that the materials used are suited to the specific conditions including the climate and environmental conditions prevailing at the site.

2. All proprietary material shall be of approved make and the type as stipulated. A list of approved makes is given at the end of the document. It will be deemed that the contractor has priced the respective items on the basis of those approved makes. However, it shall be the prerogative of the client/consultant to choose any particular make among the list as the most appropriate one and the contractor shall be bound to provide the same without any variation in the contract rate.

3. Approval of manufacturers:

Before ordering materials of any description, the contractor shall submit samples to the client/consultant along with the names of the manufacturers and/or supplier proposed and shall obtain approval thereof in writing from the client/consultant well in advance of commencement of work and procurement of materials for use at site.

4. Copies of Orders.

The contractor shall supply to the client/consultant in triplicate, copies of all orders placed by him for the supply of materials for any item of permanent work or materials for the fabrication thereof. The specialist sub-contractors also shall supply, through the main contractor, copies in triplicate of all orders they may place for items of work or materials for fabricating any article or thing for which they have been sub-contracted.

5. Samples of materials and work

a) Irrespective of the fact that some specific make or type of material has been specified, no material shall be supplied or used on permanent works until the samples of the same are prepared/submitted and have been approved in writing by the client/Consultant.
b) In addition to special provision made hereinafter as to sampling and the testing of materials by particular methods, samples of all materials and work proposed to be employed in the execution of the work may be called for at any time by the client/consultant and shall be submitted to the consultant for approval without delay by the contractor. The contractor shall arrange for the carriage of the same to enable the tests and analysis thereof to be made.
c) Samples of materials of all trades/disciplines supplied shall be such as to have a clear idea of the general type and characteristics of the whole of the materials to be used in the work. No plea regarding samples supplied being not representative of the whole of the material will be acceptable. In case it is not practical to bring or make the sample at the site office, the contractor shall arrange for inspection at the sub-contractor/ supplier's shop or works at his own cost. In the event of the contractor not submitting for the approval of the client/consultants, samples of materials of satisfactory quality and workmanship, the client/consultant shall have the power to specify any particular manufacturer or merchant for the supply of such materials and the contractor shall, at no extra charge, obtain such materials from the said manufacturer or merchant. Before submitting samples for approval to the client/consultant, the contractor shall satisfy himself that it is in accordance with the requirement of the contract. The samples shall also be submitted sufficiently early for all procedures to be duly completed including rejection and resubmissions if required, so that the approved programmed construction is not adversely affected in any way.
d) Samples when approved will be retained by the client/consultant at the site office until the completion of the project and for this purpose, suitable labeled boxes for storage of samples shall be provided by the contractor.
e) The client/consultant shall be at liberty to reject all materials and workmanship at any stages, which are not at least equal in quality and character to such approved samples.
f) The contractor shall, when required by the client/consultant, furnish all information as to quality, weight, constituent substances, dimensions, levels, strength and description of the materials, test results, full and accurate records of the dimensions and positions of all new work and any other information necessary and works and give the consultant such other particulars as may be required promptly.

INSPECTION AND TESTING OF MATERIALS:

The client/consultant shall be kept informed as to the progress of all works being carried out or materials being manufactured, prepared or supplied so that he may be able to make such arrangements for inspection, testing and analysis as he may desire. Wherever considered desirable by the client/consultant, a representative shall be sent to contractor's, sub-contractor's and/or manufacturer's premises to test the materials or inspect their manufacture. The contractor shall attend to the client/consultant or his representative during such inspection to be carried out satisfactorily. Should the client/consultant decide not to send a representative to the said premises, the contractor shall obtain the manufacturer's certificate of test, proof sheets, mill sheets, showing that the materials have been tested satisfactorily in accordance with the requirements of the specification relating thereto, but neither omission of the client/consultant to send a representative, nor the production of the manufacturer's certificates of test shall affect the liberty of the client/consultant to reject after delivery of any material found not to be suitable or not in accordance with the specifications.

The contractor shall provide means of identification of the materials delivered at the site with the corresponding certificate of tests and manufacturing batch numbers.

As soon as the materials are delivered at the site, the client/consultant shall be informed. Not withstanding any test that the client/consultant may direct to be carried out at the contractor's, sub-contractor's or manufacturer's premises, the client/consultant shall be at liberty to carry out any further test he may desire after delivery of materials at the site and may reject any or all materials which fail to comply with the approved sample or the required specification. Only after the

approval of the materials delivered at the site, the same shall be used at the works and such approval shall not relieve the contractor for fulfilling his obligations under the contract.

The contractor shall prepare and provide such and as many test pieces of the various materials as the client/consultant may, from time to time, direct or as may be specified and the contractor shall analyze, test and weigh all materials in such manner and at such time or times and in such place or places as may be specified or directed by the client/consultant.

Materials shall be packed, transported, handled and stored on the site carefully and in a satisfactory manner so as to prevent any damage and deterioration of any kind, either during transit or storage. Certain perishable materials like cement, lime, fittings, doors, windows, glass etc., are stored in covered go downs to save them from sun, rain etc.

REJECTED MATERIALS:

Should the client/consultant at any time condemn any material or goods intended for use in the works as:

a) Being inferior to samples previously approved.
b) Having deteriorated in transit or on storage or on the site so as to be no longer fit for incorporation in the permanent works.
c) Not complying with the specification.

The contractor shall promptly remove all such material from the vicinity of the works to the satisfaction of the client/consultant and confirm in writing immediately after removal.

Should the client/consultant discover on the works, any material other than those approved, he may order their immediate removal from the site, and the contractor shall forthwith remove the un-approved materials from the site within 48 hours. Any works executed with inferior material is to be taken out and reinstated with approved material at the contractor's expense and within the contracted time period.

LIST OF PROPRIETARY MATERIALS:

The contractor shall submit a comprehensive list of all proprietary articles and materials used in the works containing catalogues, reference numbers, colour shades, etc., and the manufacturer's and/or supplier's names, addresses, including a pricelist with effect to the site of works. This list in approved format shall be complete in all respects and shall be submitted together with the as-built drawings and operation and maintenance manuals.

Failure to submit the above list, shall defer issue of the completion certification.

CONTRACTOR TO SATISFY HIMSELF REGARDING ALL REQUIREMENTS:

The contractor shall satisfy himself as to the full extent and character of the works, supply and conditions affecting labour, materials and plant requirements of the Employer's safety and health regulations and all local conditions and restrictions affecting the works and provide for the same.

The responsibility of carrying out the works and the methods to be adopted under this contract shall rest solely with the contractor subject always to the approval by the consultant of the contractor's proposals. Such approvals shall not however relieve the contractor in any way of his responsibility for the proper execution of works in accordance with the contract.

RECORD DRAWINGS:

The client/consultant will issue two sets of drawings, site instructions, with sketches to the contractor for the items for which some changes have been made from the approved drawings. The contractor will mark the changes in the original drawings issued for the purpose earlier and keep record of all such changes including the changes in levels and dimensions as required at site and issued by written instructions of the client/consultant and shall keep the site drawings fully updated. Finally these drawings, with all revisions, shall be maintained as record drawings at site and all such revisions/corrections, shall be effectively reflected/incorporated in the as-built drawings to be submitted by the contractor as stated hereinafter and return these copies to the client/consultant for his approval. In case any revision is required, or the corrections are not properly marked, the client/consultant may point out the discrepancy to the contractor.

AS-BUILT DRAWINGS AND COMPLETION PHOTOGRAPHS:

Two copies of the corrected as-built drawings shall be submitted to the client/consultant for his approval.

The client/consultant shall return a copy of the same duly approved, if found satisfactory or advise the contractor on the changes required of discrepancies, if any. The contractor shall resubmit three copies after incorporating all the corrections, changes etc., as required.

On receipt of the approved copy of these drawings, the contractor shall submit to the client/consultant, six prints/copies of the same along with one reproducible copy and as directed by the client/consultant for onward submission to the Employers unless otherwise stated.

Before the works (or any section thereof) are completed in accordance with relevant provision of general conditions of contract and before submission of the last or final bill whichever is earlier, the contractor shall furnish to the client/consultant as-built drawings of the works as completed in sufficient details which in the opinion of the client/consultant will enable the Employer to maintain, dismantle, re-assemble and adjust all parts of the works.

The contractor and his specialized sub-contractors shall submit as-built drawings for all the works including electrical and data cabling works and all other services if any, fabrications, installation equipments and their layouts, distribution systems and all other relevant information as required for approval of the client/consultant.

On completion, the contractor shall engage a professional photographer to take external and internal views of the buildings/works. Four copies each (including negatives), of enlarged A4 size of these photographs shall be submitted to the client/consultant.

CARE OF WORKS AND PROPERTIES:

The contractor shall so conduct his operations so as to not damage, close or obstruct any utility, highway, road or other property until permits thereof have been obtained.

If facilities are closed, obstructed, damaged or rendered unsafe by contractors' operations, the contractor shall, at his own cost, make such repairs and provide such temporary guards, lights and other signals as necessary or required for safety and as will be acceptable to the client/consultant and/or the owner of the utility, highway, road or other property.

FIRST AID SERVICE:

The contractor shall make his own arrangements for treatment of accident/casualties on the site in such first-aid units as may be thought necessary. The whole of the arrangements for the First Aid Service shall comply with local Health Authority Regulations and shall at all times be subject to the approval of the client/consultant and the contractor shall carry out any instruction given by the client/consultant in this respect.

PROGRESS PHOTOGRAPH:

The contractor shall arrange to take progress photographs fortnightly. The number and positions from which the photographs are to be taken shall be directed by the client/consultant.

FACILITIES, ATTENDANCE ETC., ON NOMINATED SUB-CONTRACTORS

The contractors shall allow for the provision of facilities, attendance, etc., for the nominated sub-contractors.

The facilities, attendance shall include:

a) Storage facilities for plants, tools and equipment and products and materials
b) The use of sanitary accommodation, medical and welfare facilities
c) Facilities as described in clauses keeping site clean, providing drinking and construction Air and proper lighting at worksite, access, scaffolding, hoist etc., thereof
d) Watching and lighting and protection of their work as necessary.

DISPATCH OF MATERIAL:

Material shall not be dispatched from the manufacturer's works or to the site without authority from the client/consultant. The client/consultant shall be informed prior to dispatching the materials.

TECHNICAL SPECIFICATIONS

INTERIOR WORKS:

GENERAL:

This specification is for work to be done, items to be supplied and materials to be used in the works as shown and defined on the drawings and described herein, all under the supervision and to the satisfaction of the client/consultants.

1. The workmanship is to be the best available and of a high standard. Use of special tradesmen should be made in all aspects of the work and allowance must be made in the rates for doing so.
2. Templates, boxes and moulds shall be accurately set out and rigidly constructed so as to remain accurate during the time they are in use.
3. The contractor shall be responsible for providing and maintaining and boxing or other temporary convenes required for the protection of dresses or finished work if left unprotected. He is also to clean out all shelves, out ends and other waste from all parts of the works before coverings.
4. All unexposed surfaces of timber e.g. partition/paneling frames, false ceiling, backing fillets, backs of door frames, cupboard framing, grounds, etc., are to be treated with two coats of approved timber preservative ad anti-termite paints before fixing or converging.
5. Only first class workmanship will be accepted. The contractor shall maintain uniform quality and consistency in workmanship throughout.

JOINERY:

1. Joinery is to be prepared immediately after preparing the work order, framed up, bonded and tied up. Any portions that are wrapped or found with other defects are to be replaced before welding up. The whole of the work is to be framed and finished in a workmanlike manner in accordance with the detailed drawings, specifications and wherever necessary, fitted with metal ties, straps, belts, screws, glue etc. Running beaded joints are to be cross-tongued with Teak tongues wherever 1 or 1.5 thick double cross-tongued. Joinery work is to be generally finished with fine sand or glass paper.
2. Joints: All joints shall be standard Mortise and Tenon, dowel, dove tailed and cross-halved. Nailed or glued joints will not be permitted. Screws, nails etc., shall be standard Iron or wire of oxidized metal. Fold tenons should fit the mortises exactly.
3. Nailed or glued butt joints will not be permitted, but in exceptional cases approval of client/consultants has to be taken.
4. Where screws are shown on a finished surface, they will be sunk and the hole plugged with a wood plug of the same wood and grain. The finished surfaces shall be neatly punched and the hole filled with wood filler to match the colour.
5. If joints in joinery work open, or other defects arise within the period stated for defects liability in the contract, then such defective joinery shall be taken down, refilled, redecorated and/or replaced. The defective work, and any work disturbed shall be made good at the contractor's expense.
6. Nails, spikes and bolts shall be of length and weight as approved by the client/consultant. Nails shall comply with IS: 1959-1960 or equivalent approved sample. Brass headed nails are to comply BIS: 1210. Wire staples shall comply with BIS: 1494 or equivalent.
7. The contact surface of dowels, tenons, wedges etc., shall be glued with an approved adhesive.
8. Where glued joinery and carpentry work is likely to come into contact with moisture, the glue shall be Air proof.

HARDWARE & METALS:

The hardware, throughout, shall be of approved manufacture or supplier, well made and equal to, in every respect, to the samples to be deposited with the client/consultants. The contractor may be required to produce and provide samples from many different sources before the client/consultant take a decision and he should allow his rates for doing so.

1. Fittings generally shall be brass oxidized unless otherwise specified and shall be suitable for their intended purpose. In any case, it will have to be approved by client/consultants before the contractor procures it for execution at site.
2. Screws are to match the finish of the article to be fixed and to be round or flat headed or counter sunk as required.
3. The contractor shall cover up and protect the brass and bronze surfaces with thick grease or other protective material, renewed as necessary and subsequently clean off on connection.
4. Aluminium and Stainless Steel shall be of approved manufacture and suitable for its particular application. Generally the surface of Al shall have an oxidized finish and both shall comply with the samples approved by the client/consultant. All SS sheets shall be 304 S.S, Japan or equivalent, with gauge as specified but not thinner than 16 G.
5. All steel, bronze, brass and aluminium and SS articles shall be subjected to a reasonable test for strength, if so required by the client/consultant at the contractor's expense.
6. All brazing and welds are to be executed in clean smooth manner, rubbed down and left in the flattest and tidiest way, particularly where exposed.

7. Chromium plating shall be in accordance with IS or as per approved specification for normal outdoor conditions and shall be on a base material of Cu or brass.

GLAZIER:

1. All glass to be of approved manufacturer complying with IS: 3548-1966 as per approved quality and sample to be of the selective qualities specified and free from bubbles, smoke, air holes and other defects.
2. Polished plate glass shall be 'glazing glass' (GG) quality and that for mirror shall be silver quality (SG) confirming to IS: 3438-1965 as per approved sample and quality.
3. The compound for glazing to metal to be special non-hardening compound manufactured for the purpose and of a brand and quality approved by the client/consultants.
4. While cutting glass, proper allowances to be made for expansion. Each square or rectangle of glazing to be of one whole sheet. On completion of work contractor shall clean all glass inside and cut/replace all cracked, scratched and broken panes and leave in good condition.

PAINT & POLISHES:

1. All material required for the works shall be of specified and approved manufacturer, delivered to the site in manufacturer's containers with the seals etc., unbroken and clearly marked with the manufacturer's name or trade mark with a description of the contents and colour. All materials are to be stored on the site of the work.
2. Spray painting with approved machines will be permitted only if written approval has been obtained from the client/consultant prior to painting. No spraying will be permitted in the case of priming coats or where the soiling of adjacent surface is likely to occur. The nozzle and pressure to be so operated as to give an even coating throughout to the satisfaction of the client/consultant. The paint used for spraying is to comply generally with the specification concerned and is to be specially prepared by the manufacturer for spraying. Thinning of paint by brushing will not be allowed.
3. Wood preservation shall be Solignum or other equal and approved impregnating wood preservative and all concealed woodwork shall be treated with wood preservative and anti-termite treatment with Termiseal or equivalent chemical.
4. All brushes, tools, pots, kettles etc., used in carrying out the work shall be clean and free from foreign matter and are to be thoroughly washed out before being used with a different class of materials.
5. All iron or steel surfaces shall be thoroughly scraped and rubbed with wire brushes and shall be entirely free from rust, mill scale, etc., before applying the primary coat.
6. Surfaces of new woodwork to be painted are to be rubbed down and cleaned to the approval of the client/consultant.

UPHOLSTERY:

1. This will be of first class standard workmanship with webbing, no sag springs, coil springs, padding and filling as specified on drawings. Covering fabrics will be sewn, tufted and chorded as shown in the drawing and as approved by the client/consultant.
2. Cushion Vents: Brass cushion vents should be installed at the back or underside of seat cushions (Specially those that are covered in leather, vinyl plastic or very tightly woven fabric) to allow air to escape easily and to prevent tearing.
3. Materials: Finished timber shall be of the type specified. Furnishing fabrics, colour, and pattern, substance to be specified and manufactured or supplied by the company specified. No variation of this will be permitted unless with prior approval of the client/consultant.

POLISH:

French Polish: The basic material shall be shellac dissolved in methylated spirit.

Preparation: The timber should be well sanded and cleaned and the grain filled with grain filler. Any staining must be done before applying the polish.

Equipment: The polishing rubber, the most important implement in French polish, shall consist of a pad of cotton wool, which acts as a reservoir for the polish, and a cover of soft white liner or cotton fabric, similar to a well-worn handkerchief, which acts as a filler. The rubber must never be dipped into the polish. The rubber should be changed by pouring the polish on the pad with the cover removed.

Application: Work evenly over the surface with a slow figure-of-8 motion until the timber is coated with a thin layer of polish. The object is to apply a series of thin coats, allowing only a few minutes for drying between the coats. When a level and even bodied surface is obtained, the work is ready for the second stage i.e. spiriting off. Allow the work to stand for at least 8 hours, then take a fresh rubber with a double thickness of cover material and change it with methylated spirit. The

object of spiriting off is to remove the rubber marks and to give the brilliance of finish. Finally, work in the direction of the grain and continue until the surface is free of smears and rubber marks. Then leave to harden off.

Wax Polish: Wax polish shall contain silicones and driers. A good silicon wax is to be used, not a creamy or spray. The timber shall be sealed, first with another finish such as Ronseal, before applying the wax.

Application: Apply a light coat of the sealer by brush or cloth direct to the unfilled timber, working well in and finishing evenly with the grain. Allow to dry thoroughly, then sand lightly with fine abrasive paper. Apply a heavy coat of wax by cloth on a flat surface with a stiff brush. Work it well into the timber and finish off by stroking with the grain before leaving to harden. Leave for several hours before rubbing up with a soft brush. Finally buff the grain with a soft cloth.

Transparent/Coloured Polyurethane (Melamine): This shall be applied where natural grain of the wood is required to be shown. Polyurethane gives tough surface which resists scraping, chipping and boiling Air.

Application: Clean off the grease and wax with an abrasive and white spirit. This should not be applied in humid conditions. Apply the first coat preferably off clear hard glaze with a cotton pad. Leave this to dry for at least 6 hours, and then apply further coat with a paint brush. If you wait for longer than 24 hours between coats, rub down the previous coat with fine glass paper or medium grade of steel wool. Obtain a matte finish if require by giving a final coat of clear Ronseal matte coat.

TIMBER:

1. Only seasoned and chemically treated BTC / CPTW / Sal wood/matching wood to be used, as specified.
2. All the wood shall be properly seasoned, natural growth and shall be free from worm holes, loose or dead knots or other defects, saw die square and shall not suffer warping, splitting or other defects.
3. The moisture content shall not exceed 12%
4. All internal frameworks shall be treated with approved wood preservation and anti-termite chemical.
5. All wood brought to site should be cleaned, shall not have any preservative or other coating or covering.
6. All rejected, decayed, bad quality wood shall be immediately removed from site. All wood brought to site must be stack stored properly as per instructions.

PLYWOOD:

1. Marine plywood confirming to IS: 710-1976 as specified in the approved list of manufacturers shall only be used. (Block board/commercial plywood not to be used)
2. Only teak wood particle board shall be used. Particle board shall be phenol formaldehyde bonded and generally confirm to IS: 3087-1965
3. Only 3 mm – 4 mm thick straight-grained groove matching approved veneers shall be used.

MDF confirming to IS: 12406-1988 is a zero wood substitute finding a wide range pf applications in homes and offices. MDF should be of excellent finish. This should have advantage of homogenous construction, design flexibility, unbeatable machinability, no core voids and better value for money.

LIST OF APPROVED AND NOMINATED MANUFACTURERS/SUPPLIERS OF MATERIALS AND SUB-CONTRACTORS/INTERIOR WORKS

Note:

1. All materials to be used should be as per the list given below.
2. Use of equivalent make shall be only with prior approval from clients/consultants in writing. It must be at par with specified list below in all respects. Any additional expenditure/time due to this variation will be on contractors account and no claims shall be entertained.
3. Contractor shall make payment to all suppliers/sub-contractors proportionately as per the payment received from the client/consultant for the particular item of work; otherwise the client/consultant has full rights to make payment directly to the party to avoid hampering progress of work. Such amount paid out shall be deducted in whole against the account of the contractor.
4. Client/consultant reserves the right to select/prefer the material from the approved list.

Sl No.	Material	Approved make/sub-contractor/supplier	Remarks
A	**WOOD**		
1	Old Burma Teakwood	No specific supplier. Contractor to obtain approval for samples.	Open market material
2	BTC	No specific supplier. Contractor to obtain approval for samples.	Open market material
3	Cp – Teakwood	No specific supplier. Contractor to obtain approval for samples.	Open market material
4	Hardwood	No specific supplier. Contractor to obtain approval for samples.	Open market material
5	Wood to match the veneers to be used	Jalaram, Anchor, Ekbote	
B	**PLYWOOD**		
1	Marine ply (IS: 710)	Anchor, Kitply, Greenply, Uniply, Archidply.	
2	Soft Board	Jolly Board or approved equivalent	
3	Particle Board	Novopan, Egger, Duratuff, Archid	
4	MDF	Duratuff or approved equivalent (IS approved)	
5	Flush Door	Anchor, Kitply, Anchor, Green, Mayur	Marine grade
C	**DECORATIVE VENEERS/LAMINATES**		
1	Veneers	Jalaram, Anchor, Ekbote, Archid, Durian.	Group match and lot to be approved
2	Laminate	Kitlam, Greenlam, Merino, Durian, Archid.	
D	**GLASS**		
1	Glass	Asahi, Modiguard, Saint Gobain, Float Glass India	
2	Mirror	Asahi, Modiguard, Saint Gobain, Float Glass India	
3	Tempering or toughening of glass	Asahi, Modiguard, Saint Gobain, Float Glass India	
E	**ADHESIVE & PRESERVATIVES**		
1	Adhesive	Fevicol, Vamicol, Kitcol, Araldite, 3M	
2	Preservative	Termiseal, Bison, Solignum.	
F	**PAINTS & POLISHES**		
1	Interiors Paint: Acrylic, Luster, Enamel	ICI Dulux, Nerolac, Asian, Burger,	

		Oikos.	
2	Fire Retardant paint	Fire Tard, Shalimar, Viper, Nobel	
3	Poly-coating	MRF, Solvosol, Asian	
4	Melamine	MRF, Solvosol, Asian	
G	**FALSE CEILING**		
1	Gypsum	India Gypsum or equivalent make (IS approved)	
2	Acoustical: Gypsum Fibrous Metal	India Gypsum or approved equivalent AMF, Armstrong or approved equivalent Hunter Douglous or approved equivalent.	Entire, including framework, supports, hanger etc., is to be used of the same make.
3	Calcium Silicate Board	Hilux, Aerolite or approved equivalent	
H	**HARDWARE**		
1	Screws	GKW, Nettle fold or approved equivalent	
2	Locks for cabinets	Godrej, Vijayan, Dorset, Acme.	
3	Floor Spring – for toughened glass	Dorma or approved equivalent	
4	Floor springs / door closers	Hyper, Everite, Garnish, Hamco or approved equivalent	
5	Handles	Nikki or approved equivalent.	
6	Hinges	Grass, Blum, Hafele	
7	Sliding drawer channels	Grass, Blum, Hafele	
8	Metal side drawer channels	Grass, Blum, Hafele	
9	Aluminium	Jindal or approved equivalent	
10	Lock	Dorset, Vijayan, Godrej, Acme.	
11	Patch fittings	Dorma	
12	Tower Bolt/Stopper	Magnum, Shalimar, Natraj, Ebco	
13	Mobile storage	Safeguard, Godrej or approved make.	
I	**SOFT FURNISHING**		
1	Carpet	Transasia, Interface, Miliken, Shaw	
2	Glass film for tint/safety/frosting etc	3M or approved equivalent.	
J	BLINDS		
1	Venetian, vertical blinds in fabric/hard wood/bamboo – Roman fold or roll up.	Mac, Aerolux, Vista, AD series, Technofab, Trend Italia	
2	False flooring	Kingspan, Tyco, DG false flooring	
3	Aluminium sections	Jindal, Hindalco	
K	PLUMBING & SANITARY		
1	CPVC Pipes & fittings	Ashirwad, Astral	
2	UPVC Pipes & fittings	Prince. Kisan	
3	Ball Valves	Zoloto, Hawa	
4	G.M Non return valves	Zoloto, Kirloskar	
5	Stoneware Pipes	M.S.L, T.S.L	ISI Marked
6	Sanitary Ware	Hindware/Parryware	
7	Plumbing Fixtures	Jaquar	
8	Toilet Accessories	Jaquar / Kimberly Clarke	
9	Hand driers	Nova-tech	
10	Urinal Sensors	Jaquar	
11	FRC Manhole frames & covers	Southern Concrete Industries/Approved equivalent	
12	CI Gratings & MH Frames & Covers	Neco	

1. Abbreviations:

Rmt	Running meter
Sqm/Smt	Square meter
Cum	Cubic Meter
QRO	Quote rate only
C/C	Centre to centre
C.P	Chrome Plated
No.	Numbers
Mm	Millimeter
G.I	Galvanized Iron
A.C	Asbestos cement
C.I	Cast Iron

2. All dimensions shown in drawings are in mm unless otherwise stated,
3. The quoted rate shall be all inclusive and cover the cost of materials, samples brought for approval, tools and tackles, plant and equipment, supervision, over heads, profit and any other expenditure incurred for completion of work as per drawings, specifications and to the full satisfaction of the client/consultant.
4. The rates quoted shall be valid for working at all heights, depths and on all floor levels. No extra payment shall be made for scaffolding, staging, ladders etc., for transportation of men and material at higher or lower levels.
5. The item rate specifications are indicative. The contractor will have to carry out the work in accordance with the drawings, technical specifications and/or other conditions laid down in tender document and to the full satisfaction of client/consultants.
6. Quantities mentioned against respective items are approximate and can vary to any extent. Payment shall be made on actual executed quantities.
7. No claims shall be entertained in case of increase or decrease in quantities. Client/consultants reserve the right to increase or decrease in quantities. Client/consultants reserve right to increase/decrease quantities of any item and also to add/delete any item in totality.
8. Client/consultants reserve right of operating any item for any work on any floor.
9. The rate for partition, paneling shall include necessary additional framework supports that may be required to suit site conditions or stability of the item. Decision of client/consultants in regards to the need for such additional supports shall be final. Vertical members or frames of full height partitions shall be fixed with R.C.C floor and roof slab/beam.
10. All wooden frame work/member sizes mentioned shall be full size with maximum plaining tolerance of 3mm both ways.
11. Size and type of door closer/floor spring shall be suitable for type of door. The contractor shall give guarantee for performance of door closer/floor spring from him as well as manufacturer.
12. Rate of pelmet fascias and soffits shall include heavy-duty aluminium curtain channels and nylon runners, stoppers, brass hooks fixtures wherever required.
13. Rates for painting and polishing shall include protection and cleaning of glass panels, fans floor etc.
14. After completion of the work, the site shall be handed over absolutely clean, after ensuring that all laminates, floors, walls etc., are spotless clean.
15. Care shall be taken during painting and polishing works to ensure that masking tapes are use and the paint/polish does not smear over neighboring surfaces, switch plates, partitions/paneling etc., and if there is any smearing in spite of care taken, the same shall be made good.
16. Rates of all items shall remain constant irrespective of floor level and no extra cost shall be paid for handling and stacking of material, removing debris etc., from site.
17. The contractor shall clean the site and mark out the lining on the floor with brown adhesive tape for approval. The same shall not be paid for separately.
18. Unless otherwise noted, the method of measurement will be as per IS 1200.
19. Client/consultants reserve the right of operating all **'Quote Rate Only'** items.
20. Construction in medium density particle board/low density particle board/MDF board/Gypsum board etc., shall be as per manufacturer's specifications and instructions including the use of specified screws, bolts, channels etc.
21. Wherever the contractor proposed to use 'equivalent' makes he shall obtain client/consultant's prior approval. Any additional cost and time lost due to this will be on contractor's account and no claims will be entertained.
22. Veneers to be used shall be following types as approved by the client/consultants: Teak, Sycamore, Beech, White Cedar, mahogany, Walnut, Padauk, African mahogany, Golden Cedar or approved by the client/consultant. Only group-matching veneers shall be used.

23. The specification for side unit or rear side credenza unit in any item shall be same as the specification of the table in that item.
24. All keyholes shall be fixed with metallic keyhole rings and adequate stickering with key numbers shall be done prior to hand over of the site.
25. Rates for all plumbing fixtures, pipes etc., should include cost of testing the same under required pressure as per relevant IS code.
26. The rate-concealed pipes should include cost of making good the wall or floor in which it has been concealed.
27. The back of marble slab should be applied with white cement paste before fixing. Granite must be checked for porosity before laying and due treatment should be carried out to avoid patches etc.
28. The contractor should take approval for make 7-manufacture form the client/consultant before using any material, which does not appear in the list of, approved manufacturers.

Trade preamble – wood work

Notes:

1. Wherever wood is specified or mentioned, the same to be used shall be of following species for all items of work unless otherwise specified:

   For exposed woodwork: wood matching to veneer species cut to size as specified.

   For internal woodwork: Sal wood cut to size as specified, coated with wood preservative and fire retardant paint.

   Wherever MDF board is to be used, the same shall be of Exterior grade, confirming to IS: 12406 – 1288 or equivalent.

   All wooden beading mouldings to match with the veneer shall be used.

2. Rates quoted for all items shall include for cost of materials, labor, testing of materials at laboratory or site, tools & tackle, lift and lead charges, transportation charges, loading-unloading charges, insurance cover as per tender, all types of taxes & duties including Works Contract Tax, polishing & painting charges (wherever applicable), arranging in position, cleaning etc., and completing the item to the satisfaction of client/consultant.

3. Rates quoted for finishes all include for cost of exposed wood moldings or sizes mentioned in drawings and specifications together with 3 coats of Melamine polish. These members will be measured as part of respective finished items. Separate payment for wood moldings will not be made unless specified in the tender.

4. Rate quoted for framework/partitions paneling shall include the cost for cutting charges to accommodate electrical conduits, A/c ducts etc., as per markings given by respective contractors. Rate for frameworks shall also include charges for applying fire retardant and wood preservative.

5. All frameworks for partitions shall be constructed up to main ceiling (R.C.C floor slab). However in case any additional supports are necessary of any size required and as advised by the consultant, the same size shall be provided. Cost of these supports shall be included in the rate quoted for the framework. There will be no separate payment for the additional supports envisaged as above.

6. All drawers used in furniture shall have ‘sliding drawer channels’ of approved make.

7. Rates quoted for all storage units shall include for cost of shelves with sides made out of 18 mm thick marine ply board and back with 8 mm thick ply. Similarly rates quoted for storage units shall also include for finishing at back of unit wherever specified. Tenderers shall note that storage units with veneer finish will have veneer with melamine polish for rear side. Rates quoted shall include for such finishes.

8. The rates quoted for all items shall include for cost of (unless otherwise stated) fixing required wooden sleeves or supports & making openings for ducts, grills, light fixtures, speakers, all types of detectors, indicators, CCTV cameras, finishing of joints, making grooves in required profile as per details in the false ceiling or between the false ceiling and the wall /partition with required wooden strips, etc. There will be no separate payment on this account. No deductions for providing openings for fittings/fixtures shall be made for false ceiling. However no payment shall be made for column and trap door openings.

9. Rates quoted for fixing MDF/plywood of any thickness shall include for cost of skinning, boxing, paneling, fascia, ledges, etc. These rates shall be valid for all widths.

10. The rates quoted for all items shall include cost for providing & fixing edge binding strips or lipping of 6 mm thickness for exposed edges of plywood, internal framework etc., wherever these materials are used in completing the item.

11. All exposed veneered/wooden surfaces shall be finished with 3 coats of melamine polish o approved shade and color, unless otherwise specified.

12. All materials brought to site for incorporating in work shall be of approved make and manufacture. The material which will not be of approved make & manufacture will be rejected & it shall be removed from site immediately.

13. Colours, shades of laminate, veneer, paints, and polish shall be exclusively approved by consultants. No violation, deviation shall be permitted.

14. Rates for extra items shall be got approved from the Employer prior to executing such items. Payments for extra items will be made only after such approvals. For this purpose the contractor shall submit rate analysis with supporting quotations/invoices duly certified by the consultant.

15. Unless otherwise specified in the working drawings of items or specifications, laminates used in the work shall be 1.5 mm thick & veneer 3.5 mm thick.

16. Hardware such as locks, handles, tower bolts, ball catches etc., shall be as per approved list of makes & manufacturers. Specific separate approvals shall be obtained before using any other accessories in lieu of approved hardware as above.

17. All the drawers & trays of desk units & credenza units shall have telescopic drawer fittings, including stopper systems of approved make.

18. The colors of melamine polish shall be as approved by the consultants. No violation shall be permitted in any of the item. Three or more coats of melamine polish shall be applied for items with melamine polish.

19. Rates for items of doors, such as flush doors laminated or veneered finish and the teak wood frame glass doors shall include the cost of handles, locks, door holder, hinges, wooden door frames etc. Separate payment shall be made for floor springs/door closers.

20. Rates quoted for relevant items shall include for modifications required for running the electrical/telecom/data wire conduits inside partitions/paneling. There will be no separate payment for this purpose.

21. The rates quoted for storage units & credenza units shall include for the cost of hardware such as locks, handles, demountable hinges of approved make, tower bolts, ball catches etc.

22. The mode of measurement for storage units & credenza units shall be front elevation area only.

23. The similar design of glass doors & glass partitions should be adopted. Rates quoted for glass doors shall include the cost of hardware as mentioned in clause 19 above, however rates quoted for glass partitions will not include cost of any hardware as indicated in clause 19 above.

24. Rates quoted for the supple and arranging the tables, credenza units, loose furniture shall include cost of side unit, pedestal drawer unit, accompanying (if any) as shown in the drawings, foot rest, drawer units, pencil trays, tea trays keyboard tray, skirting etc., complete in all respects. The side units provided shall have top drawers, sliding shutters etc., as indicated in drawings. Skirting to be made out of matching wood to veneer and to be finished with minimum three coats of melamine polish or finished with laminate as specified. The exposed surfaces of tables, side units, desk units and other built-in furniture, is required to have finishes as specified. The exposed surfaces of drawers & inside surfaces of furniture shall have finish as shown in the drawing. Reduced rates as approved by the employer will be paid for incomplete and substandard work. **Wherever MDF is used, the screws should be proper chipboard screws or Euroscrews of approved make.**

a] The drawers & trays shall be made out as follows unless otherwise specified:

Front/rear: 19 mm plywood for veneer finish/19mm plywood for laminate finish/18 mm thick MDF finished with post formed laminate externally and 1.5 mm thick laminate internally wherever specified.

Sides: drawer slides

Bottom: 6mm plywood to be finished with wax polish on outside.

Internal sides of the drawers shall be finished with 1mm laminate and trays also shall be finished with 1.5 mm thk laminate. All beadings/mouldings shall be finished with 3 coats of melamine polish. There will be no separate payment for this.

b] The sliding as well as open able shutters shall be made out as follows (All shutters to have post formed laminates/veneers as per drawings externally and 1.5 mm thk laminate internally):

Shutters: 19mm marine plywood for laminate finish/veneer finish.
Guide rails: wood cut to size finished with melamine polish.

Internal sides shall be finished with 1.5 mm thick laminate. All beading/mouldings shall be finished with three coats of melamine polish wherever specified.

All shutters of side unit/pedestal box/storage units etc., to have post formed laminate as per specified profile externally and 1.5 mm thick laminate internally.

c] The foot rest to be made of hard wood section with sizes as shown in the drawing.

25. The payment shall be made based on actual work measured on site by client/consultant's representative.

26. The jamb lining fascia, sill board fascia and skirting shall be made out of wood matching to veneer and to be finished with three coats of melamine polish.

27. The rates quoted for sofas (if any) and lounge chairs (if any) will be including the cost of the upholstery. The tenderer is required to fix the upholstery & the charges for the same shall be included in the rates quoted for items of sofa & lounge chairs.

28. The rates quoted for wire managers shall include the cost of cutting and making hole on the surfaces where the wire managers will be fixed.

29. The rates quoted for soft board item will be for fixing fabric finish on the exposed sides.

30. The rates quoted for veneer and melamine polish finish shall include for cost of providing and fixing inlays of various materials.

31. Desk units and built-in furniture shall be of sizes and finishes indicated in relevant drawings. The rates quoted will include for cost of all provisions made in the drawing and no separate payment will be made.

32. Measurements will be taken as per standard practices and relevant BIS codes for the actually executed quantities. Wastages will not be measure and paid for. Rates quoted shall include for wastages as anticipated.

MODES OF MEASUREMENT

1	Partition frame work, paneling	Sq.Mt area (actual executed) one side only but not above false ceiling level.
2	Finishing Items – laminate, veneer etc.	Actual executed area, including skirting moulding etc.
3	Storage units	Sq. mt area – front elevation for built in units. Per number for modular bought out units.
4	Staff desk units – open office workstations	Sq. mt area – front elevation for built in units. Per number for modular bought out units.
5	False ceiling	Sq. Mt area -- finished length X finished width. No deduction for A/c grills, lights, cutouts. Drops to be measured in separate Sq. mt.
6	Venetian/roller/roman blinds	Total Sq.mt area covered
7	Painting	Sq. Mt. finished area only
8	Carpet and other floor coverings	As laid Sq. Mt area. No wastage will be added.
9	Rounding off measurements	All measurements shall be rounded off to nearest second decimal point. E.g 21.465m will be recorded as 21.47 m.

Electrical work

1.0 SCOPE OF WORK:

This specification covers the requirements of design, manufacture, testing and delivery of 415V, 50 C/S, 3 Ph / 1 Ph, LT Switchboards required for the project.

2.0 SITE CONDITIONS:

a)	Temperature	:	Maximum 50 Deg. C.
		:	Minimum 10 Deg. C.
b)	Humidity	:	Not more than 80% at maximum temperature.
c)	Altitude	:	Less than 1000 meters above MSL.

3.0 ELECTRICAL SUPPLY PARTICULARS:

a)	System voltage (Nominal)	:	415V
b)	Number of phases	:	3
c)	Frequency	:	50 c/s
d)	Neutral earthing	:	Solidly earthed.
e)	Fault level	:	Not exceeding 50 kA at 415V.
f)	Voltage variation limits	:	$\pm$ 6%
g)	Frequency variation limits	:	+ 3%, -5%
h)	Control supply for Main Board	:	240V, 1 phase, A.C.

4.0 STANDARDS :

a)	IS : 13947 (Part I & II) – 1993 IEC: 60947 (Part I & II)	:	Air Circuit Breakers (ACB).
b)	IS : 13947 (Part I & II) – 1993 IEC: 947 (Part I & II)	:	Moulded Case Circuit Breakers (MCCB).
c)	IEC: 947 –1 (General Rules), IEC: 947 -2 (For Circuit Breakers) IEC: 947 –4 (Motor Starter)	:	Motor Protection Circuit Breakers (MPCB).
d)	IS : 8828 – 1996 IEC: 898 - 1995	:	Miniature Circuit Breakers (MCB).
e)	IS : 12640 – 1998 IEC: 1008	:	Residual Current Circuit Breaker (RCCB).
f)	IS : 13947-4-1 – 1993	:	Air Break Contactors
g)	IS : 8623 – 1993	:	Low voltage switchgear assemblies
h)	IS : 2147 – 1962	:	Degree of protection provided by enclosure for switchgear
i)	IS : 1248	:	Electrical Indicating instruments
j)	IEC: 947–5-1	:	Electrical Indicating Lamps.
k)	IS : 2705	:	Current Transformers.
l)	IS : 3156	:	Potential Transformers
m)	IS : 375	:	Marking and arrangement of Busbars
n)	IS : 5578-1984	:	Guide for marking of insulated conductors
o)	IS : 11353-1985	:	Guide for uniform system of marking and identification of conductors and apparatus terminals.
p)	Statutory requirements:	:	The equipment offered shall further conform to the stipulations by supply authorities, statutory bodies and shall have TAC approval modifications if any suggested by the authorities during their inspection shall be carried out at site without any extra cost.

5.0 *CONSTRUCTIONAL FEATURES OF SWITCHBOARDS*

5.1 *TYPE OF CONSTRUCTION:*

a) Cubicle compartmentalized totally enclosed, floor mounting, freestanding, dead front, Single / Double front, Single / Double front, Single bus suitable for non-draw type feeders.

b)	Thickness of sheet steel	:	3.15mm for frame and cable gland plate
		:	2mm for body / door / equipment mounting frames
		:	1.6mm for barriers
c)	Degree of protection	:	Dust and Vermin proof – not less than IPAX of IS 8623. And IP 2X between compartments
d)	Type of assembly	:	Form 4 compartmentalization as per IS 8623
e)	Height of switchboards	:	Not more than 2400 mm
f)	Maximum operating height	:	Not more than 1800mm
g)	Minimum operating height	:	Not less than 350mm
h)	Type of doors/covers	:	Doors shall have concealed hinges
		:	Door locks shall be of the quick opening Industrial type

i)	Position of cable alley and cable entry.	:	From front side and cable entry shall be from top.
		:	Space provision should be available for 20% spare cables.
		:	Cable clamping facility should be provided.
		:	Cable entry shall be from the top.
		:	Gland plate shall be split into sections to facilitate cable terminations on top & bottom.
j)	Surface treatment	:	By seven-tank process
k)	Type & colour shade of paint finish	:	Powder coated (RAL 7032)
l)	Thickness of paint	:	Not less than 50 Microns
m)	No of feeders per vertical Panel	:	Up to 63A MCCBs - 8 Nos.
		:	100 to 200A MCCBs - 6 Nos.
n)	Maintenance of components	:	From the front side only.
o)	Safety features	:	All live parts/terminals to be totally shrouded.
		:	Finger touch proof wiring to be provided
		:	Busbars to be sleeved and Busbar joints to be provided with insulating shrouds.
		:	Switch operating handle shall be interlocked with door.
		:	Pad locking provision in OFF position for all Switches and MCCBs.
		:	Caution plate with inscription "Caution-Live Terminals" shall be provided at all points when terminals remain live unless isolation is done at remote ends.
p)	Other features	:	Shipping section length to be limited to 2.5 M.
		:	Lifting lugs to be provided.
		:	All hardware should be high tensile zinc passivated type.
		:	Spring washers to be provided at all Busbar and equipment fixing joints.
		:	Endless neoprene gaskets to be provided on all doors and covers.
		:	Danger boards to be provided on live part covers.
		:	Continuous earth bus.
		:	All doors having components mounted on them shall be earthed.
		:	Provision of a document pouch in the rear of the incoming door with 'as built' drawings pertaining to the panel.

6.0 BUS BARS:

a)	Material of Main Busbars	:	Electrolytic grade aluminium complying with requirements of grade E9IE of IS 5082 –1982
b)	Size of bars	:	Busbar size shall be based on following maximum permissible current densities.
		:	Aluminium - 0.8 Amps / Sq.mm Copper - 1.25 Amps / Sq.mm
		:	The neutral bus shall be of the same size as the phase bus.
		:	The minimum size of the Busbars shall not be less than 25x6mm aluminium and 25x3mm for copper.
		:	Each feeder shall have independent tap off Provision on the Busbars.
		:	The Busbars shall be sleeved with 1.1kV grade heat shrinkable PVC sleeves
c)	Type of Busbar supports	:	SMC / FRP
d)	Short time rating	:	Refer Single Line Diagram. (If not mentioned Suitable kA rating breaker to be selected after calculation)
e)	Temperature	:	Not more than 40 Deg. C over 55 Deg C. ambient for main Busbar.
		:	Not more than 20 Deg. C over 55 Deg. C ambient for cable end connections
f)	Bus bars clearance	:	Not less than 50mm clear for main phase bus bars and not less than 25mm clear for neutral bus and main bus.
g)	Material of earth bus	:	Copper
h)	Size of earth bus	:	50x6mm for all switchboards rated 1000A and above 25x6mm for smaller DBs
i)	Material of control bus	:	Copper.
j)	Location of control bus	:	In bus bar compartment, completely segregated / screened

from the main bus.

7.0 COMPONENTS:

7.1 AIR CIRCUIT BREAKERS (ACB)

a)	Type	:	Air Circuit Breakers shall be sheet metal enclosed flush front horizontal draw out type suitable for horizontal or vertical connections and line load reversible.
b)	Number of poles	:	3 or 4 as specified in single line diagram.
		:	The 4th pole shall have the same rating as other poles.
c)	Operating Mechanism	:	Manual / motorized operating mechanism with stored energy feature with mechanical closing and electrical closing. The ACB shall have trip free mechanism and anti-pumping feature.
d)	Main contactor Assembly	:	Physical contact wear indicator shall be provided.
e)	Closing Coil & shunt trip coil with 100 % "ON' time.	:	230V A.C. with +10% to – 15% tolerance.
f)	No. of auxiliary contacts	:	6 No + 6 NC. Minimum 3 No + 3 NC spare contacts to be wired to external terminals for purchaser's use.
g)	Breaking capacity ICs & ICu	:	Not less than 50kA. The short time withstand capability shall not be less than 50kA for 1 sec.
h)	Operating duty	:	0-3 Min. – CO – 3 Min – CO
i)	Service temperature of the breaker.	:	55 Degree C, (Without derating)
j)	Standard applicable	:	IS 13947 (Part I & II) IEC 947 (1 and 2) Shall comply with the isolating function requirement of IEC 947-1.
k)	Trip time	:	Not more than 50 milli. secs.
l)	Protection	:	Microprocessor based releases with IDMT O/C, S/C, & E/F protections. The setting range available shall cover the following.

	I setting	T setting
: Over load With rating plug to down size the ACB.	:	40-100% of rated current.
: Short circuit	:	125-1200% - 0-400mS
: Instantaneous	:	Adjustable from 150-1200%
: Earth fault	:	15% - 80%

m)	Additional feature for release.	:	The release shall be provided with rating plug to use ACB for lower rating without changing the CTs of ACB. Protection parameters shall be proportional to the rating plug used.
		:	The ACB shall be suitable for incorporating communication capable releases (without changing the entire release) & should support open bus system (Profi-Bus).
		:	The release shall be provided with display module with facility to shift by 180 Degree to read the parameters if the breakers are at the lower level of the panel.
		:	The release shall have integral test facility to check heartiness of release and ACB even during "ON" condition with option to "TRIP".
n)	Electrical endurance	:	Not less than 20000 operations with proper maintenance.
o)	Utilization category	:	B
p)	Accessories	:	Mechanical ON-OFF indicator.
		:	Emergency red trip push button (shrouded).
		:	Operation counter.
		:	Safety shutters-lockable in closed position.
		:	Door interlock with operating handle.
		:	Withdrawing handle.
		:	Provision for castle lock.
		:	Padlocking provision on door.
q)	Safety interlocks/features.	:	Double insulation on the front face (class-II) positive contact indication.
		:	Mechanical indicator shall be provided to indicate "OFF' position when all the contacts are separated and ACB shall be suitable for isolation.

: The breaker shall have "Mechanical Indicator", when all "TRIP" and "OFF" conditions are eliminated, and the ACB can be closed on "ON" signal.
: ACB cannot be closed, if the doors are open.
: ACB cannot be closed, if it is not in engaged/test/with-drawn position.
: ACB cannot be withdrawn if it is in closed position.
: Safety shutters should close automatically when ACB is withdrawn.
: It shall not be possible to insert breaker racking handle when outside door is open. Interlock defeat facility shall be available.
: The transformer I/C ACB shall be interlocked with the H.V circuit breaker such that the L.T ACB can close only if the H.V CB is closed.
: The I/C ACB controlling grid and captive supply shall be interlocked to avoid paralleling.
: The bus coupler and I/C ACBs shall be interlocked to avoid paralleling of transformers & DG sets.
: Caution plates to be provided for live terminals.

r) Cradle : The cradle shall be so designed and constructed as to permit smooth withdrawal and insertion of the breaker into it. The movements shall be free from jerks, easy to operate and shall be on steel balls / rollers and not on flat surfaces.
There shall be 4 distinct and separate position of the circuit breaker on the cradle.
: *Service Position*
Main isolating contacts and control contacts of the breaker are engaged.
: *Test Position*
Main isolating contacts are isolated but control contacts are still engaged.
: *Isolated Position*
Both main isolating and control contacts are isolated.
: *Maintenance*
Circuit Breaker fully outside the panel ready for maintenance after the front facia is opened.
There shall be provision for locking the breaker in any or all of the first three positions.

7.2 MOULDED CASE CIRCUIT BREAKERS (MCCB)

a) Type : Air break, current limiting type double break having a service fault interrupting capacity (ICS) shall be as follows:
: Upto 100A Not less than 25kA
: 200A and above Not less than 35 kA

b) Number of poles : 3 or 4 as specified in single line diagram.
: The 4th pole shall have the same rating as other poles for 4 pole breaker.

c) Standard applicable : IS 13947 (Part I & II)
: IEC 947 (1 & 2)

d) Duty category : $I_{CS} = I_{CU}$ at 415 Volts.

e) Type of operating mechanism : Front drive with manual closing mechanism with provision for door interlock and pad locking position in 'OFF' position. The handle shall give positive indication of ON, OFF & trip conditions.

f) Type of protection for rating 250A & above. : Microprocessor based releases with IDMT O/C, S/C, E/F releases.
:

	I setting	T setting
(i)	Over load	40-100%
(ii)	Short circuit	200-1000% fixed.
(iii)	Earth fault	40-100%

g) Type of protection for rating below 250A. : Thermal overload adjustable at site between 80-100% of the rating.

h) Auxiliary contacts : 1 No + 1 NC and 1 trip contact wired to terminals.

i)	Tripping facility	:	Through shunt trip coil, suitable for 24V, D.C for all MCCBs on main LT board on others, only releases need be provided.
j)	Others accessories	:	Terminal shrouds.
			Barricading sheet to be provided between each terminals (Supplied by breaker supplier only)
			Spreader links to be provided for all breakers. (Supplied by breaker supplier only)

7.3 MINIATURE CIRCUIT BREAKERS.

a)	Type	:	Current limiting, DIN rail mounting. With no line load restriction.
b)	Standard applicable	:	IS 8828 – 1996
		:	IEC 898 - 1995
c)	Breaking capacity	:	10kA
d)	Protections	:	Thermal overload magnetic short circuit.
e)	Power loss/Pole	:	In accordance with is 8828 – 1996
f)	Tripping characteristics	:	B, C and D as per application
g)	Terminal size.	:	Suitable for both aluminium and copper cables up to 35 Sq.mm size.

7.4 RESIDUAL CURRENT CIRCUIT BREAKER (RCBo)

a)	Type	:	Din rail mounting direct acting type with over current, short circuit and earth leakage protection.
b)	Standard applicable	:	IS 12640 – 1988
		:	IEC 1008 – 1996
c)	Breaking capacity	:	10kA
d)	Protections	:	Thermal overload, Magnetic short circuit and Earth leakage, Nuisance tripping due to transient over voltages should be eliminated by design.
e)	Sensitivity	:	30 / 100 / 300mA as specified.
f)	Tripping characteristics	:	B, C, D as specified.
g)	Terminal size	:	Suitable for both aluminum and copper cables upto 16 Sq.mm.
h)	Testing provision	:	A push button shall be provided to check the integrity of earth leakage detection system.

7.5 MOTOR PROTECTION CIRCUIT BREAKERS. (MPCBs)

a)	Type	:	Din rail mounting with magnetic releases for short circuit protection.
b)	Breaking capacity	:	35kA, current limiter to be provided if required.
c)	No. of Poles	:	3
d)	Auxiliary contacts	:	1 NO + 1 NC
e)	Terminal Size	:	Suitable for conductor size up to 16 Sq.mm
f)	Standard applicable	:	IEC – 947

7.6 SWITCH DISCONNECTOR

a)	Type	:	Heavy duty
b)	Standard applicable	:	IS 13947 Part – 3
c)	No. of Poles	:	3 with possibility to add 4 pole
d)	Contacts	:	Double break silver plated copper roller spring assisted type
e)	Operating mechanism	:	Rotary handle interlocked with color.
f)	Other features	:	Front alive with door interlock with defeat facility.
		:	Padlocking facility on handle.
		:	Phase barriers.
		:	Bolted Neutral link to be provided.

8.0 CURRENT TRANSFORMER:

a)	Type	:	Epoxy moulded ring type either bar or wound primary
b)	Standard applicable	:	IS 2705
c)	Secondary current	:	5A
d)	VA burden	:	5/10/15 VA as specified.
e)	Accuracy class	:	Class – 1 for metering

9.0 POTENTIAL TRANSFORMER:

a)	Type	:	Epoxy molded.
b)	Standard applicable	:	IS 2705
c)	Ratio	:	415/110V

d)	No. of phases	:	3
e)	Accuracy class.	:	As specified in Drawing
f)	VA Burden	:	To suit the application
g)	Terminals	:	Fully shrouded
h)	Protection	:	By MPCB
i)	Primary side wiring.	:	By high fault withstand wires (35kA) of Lapp Make or approved equivalent

10.0 INDICATING MEETERS:

a)	Type	:	Solid state digital type
b)	Mounting	:	Flush mounting
c)	Range	:	To suit specific requirements.
d)	Size	:	96 x 96mm
e)	Accuracy class	:	1.5
f)	Additional features	:	P.T/C.T ratio shall suit the specific requirements. Shrouding of terminals.

11.0 INDICATION LAMPS

a)	Type	:	Panel mounting LED type
b)	Standard applicable	:	IS 6875
c)	Lamp voltage	:	240V A.C
d)	Lamp voltage	:	Less than 0.5 W.
e)	Terminals	:	Finger touch proof
g)	Degree of protection		IP54 (IEC 250)

12.0 Multi Data Meter

This shall be of the solid state type capable of measuring/recording following electrical parameters. And shall be suitable for BMS application.

a) Ampers
b) Voltage
c) KVA
d) KW
e) Power factor (PF)
f) KWH (Energy module attachment to be provided)

13.0 PROTECTIVE RELAYS

a)	Earth Leakage Relay	:	Residual current type of Alstom make or equivalent.
b)	Setting	:	300-3000mA
c)	Time delay	:	1 – 3 Sec.
d)	Auxiliary supply	:	240V AC
e)		:	To be supplied with compatible CBCT. 1 NO/1 NC contact required.

14.0 PUSH BUTTONS

a)	Type	:	Manually operated spring return type
b)	Standard applicable	:	IS 6875
c)	Diameter	:	22 mm
d)	Type of mounting	:	Snap type
e)	Terminals	:	Finger touch proof
f)	Electric shock protection	:	Class –2 (IEC 536)
g)	Degree of protection	:	IP54 (IEC 259)
h)	Colour of actuator	:	Start Push Buttons – Green
		:	Stop Push Buttons – Red
		:	Test / Reset Push Buttons – Black
i)	Contact configuration	:	2 NO + 2 NC

15.0 CONTACTORS

a)	Type	:	Air break, load break, and fault-making type.
b)	Standard applicable	:	IS 2959
c)	Duty category	:	AC3
d)	No of poles	:	Three / Four as per drawing.
e)	Coil voltage and voltage	:	230V or 110V, 1 phase A.C. & suitable for voltage limits of 75% to 110%. Insulation class of operating coil shall be Class-H or better.
f)	Auxiliary contacts	:	2 No + 2 N.C
g)	Terminal arrangement	:	Finger touch proof shrouded type
h)	Mounting arrangement	:	Din rail mounting preferred up to 70A base mounted for higher rating
i)	Coordination with MCCBs	:	Type '2' co-ordination required (Test certificate to be furnished)

j) Capacitor duty : Special contractors suitable for capacitor switching applications. These Contactors shall have inbuilt resistors to limit the inrush current.

16.0 CAPACITORS:

a) The capacitors shall be of the dry type heavy duty metalized polypropylene naturally air cooled type with self-healing properties.
b) The active element shall be wound on an insulated metallic core, housed in an extruded metal container with a press rolled lid and vacuum dried.
c) The container may be preferably filled with inert gas and hermetically sealed.
d) The capacitors shall be suitable for operation on 415V, 3 phases, and 3 wires, 50 c/s A.C supply.
e) The capacitor shall be rated for continuous 10% over voltage, 30% over current and 15% over capacitance. Each unit shall have over pressure protection.
f) The capacitor shall withstand respective cycles of inrush currents up to 200 times the rated current without any damage.
g) External discharge resistors shall be provided to discharge the capacitor and bring the voltage to less than 50V within 1 minute of power disconnection.
h) The watt loss/KVAR shall not be more than 0.5 with discharge resistors connected.
i) Each unit shall have finger touch proof terminals of adequate capacity to which external supply can be connected.
j) It shall be possible to mount the capacitors in any position.
k) The capacitors shall withstand H.V test at 1.1KV for 1 minute.
l) The capacitors shall conform to BIS 2834 and IEC 831.
m) The capacitors shall be guaranteed for continuous operation without any deterioration for a period of 24 months.

17.0 INDUCTORS:

Air cored copper wound inductor coil designed to limit the inrush currents shall be provided if required. The inductor design shall ensure that resonance is avoided under all operating conditions.

18.0 MAIN AND AUXILIARY WIRING:

a) Internal wiring of power circuits rated upto 63A shall be carried out using 1100V, FRLS grade PVC insulated, flexible copper conductor wires. Minimum size of wiring shall be 6 Sq.mm and maximum shall be 25 Sq.mm. For rating above 100A, bus bars of appropriate size shall be used. The bus bar sizes shall be selected as specified elsewhere.
b) The internal wiring for signaling, protection and instrumentation shall be carried out using 660V grade FRLS insulated, multistoried copper conductors. The sizes of wires shall be as follows:
c) For controls & Signaling : 1.5 Sq.mm for internal wiring.
: 2.5 Sq.mm for external cabling.
d) For CTs : 2.5 Sq.mm for internal wiring
: 4.0 Sq.mm for external cabling
: Inter panel writing shall be carried out using PVC troughs.
e) For P.T circuits. : High fault withstand (35kA) wires of 1.5 Sq.mm
f) Provision shall be made in the writing for remote metering and status indication of all feeders.
g) Each wire shall preferably be terminated at a separate terminal. Termination of up to two outgoing wires at a single terminal will be acceptable. Wires shall not be joined between terminal points. Shorting links shall be provided for all C.T terminals. Wiring shall be neatly bunched
h) Each wire shall be identified at both ends by yellow colour PVC ferrules marked with black letters. Supporting facilities shall be provided for clamping the control cables. Inter panel writing shall be done by the switchgear manufacturer before dispatch with disconnection facility at the shipping section with plug in type multiway connector.
i) Rubber grommets shall be provided so that metal parts should not come in contact with any power or control wires/cables.
j) Minimum size of terminals for control wiring shall be 2.5 sq. mm or higher to suit the Wiring sizes stipulated. Terminals shall be of the screw less type. 20% spare terminals shall be provided on each terminal block. The terminal blocks for C.T connections shall have C.T disconnection and shorting facility.
k) Standard conductors shall be terminated with insulated tinned copper lugs at both ends before connections are made
l) Wiring shall be finger touch proof at all places. Where the terminals of equipment's Meters/relay and accessories are not finger touch proof, insulating shrouds shall be provided.

19.0 EARTHING:

a) All cubicles shall be connected to a common copper earth Busbar of specified size running throughout the length of the switchboard. All doors and movable parts shall be connected to the earth bus with flexible connections
b) Provision shall be made to connect the Busbar to the plant-earthing grid at two ends. All non-current carrying metallic parts of the mounted equipment shall be earthed.

20.0 DRAWINGS AND DOCUMENTATION:

a) The manufacturer shall submit for approval a schedule of drawings, which shall include the single line diagram, general arrangement of switch board & bus duct indicating safe clearances, component list with all protective devices, their settings, rated current, foundation plan and control writing along with terminal chart. The approval of general arrangement should be obtained before the fabrications of cubicles are started. Approval of schematic drawings, single line and control wiring drawings shall be obtained before the manufacture process with the cubicle writing.

b) The approval of drawings shall not relieve the manufacturer of the responsibility of supplying equipment conforming to the relevant specifications and standards. Once manufacturers schematic diagram have been finally approved, the manufacturer shall prepare wiring connection diagram for each cubicle. These diagrams shall show all wiring inside the cubicle starting from the cubicle terminal strips. These diagrams which will be used for troubleshooting.

c) A detailed B.O.Q with component specifications and recommended spares with Unit rate there of shall be submitted one month before the delivery of the switchboards

21.0 PREFERRED MAKES:

a)	Air Circuit Breaker (ACB)	:	Siemens (3WL) / ABB / Schneider (MG).
b)	Moulded Case Circuit Breaker (MCCB)	:	Siemens/ABB/Schneider (MG)
c)	Contactors & O/L Relay	:	Siemens/ABB/Schneider
d)	Multi data meter	:	Electrex / Enercon /ABB
e)	Timer		BCH / Siemens / Merlin Gerin.
f)	MCBs	:	Schneider/MDS
g)	CTs & PTs.	:	Kappa / Kalpa
h)	Control switches	:	Kaycee / Salzer / Siemens
i)	Protective relays	:	Alstom / Siemens / ABB / L&T / Easun Reyrolle
j)	Push buttons	:	Siemens/ Teknic / Schneider /Raas controls
k)	Indicating lamps (LED type)	:	BCH / Siemens / Merlin Gerin
l)	Indicating meters		AE / Rishab / MECO
m)	Terminals	:	Elmax / Wago-Finger Touch Proof
n)	Ferules	:	Mayfair
o)	Bus bar supports	:	Power mat or approved equivalent
p)	Energy Meter	:	BHEL / Universal / HPL Socomec.
q)	Power factor meter		Krycard / Beluk / Fraco / Siemens
r)	ALL PP Capacitors (LT) & Harmonic Filters		Siemens - Epcos / Neptune Ducati
s)	Nameplates	:	Self eliminated type in dark (Fluorescent)

22.0 INSTALLATION TESTING & COMMISSIONING:

The installation will be carried out by other agencies. However the vendor shall depute representatives for testing and commissioning the switchboard at no extra cost

23.0 TRAINING:

The vendor shall train the client's engineers in the first operation.

24.0 STATUTORY APPROVAL:

The approvals will be arranged by other agencies (if the panel is supplied by the client directly). However it shall be the supplier's responsibility to ensure that the switchboard design & installation is carried out as per statute applicable. Further any changes/modifications suggested by the authorities shall be carried out at no extra cost to the complete satisfaction of the authority within the shortest time.

TECHNICAL SPECIFICATION

FOR

1.1kV / 660 V GRADE - LT CABLES.

1.0 SCOPE:

This specification covers the requirements of design, manufacture, assembly, testing and delivery of LT cables required for project.

2.0 SITE CONDITIONS:

a)	Temperature	:	Maximum 50 Deg. C
		:	Minimum 10 Deg. C
b)	Humidity	:	Nor exceeding 80% at maximum temperature
c)	Rainfall	:	1500-2000mm per annum
d)	Attitude	:	Less than 1000 mtrs from MSL

3.0 ELECTRICAL SUPPLY PARTICULARS:

a)	System Voltage	:	LT - 415 V +/-6%

b) Frequency : 50 c/s + 3%
c) Fault level : Not exceeding 50KA at 415V
d) Neutral earthing : Solidly earthed

4.0 STANDARDS:

The cables shall conform to the requirements of latest editions of following standards issued by BIS: -

a) IS 1554 : Heavy duty PVC insulated cables
b) IS 1753 : Conductors for cables
c) IS 7098 (Part-1) : XLPE Insulated cables.

The cables shall bear ISI mark and shall have TAC approval

TECHNICAL SPECIFICATIONS:

5.0 L. T. CABLES:

a) The L.T. Power and control cables shall be of the Aluminium / copper conductor, XLPE sheathed, galvanized steel strip armored and PVC served heavy duty type, conforming to IS: 1554.
b) All L.T. cables shall be of 1100V grade.
c) The design shall permit continuous operation of the cable at a conductor temperature upto 85 Deg. C under normal conditions an up to 160 Deg. C during faults without causing any permanent damage.
The cables shall be designed to allow a bending radius of not less than 12 times the diameter or lower as per manufacture's instructions.

6.0 CONDUCTOR:

a) The aluminium conductor for the cables shall be of Electrolytic grade, 99 % purity & ¾ Hardness.
b) The copper conductor for control cables shall be of the Electrolytic grade and 99.9% purity.
c) The conductor shall be of circular/sector shaped type and insulation of phase and neutral shall be color coded.
d) All sizes aluminium of conductors specified shall be of the stranded type. The copper conductor upto 10 sq.mm may be of the single strand type.

7.0 GENERAL REQUIREMENTS:

a) The cables shall be suitable for laying directly underground or in trenches or overhead in cable trays.
b) The cables shall be suitable for earthed system unless otherwise specified.

8.0 CORE IDENTIFICATION:

Cores shall be provided with the following colour schemes of PVC insulation

a) Single Core : Green for earthing
b) Two Core : Red and Black, Blue and Black, Yellow and Black
c) Three Core : Red, Yellow and Blue
d) Four Core : Red, Yellow, Blue and Black

9.0 TESTING:

All routine tests shall be carried out on the cables as per relevant BIS standards and Type and Routine Test certificates shall be furnished in six copies.

10.0 PACKING:

a) All cables shall be supplied duly packed on non-returnable wooden drums unless otherwise specified; standard drum lengths as per manufacturer's standard can be supplied. However, in the case of cable sizes of 120 sq.mm. and above, such lengths as would be required to avoid / minimize straight through joints shall be supplied in consultation with Client/Consultant.

b) The manufacturers name or brand name with logo and the ISI mark shall be embossed at regular intervals on all sizes of cables. In addition to the above, the length to be marked on every meter of the cable.
The following information shall be provided on the flange of each cable drum: -
   a) Type of cable
   b) Size of cable
   c) Length
   d) ISI mark
   e) Gross weight
   f) Direction of rolling & Year of manufacture
   g) Both ends of the cables wound on the drums shall be sealed to prevent ingress of Air.
   h) All cables shall have manufacturer's name/symbol and ISI mark shall be printed on all cables and wires at regular intervals.

11.0 DOCUMENTATION:

As a part of the supply, the contractor shall furnish Six copies of following documents.

a) Technical literature giving constructional details and current ratings of cables.
b) Test Certificates.
c) Installation and testing instructions.

TECHNICAL SPECIFICATION

FOR

660V GRADE, WIRING SYSTEM.

LOCATION: NEW DELHI.

1.0 SCOPE:

The scope of work under this section generally covers internal wiring for lights, exhaust fans, Fan coil units, power sockets etc., The contractor shall provide all materials, labour, equipment's, scaffoldings, etc., as required for the completion of wiring installation called for.

The wiring shall generally be done using PVC insulated copper conductor wires in PVC/M.S/G.I conduit as called for including providing modular switches, switch plates, shuttered sockets outlets, plug tops, metallic outlet boxes etc.

2.0 STANDARDS APPLICABLE:

The applicable standards for above work shall be as listed below:

a)	IS: 732	:	Code of practice for electrical wiring installation (system voltage not exceeding 650V)
b)	IS: 1646	:	Code of practice for fire safety of buildings (General Electrical installation)
f)	IS: 694	:	PVC insulated cables.
g)	IS: 2509	:	Rigid-non-metallic conduits for electrical wiring.
h)	IS: 6946	:	Flexible (Pliable) non-metallic conduits for electrical installation.
i)	IS: 1293	:	3 pin plugs and sockets.
j)	IS: 8130	:	Specifications for conduits for electrical installation.
k)	IS: 3854	:	Switches for domestic purpose.
l)	IS : 3415	:	Fittings for rigid non-metallic conduits.
n)	IS : 9537	:	Conduits for electrical installation.
p)	IS : 3043	:	Code of practice for earthing.
q)	IS : 5216	:	Guide for procedures and practices in electrical work.

3.0 POINT WIRING FOR LIGHTS, EXHAUST FANS & 6A AND 16A SOCKET:

A point wiring shall consist of the branch wiring using FRLS / FR grade copper conductor wires from the distribution board together with a switch/fan regulator as required, including providing conduit and accessories, the ceiling rose or pendant holder or a swan holder, or ceiling fan hook box or socket etc., with suitable termination. A point wiring shall include, in addition, the earth continuity conductor/wire from the Distribution board to the earth pin/stud of the outlets/switch box and to the outlet points. The point wiring shall be carried out in the under mentioned manner.

4.0 CIRCUIT MAIN FOR LIGHT :

The circuit main for lights /6A sockets (where 6A sockets connected to light circuit) shall include the wiring from the MCB distribution boards up to the first switch/light point. This is measured in linear meter. The scope of work under this section shall include:

a) Supply and wiring in concealed/surface conduit from DB's to first switch/light/fan point.
b) Providing and installing copper conductor earth wire, as per BOQ.
c) Providing and installing G.I fish wire (pull wire) in the conduit.
d) Termination of wires in DB's and switches using proper tinned copper lugs of crimping type.
e) Providing and installing necessary pull/junction boxes where necessary.

5.0 POINT WIRING:

a) The rate for point shall include supply, installation, connection, testing and commissioning of point wiring in conduit. The points shall be measured in Nos/sets for the set/group of lights controlled as mentioned in BOQ. The exact scope of work included in the point wiring for the purposes of measurement is enumerated as stated below.
b) Wiring starting from the first switch/light/fan point where the circuit main is terminated to the various lights/fans/sockets (where 6A sockets connected to light circuit loop), and then looping between the switches/lights/fans/6A sockets etc.
c) Providing and installing all necessary switches, switch plates, sockets, pull/ junction/ fan hook boxes etc. as called for.
d) Providing and installing insulated earth continuity wire in each conduit along with the wiring system.
e) Providing and installing G.I fish wire (pull wire) in the conduits.
f) Providing and installing ceiling roses, lamp holders where necessary.
g) Providing and installing PVC insulated, PVC sheathed flexible three core 1.5 sq.mm extension cords including flexible conduits from light fan outlet points mounted at ceiling point to the light/fan outlet.

6.0 MATERIALS:

6.1 CONDUITS:

a) All conduits shall be of G.I/M.S conduits as per Bill of quantity.

b) Generally concealed electrical wiring installation shall be in PVC conduits and surface wiring in G.I/M.S conduits.

6.2 METALIC CONDUITS:

All conduit pipes shall confirm to IS 9537 PART-II 1981.

Metal conduits shall be ERW black enameled of wall thickness of 1.6 mm, 20mm/25mm or medium Gauge Hot dipped GI Conduit whichever specify in BOQ items as the case may be depending upon the number of wires permitted as table-1.

The conduits shall be fixed to walls/ceiling with M.S. saddles and spacers at an interval of 1 meter and on either side of bends.

All pipes shall be cleaned for sharp burrs. Switch boxes shall be of G.I. 16G/14G. The switch boxes shall be concealed as per site requirement & as per Architect's/Consultant's Instructions.

Point shall be controlled with 6A switch or directly from DB as specified in schedule of quantities.

6.3 CONDUIT ACCESSORIES:

a) **Conduit bends & collars:**

The conduit bends & collars shall be of heavy duty and preferably of the same make as of conduit.
This shall conform to IS 9537/1983 (part 3) with ISI mark
Where necessary bends or diversion may be achieved by means of using bends and or circular inspection boxes with adequate and suitable inlet and outlet termination. In case of recessed installation system the bends shall be properly secured & flush with the finished wall surface. Elbows shall not be used.
No bends shall have radius less than 2 ½ times the outside diameter of the conduit.

b) **Inspection/Junction/Pull boxes :**

The Inspection/pull box/ junction box where used, with relevant conduit installation shall be conform to IS specification and shall match with the conduit sizes.
The box shall be round/squat rectangular with conduit stub projection for termination of conduit.
The box shall be of minimum 50mm deep and the size of box shall be suitable to pull/ make necessary joints of wires inside the boxes. Extra deep boxes are preferred.
The boxes shall have flush type cover.
The colour of plate shall match the colour of paint of the surface where installed.
The boxes shall have concealed screwed socket for fixing the ceiling rose.

7.0 SWITCH OUTLET & SOCKET OUTLET BOXES:

a) **Concealed Type Outlet Boxes:**

The concealed outlet boxes for switches, sockets, power outlets, telephone outlet shall be of standard factory made and to match the exact requirement of combination of outlets.
The boxes shall be fabricated out of heavy gauge (CRCA) cold rolled carbon alloy sheet steel with zinc plating (G.I). The size of boxes shall match the type of outlet/switch plate to be mounted on the box.
Adequate number and size of knockout holes shall be provided to terminate the conduits in the box. These boxes shall be of standard factory made product and of same make as of switch plates and sockets.
Separate screwed earth terminal shall be provided in the box for earthing.
The outlet box shall be of minimum depth of 50mm. Boxes shall be suitable for grid mounting type of accessories.
Long screw shall be provided to take care of the extra plaster thickness to mount the switch plates.
Provision shall be made in the box and switch plate to have the minor adjustment of alignment of switch plate to plumb level.

b) **Surface Type Boxes:**

The boxes for mounting switches, sockets and other wiring devices shall be heavy gauge CRCA sheet steel painted to match the colour of wall.
The box shall be suitable to terminate the G.I / M.S / PVC surface conduit into the box.
The size and shape of box shall match the exact type and combination of switch plates, receptacles and wiring devices.
Deep boxes shall be used to facilitate easy termination of conduit and wires/cables. Separate screwed earth terminal shall be provided in the box for earthing.

c) **Light Outlet boxes:**

For concealed PVC conduit installation the light outlet box shall be of PVC round/square with knock-out holes.
Conduit projection shall be suitable to terminate the conduit to the box. The box shall be made of heavy gauge PVC and the sample to have the approval of Construction Manager before use.
The boxes shall have concealed screwed socket to fix the ceiling rose. The boxes shall be minimum 50mm deep. For surface conduit installation the light outlet box shall be of G.I/black enameled M.S boxes.

The boxes shall have threaded stud projection having internal threading to terminate the conduits of different sizes. The boxes shall have concealed screwed socket for fixing the ceiling rose. The boxes shall be minimum 50mm deep.

8.0 SWITCHES :

Switches shall conform to IS: 3854 and IS: 4615.

Switches shall be single pole, single or two ways as shown on the drawings.

They shall be of the molded type rated for 250V, 6/16A. They shall be provided with insulated dollies and covers.

The switches shall be rocker operated with a quiet operating mechanism with bounce free, snap acting mechanism in an arc resistant chamber.

The switches shall have pure silver and silver cadmium contacts.

The switches shall be of approved make as indicated in the 'List of Approved Makes'.

Switches installed outdoors shall be industrial, metal clad type, and shall be provided in weatherproof enclosure, complete with weatherproof gasketed covers.

9.0 COVER PLATES FOR SWITCHES & OUTLETS:

Switches /sockets/ wiring devices plates shall be of the same make as of switches/ sockets/ wiring devices. These shall be of best quality.

Molded plastic grid mounting type device plates/frames shall be used and these shall match with the type of switches/sockets and boxes.

10.0 COVER PLATES FOR INSPECTION/JUNCTION /PULL BOXES :

The cover plate for PVC boxes shall be with minimum 3mm thick Perspex /Formica sheet cover

And for the G.I/M.S boxes, shall be of G.I/black enameled M.S plates. The shape of the plate shall match with that of the box.

11.0 RECEPTACLES:

The sockets shall conform to IS 1293.

Each socket shall be provided with control switch of appropriate rating. The sockets shall be molded type rated for 250 volts and of 6A or 16A capacity as mentioned on the drawings.

The 16A sockets shall be multipin (6 pin) automatic shutter type suitable for plugging 6/16A plugs. The shutter shall open when the earth pin of the plug is inserted in the socket.

Where called for, the 16A socket shall have indicating lamp. The socket outlets and switches shall be of grid mounting type. Where called for sockets shall be provided with three-pin plug top suitable to the socket and of the same make as of socket.

The plug shall conform to IS 6538.

12.0 INDUSTRIAL TYPE SOCKETS:

The socket outlets single phase or three phase, three pin or 5 pin industrial type with MCB (1 phase or 3 phase) control.

The socket and MCBs shall be mounted in a sheet steel enclosure and shall be standard factory made product.

13.0 CONDUCTORS :

All PVC insulated copper conductor wires shall conform in all respects to standards as listed under sub-head 'Regulations and Standards' and shall be of 1100V grade.

14.0 PVC INSULATED WIRES (for light & small power wiring)

a) The PVC cables shall conform to IS: 696/1977. For all internal wiring PVC insulated cables of 1100V grade, single core shall be used. The wires should be tested as per relevant Indian Standards at CPRI.

b) The conductor shall be plan, circular stranded annealed copper conductors complying with BS: 6360.

c) The minimum number and diameter of wires for circular stranded conductor shall meet the requirements set out in the relevant British Standards.

d) The insulation shall be PVC compound complying with the requirement of BS : 6746. It shall be applied by an extrusion process and shall form a compact homogeneous body. The PVC compound shall comply, with the requirements of IS 5831-84.

e) The cores of all cables shall be identified by colors in accordance with the following sequence.

1.	Single phase	:	Red or Yellow or Blue
2.	Three phase	:	Red, Yellow, Blue
3.	Neutral	:	Black
4.	Earth	:	Green

A means of identifying the manufacturer shall be provided throughout the length of cable.

Unless otherwise specified in the drawings, the sizes of the cables/wires used for internal wiring shall be as follows:

In case of circuit wiring for lights, exhaust fans, convenience socket outlet points:

a) 2.5 Sq mm: : For lights / 6A socket wiring from DB's upto the outlet points including control wiring where the circuit length from the DB's to 1st outlet is less than 40mtr.

In case of power socket outlet circuit.

a) 6.0 Sq.mm : From DB's 20/32 Amps Industrial type sockets.

b) 4.0 Sq.mm : From DBs to 16 Amps sockets.

The earth continuity conductor size as indicated in the drawing/BOQ shall be drawn through conduit along with other circuit cables/wires.

15.0 INSTALLATION OF CONDUIT:

a) Wherever specifically called for surface conduit system shall be adopted. All conduits shall be of rigid M.S / PVC conduit. All conduits and their accessories shall be of threaded type for metallic conduit and for PVC conduit shall be of push fit type.
Conduit shall run in square and symmetrical lines. Before the conduits are installed, the exact route shall be marked at the site and approval of the construction manager shall be obtained.

b) Conduits shall be fixed by heavy gauge G.I saddles, secured by suitable rawl plugs, at intervals of not more than one meter. Wherever couplers, bends, or similar fittings are used saddles shall be provided at either side at a distance of 300mm from the center of such fittings. Conduits shall be joined by means of screwed couplers and screwed accessories only. In long distance straight runs of conduit, inspection type couplers/junction boxes shall be provided.

c) Wherever conduits terminate into control boxes, outlet boxes, distribution boards etc., they shall be rigidly connected to the box with check nuts on either side of the entry.

d) G.I fish wire shall be drawn in each conduit.

e) Separate insulated earth wire shall be drawn in each conduit.

f) Draw boxes shall be located at convenient locations for easy drawing of wires.

g) Every main and sub main shall run in an independent conduit with an independent earth wire of specified capacity along the entire length of conduit.

h) The conduit to be installed shall be of ample cross-section area to facilitate the drawing of wires. The diameter of the conduit shall be selected as per table specified in this specification. But no case it shall be less than 20mm diameter.

i) Entire conduit layout shall be done so as to avoid additional junction boxes other than for outlet points. Conduits shall be free from sharp edges and burrs. Conduits shall be laid in a neat and organized manner as directed and approved by the construction manager. Conduit runs shall be planned so as not to conflict with any other services pipe, lines/duct.

j) If required, connected between PVC and steel conduits shall be through a junction box. Direct connections between PVC and steel conduits are not allowed.

k) Where exposed conduits are suspended from structure, they shall be clamped firmly and rigidly to hangers of design to be approved by the owner/consultant. Where hanger supports are to be anchored to reinforced concrete, appropriate inserts and necessary devices for their fixing shall be left in position at the time of concreting, making holes and opening in the concrete will generally not be allowed. Where inserts avoidable, prior permission of the owner/consultant shall be obtained to make any openings in the concrete surface.

15.2 Conduit joints:

Conduits shall be joined by means of plain couplers. The conduits shall be thoroughly cleaned before making the joints. In case of plain coupler joints, proper jointing material like vinyl solvent cement (gray in color) or any material as recommended by the manufacturer shall be used.

15.3 Bends in conduit:

Wherever necessary, long bends or diversions may be achieved by bending the conduits or by employing normal bends. No bends shall have radius less that 2.5 times outside diameter of the conduit. Heat may be used to soften the PVC conduit for bending, but while applying heat to the conduit, the conduit shall be filled with sand to avoid any damage to the conduit. Kinks in the conduit bends shall not be acceptable.

16.0 BUNCHING OF CABLES:

a) Cables of AC supply of different phases shall be bunched in separate conduits. The number of insulated wires/cables that may be drawn into the conduits shall be as per the following table. In this table, the space factor does not exceed 40%. However, in any case conduits having less than 20mm diameter shall be used.

b) Maximum permissible number of 650volt grade ingle core wires that may be drawn into rigid PVC conduits.

c) Unless otherwise specified, insulated conductors of different phases shall be bunched in separate conduits.

d) Wires carrying current shall be so bunched in the conduit that the outgoing and return wires are drawn in to the same conduit. Wires originating from two different phases shall not be run in the same conduit.

e) The number of insulated wires/cables that be drawn into the conduits shall be as per the following table.

MAXIMUM PERMISSIBLE NUMBER OF 1.1KV GRADE SINGLE-CORE CABLES THAT MAY BE DRAWN INTO METALLIC CONDUITS.

Size of Cable	SIZE OF CONDUIT, MM					
Nominal cross sectional area (Sq.mm)	**16**	**20**	**25**	**32**	**40**	**50**
1.0	4	6	12	19	--	--
1.5	3	5	9	13	--	--
2.5	2	4	9	13	--	--
4	1	2	5	9	13	--
6	--	1	4	8	10	--
10	--	--	3	6	8	--
16	--	--	1	3	4	10

17.0 WIRING:

a) All final branch circuits for lighting and appliances shall be single conductor cables run inside conduits. Branch circuit conductor sizes shall be as shown in the load analysis of drawing and conforming to the requirements of the I.E Regulations and I.S Code.

b) For each lot of wire supply, Contractor shall supply a certificate issued by the Manufacturer stating its origin, date of manufacture, constitution and standards to which it complies and the test certificates.

c) Looping system of the wiring shall be used. Wires shall not be jointed inside the conduit or pull boxes. Where joints are unavoidable, they shall be made through approved mechanical connectors with prior permission of owner/consultant.

d) Control switches shall be connected in the phase conductors only and shall be 'ON' when knob is down. Switches shall be fixed in galvanized steel boxes. Chromium plated screws shall be used.

e) Power wiring shall be distinctly separate from lighting wiring.

f) Each circuit phase wire from the distribution boards should be followed with a separate neutral wire of the same size as the circuit wire and earth continuity wire of ½ size of phase conductor.

18.0 BUNCHING OF WIRES:

Wires carrying current shall be bunched so that the outgoing and the return wires are drawn in the same conduit. Wires originating from two different phases shall not run in the same conduit.

18.1 Drawing conductors:

i. The drawing and jointing of PVC insulated copper conductor wires and cables shall be executed with due regard to the following precautions. While drawing wires through conduits, care shall be taken to avoid scratches and kinks, which cause breakage of conductors. There shall be no sharp bends.

ii. Insulation shall be shaved off like sharpening of a pencil and it shall not be removed by cutting it square.

iii. PVC insulated copper conductor wire ends shall be soldered (at least 20mm length). Strands of wires shall not be cut for connecting terminals. The terminals shall have sufficient cross sectional area to take all strands and shall be soldered. Connecting brass screws shall have flat ends. All looped joints shall be soldered and connected through block/connectors. The pressure applied to tighten terminal screws shall be just adequate, neither too much nor too less. Conductor of all sizes shall always be terminated using cable sockets. At all bolted terminals, brass flat washers of large area and approved steel spring washers shall be used. Brass nuts and bolts shall be used for all connections.

iv. Only certified wiremen and cable jointers shall be employed to do wiring work. All wires and cable shall bear the manufacturers label and shall be brought to site in original packing. For all internal wiring, PVC insulated wires of 650/1100 volts grade shall be used. The sub-circuit wiring for point shall be carried out in loop system and no joints shall be allowed in the length of the conductors. If the use of joint connections are unavoidable due to any specific reason, prior permission, in wiring, shall be obtained from the owner/consultant. No wire shall be drawn into any conduit, until all work of any nature, that may cause injury to wire, is completed. Care shall be taken in pulling the wires so that no damage occurs to the insulation of wire. Before the wires are drawn into the conduits, the conduits shall be thoroughly cleaned of moisture, dust, dirt or any other obstruction by forcing compressed air through the conduits. The minimum size of PVC insulated conductor wires for all sub-circuit wiring for light points shall be 2.5Sq.mm.

18.2 Joints :

All joints shall be made at main switches, distribution boards, socket outlets, lighting outlets and switch boxes only. No joints shall be made in conduits and in junction boxes. Conductors shall be continuous from outlet to outlet.

19.0 MAINS AND SUB-MAINS:

Mains and sub-mains cables or wires where called for shall be of the rated capacity and approved make. Every main and sub-main wire shall be drawn through an independent adequate size conduit. An independent earth wire of the proper rating shall be provided for every single-phase sub main. For every 3-phase sub main, 2 nos. earth wires of proper rating shall be provided along with the sub main. The earth wires shall be drawn inside the conduits along with the circuit main. Where mains and sub-mains cables are connected to switchgear, sufficient extra lengths of cables shall be provided to facilitate easy connections and maintenance.

20.0 LOAD BALANCING:

Load balancing of circuits in three-phase installation shall be planned before the commencement of wiring and shall be strictly adhered to.

21.0 COLOUR CODE OF CONDUCTORS:

Colour code shall be maintained for the entire wiring installation: red, yellow, blue for three phase, black for neutral, green for earthing. The control wire from light control switches to the light/fan points shall be the same colour as that of the phase/circuit wires feeding that particular loop.

22.0 EARTHING:

All earthing system shall be in accordance with IS 3043 - 1985 code of practice for earthing. Each conduit originating from the DB to various outlets shall have one earth wire (PVC insulated green colour wire).

23.0 TESTING OF INSTALLATION:

Before a completed installation is put into service, the following tests shall be complied with:

a) Insulation Resistance:

b) The insulation resistance shall be measured by applying 500-volt megger with all fuses in place, circuit breaker and all switches closed. The insulation resistance in mega ohms of an installation measured shall not be less than 50 mega ohms divided by the number of points in the circuit.

c) The insulation resistance shall be measured between
Earth to Phase
Earth to Neutral
Phase to Neutral

d) **Earth continuity path:**
The earth continuity conductors shall be tested for electrical continuity and the electrical resistance of the same along with the earthing lead but excluding any added resistance or earth leakage circuit-breaker, measured from the connection, with the earth electrode to any point in the earth continuity conductor in the completed installation and shall not exceed one ohm.

e) **Polarity of Single Pole Switches:**
A test shall be made to verify that every non-linked, single pole switch is connected to one of the phases of the supply system.

24.0 COMPLETION CERTIFICATES:

a) All the above tests shall be carried out in presence of Construction Manager and the results shall be recorded in prescribed forms. Any default during the testing shall be immediately rectified and that section of the installation shall be retested. The completed test results forms shall be submitted to the owner/consultant.

b) On completion of an electric installation a certificate shall be furnished by the contractor, countersigned by the certified supervisor under whose direct supervision the installation was carried out. This certificate shall be in a prescribed form as required by the local electric supply authority.

25.0 MEASUREMENTS

Mode of measurement is as follows:

25.1 Point wiring:

For purposes of measurement the point wiring for lights/fans/6A sockets (where 6A sockets are connected to lighting circuit loop) is divided into two parts.
Point wiring
Circuit main

i. Point wiring:

The wiring for lights/fans/6A sockets (where 6A sockets are connected to lighting circuit loop) point starting from first light/switch/fan and looping between switches/ fans/ sockets etc., shall be measured either in 'Number' or 'Set'

One light/fan point controlled by one switch is measured in number (No.)
Set of two or more light points controlled by one switch is measured in 'Sets'
Where set of light points wired and controlled directly from MCB DB shall be measured in 'Sets'. The rate for this item shall not include the cost of switch & switch box.
6A socket wiring where connected to the lighting circuit loop is measured in number (No.)

25.2 Circuit Main:

a) The length of lighting circuit main including conduit starting from MCB DB to first switch/light/fan point shall be measured separately in 'Linear meters' (Rm). (Further wiring is measured in point wiring).
b) Circuit main for wiring 6A sockets, 16A sockets and power outlets shall be measured as under.
c) Length of power circuit wire including conduit starting from MCB DB to outlets and looping between outlets shall be measured in linear meters (Rm).
d) The socket outlet with switch, outlet box, and cover plate shall be measured in numbers (No.).
e) The industrial type socket outlet including MCB, plug top, outlet box, & cover plate shall be measured in numbers (No.)
f) The plug tops where called for shall be measured in numbers (No.)

TECHNICAL SPECIFICATION

FOR

EARTHING SYSTEM

1.0 **SCOPE:**

2.0 The intent of this specification is to define the requirements for the supply, installation, testing and commissioning of the Earthing System.

3.0 **STANDARDS:**

The work shall be carried out in the best workman like manner in conformity with this specification, the relevant specifications, codes of practice of Indian Standards Institution, approved drawings and instructions of Engineer-in-charge or his authorized representative issued from time to time. In case of any conflict between the standards, the instructions of Engineer-in-charge shall be binding.

4.0 CONDUCTOR / ELECTRODE:

The main grid conductor shall be hot dip galvanized G.I. flat or PVC insulated aluminium conductor / copper conductor. Sizes for main conductors shall be marked on the drawings. Earth electrodes shall be as per DEC standard drawing thickness of hot dip galvanizing shall not be less than 75 microns for conventional type earth pit / Safe maintenance free type earth pit's standard as recommended by Manufacturer.

5.0 EARTHING NETWORK:

4.1 The earthing installation shall be done in accordance with the earthing drawings, specifications and the standard drawings of reference attached with this document. The entire earthing system shall fully comply with the Indian Electricity Act and Rules framed there under. The contractor shall carryout any changes desired by the Electrical Inspector or the owner. In order to make the installation conform to the Indian Electricity Rules at no extra cost. The exact location of earth conductors, earth electrodes and earthing points on the equipment shall be determined in field, in consultation with the Engineer-in-charge or his authorized representative. Any changes in the methods, routing, size of conductors etc. shall be subject to approval of the owner/engineer-in-charge before execution.

4.2 Excavation and refilling of earth, necessary for laying underground earth bus loops shall be the responsibility of the contractor.

4.3 The earth loop impedance to any point in the electrical system shall have a value, which ensures satisfactory operation of protective devices.

4.4 The main earth loop shall be laid at a depth of 500 mm below grade level. Wherever cable trenches are available, the earth lead shall be laid in the trenches and shall be firmly cleated to the walls of concrete lined trenches. The earthing strip shall be protected against mechanical damage.

4.5 Joints and tapings in the main earth loop shall be made in such a way that reliable and good electrical connections are permanently ensured. All joints below grade shall be welded and suitably protected by giving two coats of bitumen and covering with Hessian tape. All joints above ground shall be by means of connectors/lugs as far as practicable. The connectors shall be used for tapping; earth leads from the main earth loop wherever it is installed above ground. Earthing plates as shown in standard drawing shall be provided for earthing of two or more equipment at a place from earth grid. Where aluminum cable risers are to be connected to the underground GI earth bus, the aluminum cable riser shall be taken to the nearest earth pit and terminated through a bolted joint. If this is not practicable, then a GI riser shall be brought above grade and a bolted joint shall be provided for earthing of two or more equipment at a place from earth grid. Where aluminum cable risers are to be connected to the underground GI earth bus, the aluminum cable riser shall be taken to the nearest earth pit and terminated through a bolted joint. If this is not practicable, then a GI riser shall be brought above grade and a bolted joint shall be made between this GI riser and the aluminum cable riser, just above grade. Aluminum lugs shall be protected applying two coats of bituminous paint / bitumen on the exposed portion.

4.6 Conduits, in which cables have been installed, shall be effectively bonded and earthed. Cable armours shall be earthed at both ends.

5.0 EARTH ELECTRODES:

5.1 Earth pipe electrodes shall be installed as shown in the earthing layout drawings and in accordance with the standard drawings of reference and IS:3043. Their location shall be marked to enable accurate location by permanent markers.

5.2 All earth electrodes shall preferably be driven to a sufficient depth to reach permanently moist soil. Electrodes shall preferably be situated in a soil, which has a fine texture, and which is packed by Airing and ramming is tightly as possible. Wherever practicable, the soil shall be dug up, all lumps broken and stones removed from the immediate vicinity of the electrodes.

5.3 All earth electrodes shall be tested for earth resistance by means of standard earth test meter. The tests shall take place in dry months, preferably after a protracted dry spell. If necessary, a number of electrodes shall be connected in parallel to reduce the earth resistance. The distance between two electrodes shall not be less than twice the length of electrode.

5.4 The electrodes shall have a clean surface, not covered by paint, enamel, grease or other materials of poor conductivity.

5.5 The disconnect facility shall be provided for the individual earth pits to check their earth resistance periodically. All the earth electrodes shall be suitably numbered and this should be indicated in as built drawings.

6.0 CONNECTION:

6.1 All electrical equipment is to be doubly earthed by connecting two points on equipment to a main earthing ring. The earthing ring will be connected via links to several electrodes. The earth grid formed shall be a closed loop as shown in the drawing with earth electrodes connected to the grid with double strip connection. The cable armour will be earthed through the cable glands.

6.2 All paint, scale and enamel shall be removed from the contact surface before the earthing connections are made.

6.3 All earthing connections for equipment earthing shall be preferably from the earth plate mounted above ground. In case of GI earth loop all underground "T" connections shall be of the same size as main loop however in case of PVC insulated aluminum conductor loops underground joints shall be completely avoided. Connections to motors from earth plate or main loop conductor brought above ground shall not be less than following:

(i) No. 8 SWG GI Wire upto 3.7 KW motors & for MCB DBs.

(ii) Proper size of earth strip as indicated in Bill of quantity shall be adopted for Panels and UPS earthing.

6.4 All hardware used for earthing installation shall be hot dip galvanized or zinc passivated. Spring washers shall be used for all earthing connections of equipment.

6.5 Lighting fixtures shall be earthed through the extra core provided in the lighting cable for this purpose.

7.0 TESTING:

Earthing systems / connections shall be tested as follows:

7.1 Resistance of individual electrodes shall be measured after disconnecting it from the grid.

7.2 Earthing resistance of the grid shall be measured after connecting all the electrodes to the grid. The resistance between any point on the metallic earth grid and the general mass of earth shall not exceed 1 ohm.

7.3 The resistance to earth shall be measured at the following:

a) At each electrical system earth or system neutral earth.

b) At one point on each earthing system used to earth electrical equipment enclosures.

c) At one point on each earthing system used to earth wiring system enclosures such as metal conduits and cable sheaths or armour.

Measurement shall be made before connection is made between the ground and the object to be grounded.

8.0 TEST PROFORMA:

(INSTALLATION TESTING REPORT EARTHING INSTALLATIONS)

1. Earth system data:
   - Type of electrode :
   - Total number of electrodes :
   - Main grid size :
   - Material :

2. General checks : Put tick ☐ if o.k.; otherwise give details.
   - Construction of earth electrodes as per Manufacturer's recommendation. ☐
   - Size of earth conductor for various equipment O.K. as per standard. : ☐
   - Minimum distance kept between two electrodes. : ☐
   - Cleanliness and tightness of connectors. : ☐
   - Inspect bolted & clamped connectors. : ☐

9.0 **TESTS:**

9.1 Measured earth resistance of each electrode in ohms.

- No. 1. : ☐
- No. 2. : ☐
- No. 3. : ☐
- No. 4. : ☐

9.1 Measurement of earth grid resistance
(with all electrodes connected to grid)

a) At each electrical system earth or system neutral earth :

b) At each point provided for structure lightning protection :

c) At one point on each earthing systems used to earth electrical Equipment enclosure. :

d) At one point one each earthing systems used to earth wiring system such as metal conduits etc. :

e) At one point on each fence enclosing electrical equipment. :

1.0 The tenderer shall carefully go through the tender documents and quote the unit price, which shall be inclusive of all Taxes and installation accessories & consumables. No extra amount will be paid for any incidental, contingent work and materials.

2.0 The quantities indicated cover the probable quantities of work involved. The quantities are indicated for the guidance of the bidder. The order arising out of this enquiry will be a unit rate contract & not a lump sum one. The Owner, however, does not in any way guarantee that the actual work involved would correspond to the quantities indicated in the tender.

3.0 No change in unit rate will be allowed for any change in quantity, or for any other reason whatsoever.

4.0 All measurements will be carried out in metric units.

5.0 The rates quoted for the "Supply" items shall include all taxes, duties, packing, forwarding, freight & unloading charges.

6.0 The installation charges shall be inclusive of the cost of shifting materials from the Stores, unpacking, installation on foundations as specified elsewhere, supply of hardware, consumables and any minor civil works involved.

7.0 In BOQ if FI indicated (Free Issue), then the equipment will be supplied by the client. The rate quoted for the installation such items shall include receiving of material at site, unloading, stacking and storing it in assigned area. The rate shall also include providing / installing the same as per project requirement.

8.0 The installation rate for cables shall include shifting of cable drums, unwinding & laying as per engineering standards all labor supervision, routine testing, consumables such as identification tags, clamps etc. However, the cost shall exclude steel supports, installation of trays and cable termination.

9.0 The supply rate quoted for cable termination shall include double compression brass cable gland, crimping type tinned copper lugs, earth tag for gland earthing. The installation rate shall include all consumables and labor.

10.0 The installation rate of MDB & SDBs shall exclude the cost of cable termination, but shall include the cost of painting, shifting, grouting with necessary hardware & consumables and conducting all tests as specified.

11.0 The installation rate of wiring shall include the cost of all-necessary hardware & consumables required for fixing the conduits/conduit accessories, drawing, FRLS / FR / P.V.C insulated copper wires and terminating the same with crimping type lugs.

12.0 The rate for installation of earthing grid conductors shall include the cost of welding/ riveting & brazing of the joints, protecting the same against corrosion at joints, drilling holes for equipment terminations, cost of lugs for earthing wires and supply of hardware.

13.0 The rate quoted for Wire way / Raceway should include all necessary consumables and cost of supports by using suitable supports.

14.0 All testing charges for the Equipment shall be included in the installation rate of the respective equipment.

15.0 The cost of excavation, supply of sand, bricks, back filling and supply of cable markers etc shall not be included in the cost of cable laying and same shall be covered under excavation rates. The cost of cable trenches shall include the cost of RCC slab, sand, bricks and backfilling.

16.0 The installation price of power socket outlets shall include all necessary hardware & consumables required for mounting it on the surface of the wall.

17.0 The installation price of wiring shall include the cost of all-necessary hardware & consumable required for fixing the conduits/conduit accessories, drawing, P.V.C. insulated copper wires and terminating the same with crimping type lugs.

18.0 The supply price of power wiring in conduit shall include the cost of insulated copper wires, crimping type lugs for termination & bunching tape.

19.0 The rate quoted for installation of Floor trunking shall include the cost of Floor chipping to required depth and making it to original finish after installation of trunking.

20.0 Installation rate for pipe sleeves/conduits shall cover necessary chasing in the floor/ walls etc.,

21.0 The rate quoted by the contractor shall include obtaining all necessary approvals relating to the installation. Any official fees towards this shall be paid by the Owners on submitting the original bills, Other expenses if any, shall be born by the contractor.

22.0 The rate quoted shall also include all liaison work with Directorate of Electricity boards and Statutory authority.

23.0 The tenderer in his offer shall include any item not specifically mentioned in this specification but considered essential for satisfactory operation of the system.

LIST OF APPROVED MAKES OF EQUIPMENT - ELECTRICAL SERVICES.

SL.NO.	DESCRIPTION	MAKE
1	Air Circuit Breaker	Siemens (3 WL) / ABB / Merlin Gerin
2	Moulded Case Circuit Breaker	ABB / Merlin Gerin / MDS
3	MCB Distribution Boards	Merlin Gerin / Moeller / MDS Clipsal - Outdoor type
4	Miniature Circuit Breaker	Merlin Gerin / Moeller / MDS
5	E.L.C.B & RCBOs	Merlin Gerin / Moeller / MDS
6	Contactors and starters.	ABB / Groupe Schneider (Telemechanic)
7	Current Transformer	Kappa / A.E.
8	Timers	BCH / Siemens / Merlin Gerin.
9	Push Buttons	BCH / Siemens / Technic / Tele mechanic.
10	Indicating lamps	BCH / Siemens / Merlin Gerin
11	KWH Meters	BHEL / Universal / HPL Socomec.
12	Selector Switches and Rotary Switches	EE / Kaycee/Salzar
13	Indicating Instruments (Digital type)	AE / Rishab / MECO
14	LT Cables (Power & Control)	Universal / Polycab / KEI / Havells / Rajinigandha
15	PVC Insulated Copper Wires FR/FRLS GRADE / Flexible cables	Finolex / Rajinigandha / Power-Flex / S-bee
16	Crimping type lugs	Dowells / SMI.
17	Cable Glands.	Dowells / HMI / SMI.
18	Terminals.	Wago / ELMAX
19	PVC rigid conduits. FRLS	VIP delux / Universal / Nelco plastic / Avon plast

20	Modular Switches, Sockets, Plugs, Plug tops etc. (White, grey, black)	MK / Legrand / Anchor
21	Industrial / Sockets in sheet steel enclosure with MCB.	MDS / Merlin Gerin / Shokomac
22	Light Fixtures.	Wipro / LD2 / Keselec
23	Lamps & Ballast	Osram - German
24	Exhaust fan	GEC / Crompton Greaves / Usha
25	Protective relays.	Alstom / Siemens / ABB / L&T / Easun Reyrolle
26	P.F. relay.	Krycard / Beluk.
27	ALL PP Capacitors (L.T) & Harmonic Filters	Siemens - Epcos / Naptune Ducati
28	Cable tray	Patney / Frobab / Site Fabricated
29	Hand drier	Nova tech - Bangalore.

ARTICLES OF AGREEMENT

Made at …….. this …….. day of …….. between…….. ……..(hereinafter referred to as the Employer which expression shall include his, Executors, Administrators and Assigns) of the other part WHEREAS the employer is desirous of "Renovation of Air Lab-Civil and Electrical works" in C.P.C.B building.
WHEREAS the said drawings and the specifications and the priced schedule of quantities have been signed by or on behalf of the parties hereto and WHEREAS the contractor has agreed to execute upon and subject to the conditions at forth herein (hereinafter referred to as 'the said conditions") the work shown upon "the said Drawings" and described in "the said specifications" and the said "

Priced Schedule of Quantities"

At the respective rates mentioned in the priced Schedule of quantities attached.
and WHEREAS the contractor has deposited Rs…… Rupees …… .....……..) with the Employer for the performance of the Agreement.

NOW IT IS HEREBY AGREED AS FOLLOWS:

1. In consideration of the payments to be made to the contractor as hereinafter provided he shall upon and subject to the said conditions execute and complete the works shown upon the said drawings and such further detailed drawings as may be furnished to him by the said Architects and described in the specifications and the said priced schedule of quantities.
2. The employer shall pay the contractor such sums as shall become payable hereunder at the time and in the manner specified in the said conditions.
3. the plans, agreements and documents mentioned above shall form the basis of this contract and the decision of the said Employer as mentioned in the conditions of contract with reference to all matters of dispute as to the material, workmanship or account and as to the intended interpretation of clauses of this agreement or any other document attached hereto shall be final and binding on both parties and shall be made a rule of court.
4. The said contract comprises the above mentioned buildings and all subsidiary works connected there within the same site as may be ordered to be done from time to time by the said Employer even though such works may not be shown on the drawings or described in the said specifications or the priced schedule of quantities.
5. The said conditions and special conditions, specifications, schedule of quantities, wage schedule of labour and schedule of materials to be supplied by the employer and guarantee bond shall be read with construed forming part of this agreement and the parties hereto will respectively abide by and submit themselves to the conditions and stipulation and perform the agreements on their parts respectively in such conditions contained.
6. The Employer reserves to himself the right of altering the drawings and nature of the work and of adding to or omitting any items of work or of having portions of the same carried out departmentally or otherwise and such alternations or variations shall be carried out without prejudice to this contract.
7. All disputes arising out of or in any way connected with this Agreement shall be deemed to have arisen in Delhi and courts in Delhi shall have jurisdiction to determine the same.

8. The several parts of this contract have been read by us and fully understood by us. As witness our hands this ……. …….. day of ……

Signed by the said

_____ _____
in the presence of witnesses EMPLOYER

1. Signed by the said

_____ _____

2. In the presence of

SPECIAL CONDITIONS

1. Sealed tenders superscripted with "Renovation of Air and Treatability Lab-Civil and Electrical works" should be submitted at the office of the Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi - 110 032. The tender documents will be received upto 3.00 p.m. on 19.11.2010.

2. The bids will be opened on 19.11.2010 at 3.30 p.m. at the same address.

3. No tender will be received after 3.00 p.m. on 19.11.2010 under any circumstances whatsoever.

4. Tender shall remain valid for a period of 3 months from the date of opening the tender.

5. CPCB does not bind itself to accept the lowest or any tender and reserves to itself the right to accept or reject any or all the tenders, either in whole or in part without assigning any reasons for doing so.

6. (a) Each page of tender documents is required to be signed by the person or persons submitting tender in token of his /their having acquainted himself/ themselves with General conditions of contract, General Specification, special conditions, etc., as laid down. Any tender with any of the documents not so signed will be rejected. This also applies in respect of limited and private limited companies.

   (b) the tender submitting on behalf of a firm shall be signed by all the partners of the firm or by a partner who has the necessary authority on behalf of the firm to enter into the proposed contract, otherwise the tender is liable to be rejected.

7. (a) The tender form must be filled in English or Hindi language and all entries must be made by hand written in ink. If any of the documents is missing, or unsigned, the tender will be considered invalid.

   (b) The tender shall also submit along with his tender in respect of items wherein make is not specified a list mentioning the names of manufacturers specialized items which he proposes to use in the work if his tender is accepted.

8. All erasures and alternations made while filling the tender must be attested by initials of the tenderer. Overwriting of figures is not permitted. Failure to comply with either of these conditions will render the tender void. No advice of any change in rate of conditions after opening of the tender will be entertained.

9. Intending tenderers shall pay as Earnest Money a sum of Rs 1,95,195/- by demand draft/FDR in favour of CPCB, Delhi.

   A tender which is not accompanied by earnest money will not be considered. The earnest money will be returned without any interest to the tenderer if his tender is not accepted.

10. Within fourteen days of issue of letter of intent from the CPCB of the acceptance of its tender the successful tenderer shall be bound to execute the contract by signing in accordance with the draft agreement and schedule of conditions but written acceptance by the Employer of a tender will constitute a binding contract between the employer and the tenderer whether such formal contract is subsequently entered into or not.

11. All compensation or other sums of money payable by the contractor to the employer under the terms of this contract shall be deducted from its earnest money and the security deposit if the amount to permits and contractor shall unless such deposit has become otherwise payable, within ten days after such deduction make good in cash the amount so deducted.

12. The contractor shall not assign or sublet any portion of the contract. He must not sublet any portion of the contract except with written consent of the Employer, failing which the employer may serve a notice in writing rescinding the contract where upon the security deposit shall stand forfeited at the absolute disposal of the employer.

13. A schedule of probable quantities in respect of such work and specification accompany these special conditions. The schedule of probable quantities are liable to alterations omission, deductions or additions at the discretion of the Employer. Each tender should contain not only the rates but also the value of each item of work entered in a separate column and all the items should be totaled up in order to show the aggregate value of the entire tender. All corrections in the tender rates shall be duly attested by the dated initials of the tenderer. Corrections which are not attested may entail the rejection of the tender. Rates should be quoted both in figures and words in columns specified. In case of discrepancy in the rates in figures and words the rates in words shall be deemed to be correct.

14. The tenderer must obtain for itself on its own responsibility and his own expense all the information which may be necessary for the purpose of making a tender and for entering into a contract and must examine the drawings and must consider and inspect the site of the work and acquaint himself with all local conditions, means of access to the work, nature of the work and all matters pertaining thereto and influencing its rates for the work.

15. The rates quoted in the tender shall include all charges for double scaffoldings, marking out and clearing of site, Airing etc., as mentioned in the specifications. The rates quoted shall be deemed to be for the finished work. Tenderer must include in their rates royalty, sales tax, excise duty, octroi and any other tax and duty, or other levy levied by the central government or any state government or local authority if, applicable, no claim in respect of royalty, sales tax, excise duty, octroi or other tax, duty or levy shall be entertained by the Employer.

16. Time shall be considered as the essence of the contract. The entire work must be completed in 3 (three) calendar months. The attention of the tenderer is drawn to clause 10 of the conditions of contract referring to damage for non-completion. The tenderer shall before commencing work prepare a detailed work programme which shall be approved by the employer.

17. The contractor shall not be entitled to any compensation for any loss suffered by him on account of delay in commencing or executing the work whatever the course of delays may be, including delay arising out of modification of the work entrusted to him or any sub-contracts connected therewith or delays in awarding contracts for other trades of the project or in commencement or completion of such works or in procuring government controlled or other building materials or in obtaining Air and power connections for construction purposes or for any other reason, whatsoever and the employer does not accept liability for any sum besides the tender amount subject only to such variations as may be provided for herein.

18. The successful tenderer is bound to carry out any items of work necessary for the completion of job even though such items are not included in the quantities and rates. Schedule and instructions in respect of such additional items and their quantities will be issued in writing by the Employer.

19. If the Head quarters of the successful tenderers are elsewhere than Delhi he shall have a duly authorized agent in Delhi from the commencement of the work until the building is occupied by the employer. Such agent shall be authorized to act on behalf of the successful tenderer to accept service of notice of contract and to agree to extras, omissions and varied item of work and rates for the same. Such agent shall maintain on his staff a qualified Engineer approved by the Employer and such office personnel as may be required for the efficient execution of works. Any notice under the contract shall be deemed to have been served on the successful tenderer if served upon such agent or sent by registered letter to address. Such agent shall not be changed and shall not leave during the duration of the contract, unless the consent of the Employer shall have been previously obtained. If the Employer shall order the tenderer to carry out any rectifications under the terms of the contract after the building is completed, the successful tenderer shall have the same or another duly authorized agent while such rectifications are being carried out.

20. The successful tenderer must co-operate with the CPCB and its decisions so that the work shall proceed without any delay and to the satisfaction of the employer.

21. The contractor shall be supplied Air and electrical connection free of cost.

22. The security deposit of the successful tenderer will be forfeited if he fails to comply with any of the conditions of the contract.

- On completion of the work, the contractor shall clear away and remove from the site all surplus materials, rubbish and temporary works of every kind and leave the whole of site and permanent works clean and in a workman like condition into the satisfaction of employer.

- The contractor shall also submit the wage schedule for all classes of labourers required in the work, for information of the department and necessary action in case the department desires to engage its labour for minor works to be done departmentally.

S.N.	**Classification of Labour**	**Unit**	**Rate/day in figures words**
1	**Diploma holder**	**Each**	
2	Foremen Ist grade	Each	
3	Electrician Ist grade	Each	
4	Fitter Ist grade	Each	
5	Khalasi	Each	
6	Mason	Each	

CONDITIONS OF CONTRACT

1. Interpretations

In Construing these conditions, the specifications, the priced schedule of quantities, tender and agreement, the following words shall have the meanings herein assigned to them except where the subject or contact otherwise required:-
"Employer" shall mean ……..
…….. And his (their) heirs, legal representatives, assigns and successors.
" Contractor" shall mean ……..
…….. and his (their) heirs, legal representatives, assigns and successors.
"Site" shall mean the site of the contract works as shown bounded on the site plan attached hereto including any buildings and erections thereon and any other land adjoining thereto (inclusively) as aforesaid allotted by the Employer for the Contractor's use.
"This Contract" shall mean the Articles of Agreement, special conditions, these conditions, the priced schedule of quantities, the specifications, and the appendix and the drawings, additional instructions issued till the receipt of the tender and subsequently correspondence if any till the date of acceptance of tender, and the letter of acceptance of contract.
"Act of Insolvency" shall mean any act of Insolvency as defined by the Presidency town Insolvency Act, or the provincial act or any amending statute.
"Notice in writing" or written notice shall mean a notice typed or printed characters sent (unless delivered) personally or otherwise provide to have been received by registered post to the last known private or business address or registered office of the addressee and shall be deemed to have been received when in the ordinary course of post it would have been delivered.
"Virtual completion" shall mean that building is in the opinion of Employer fit for occupation.
"Words imputing persons" include firms and corporations. Words imputing the singular only also include plural and vice versa where the context so required.

2. Scope of work

The contract in brief covers civil works for the "Renovation of Air and Treatability Lab-Civil and Electrical works" in CPCB at Parivesh Bhawan, East Arjun Nagar, Delhi – 110 032.
The contractor shall carry out and complete the works in every respect in accordance with this contract and in accordance with the directions and to the satisfaction of the employer. The employer in their absolute discretion from time to time issue further drawings and / or written instructions, details, directions and explanations which are hereafter collectively referred to as the "Employer's Instructions" in regard to:-

a) The variation or modification of the design, quality of works or the additions or omission or substitution of any work.
b) The removal from the site of any materials brought there on by the contractor and the substitution of other materials therefore.
c) The removal and/or re-execution of any works executed by the contractor.
d) The dismissal from the works of any persons thereupon.
e) The opening up for inspection of any work covered up.
f) The amending and making good of any defects under clause (11)

4. Authorities, Notice and Patents

The contractor shall confirm to the provisions of any acts of the legislature relating, to the works and to the regulations and bye-laws of any authority, and of any Air, lighting and other companies and /or authorities with whose system the structure is proposed to be connected, and shall, before making any variations from the drawings or specifications that may be necessitated by so confirming give to the Employer written notice, specifying the variation proposed to be made and the reason for making it, and apply for instructions, thereon. In case the contractor shall not within in seven days receive such instruction he shall proceed with the work confirming with the provisions, regulations or bye-laws in question.
The contractor shall arrange to give all notice; required by the said acts, regulations or bye-laws to be given to any authority, and to pay to such authority, or to any public officer all fees that may be properly chargeable in respect of the works, and lodge the receipts with the employer.
The contractor shall identify the Employer against all claims in respect of patent rights and shall defend all actions arising from such claims unless he has informed the employer before any such infringement received their permission to proceed and shall himself pay all royalties license fees, damages, coasts and charge of all and every sort that may be legally incurred in respect thereof.

5. Access

The employer, their representative shall at all reasonable times have free access to the work and / or to the workshop factories, or other places where materials are being prepared or construct the contract and also to any other place where the materials are lying or from which they are being obtained, and the contractor shall give every facility to Employer and their representative necessary for inspections and examinations and tests of the materials and workmanship. Except the representatives of public authorities no person shall be allowed on the works at any time without the written permission of the employer.
If any work is to be done at the place other than the site of works, the contractor shall obtain the written permission of the employer for doing so. The work during the progress / on completion can also be inspected by the employer.

6. Dismissal of workmen

The contractor shall on the request of the employer immediately dismiss from the works any person employer thereon who may, in the opinion of the employer, be unsuitable or incompetent or who may misconduct himself, and such person shall not be again employed or allowed on the work without the permission of Employer.

7. Date of Commencement and completion

The contractor shall be allowed admittance to the site on the "Date of commencement" stated in the Appendix, and he shall thereupon and forthwith begin the works and shall regularly proceed with and complete the same on or before the "Date of Completion" stated in the Appendix subject nevertheless to provisions for extension of time hereinafter contained.
The time being the essence of contract, the contractor will adhere to time and progress chart and will give proportionate progress in proportionate time i.e. 1/8th of work in 1/4th of the time, 3/8th of the work in ½ of the time and 3/4th of the work in 3/4th of the time and commensurate with the progress as envisaged in the bar chart based on the analogy had accepted by the employer. In case of failure on the part of the contractor to give proportionate progress in proportionate time then the employer may recover by way of liquidated damages the amount calculated as described in the appendix shall however be refunded in case the individual items and the entire works are completed by the target dates, as decided by the employer, whose decision shall be binding.

8. Assignment

The whole of the works included in the contract shall be executed by the contractor and the contractor shall not directly or indirectly transfer, assign or underlet the contract or any part, share interest therein nor shall be take a new partner without the written consent of the employer, and no subletting shall relieve the contractor from the full and entire responsibility of the contractor or from active superintendence of the work during its.

9. Schedule of quantities

The schedule of quantities unless otherwise stated shall be deemed to have been prepared in accordance with the method of measurement mentioned in the specifications and shall be considered to be approximate and no liability shall attach to the employer for any error that may be discovered therein.

10. If in the opinion of the employer the work be delayed

a) By force of nature such as incessant rain, flood, fire and like natural calamities or
b) Reason of any exceptionally inclement of weather or
c) By reason of proceeding taken or threatened by or dispute with adjoining or neighboring owners or public authorities or
d) By the works or delays of other contractor or tradesman engaged by the employer and not referred to in the schedule of quantities and /or specification or
e) By reason of employer's instructions as per clause No.2 or
f) By reason of civil commotion, local combination of workmen or strike of lockout affecting any of the building trades or
g) By consequence of the contractor not having received in due time necessary instructions from the employer for which he shall have specially applied in writing or
h) From other causes which the employer may certify as beyond the control of the contractor or
i) In case of strike or lock out the contractor shall give written notice thereof to the employer, but the contractor shall nevertheless constantly use his endeavors to prevent delay and shall do all that may reasonably be required to the satisfaction of employer to proceed with the work. The employer shall make a fair and reasonable extension of time for the completion of the contractor work.

11. Damage for non-completion

If the contractor fails to complete the work by the date of completion stated in the appendix or within any extended time under clause 9 thereof and the employer certify in writing that in their opinion the same ought reasonably so to have been completed, the contractor shall pay or allow the employer the sum named in the appendix as "liquidated Damaged" for the period during which the said works shall so remain incomplete and the employer may deduct such damage from any moneys due to the contractor.

12. Failure by Contractor to comply with employer's instructions

If contractor after receipt of written notice from the employer requiring compliance, with such further drawings and / or employer's instructions fails within seven days to persons to execute any such work whatsoever may be necessary to give effect thereto and all costs incurred in connection therewith shall be recoverable from the contractor by the employer as a debt or may be deducted by him from any moneys due to the contractor.

13. Certificate and payment

The contractor shall be paid by the employer from time to time by installments under interim certificates to be issued by the employer to the contractor on account of the works carried when in the opinion of the employer work to the approximate value named in the appendix as value of works for interim certificates (less at the reasonable discretion of the employer) has been executed in accordance with this contract, subject however to a retention of the percentage of such value named in appendix hereto as "Retention percentage of interim certificates". The employer may in their discretion include in the interim certificate such amount as per standard CPWD procedure on account of material delivered upon the site by the contractor for use in the works.
And when the works have been virtually completed and the employer shall have certified in writing that they have been so complete the contractor shall be paid by the employer in accordance with the certificate to be issued by the employer the sum of money named in the appendix as 'Installment after virtual completion' and the contractor shall be entitled to the payment of the final balance in accordance with the final certificate to be issued in writing by the employer at the expiration of the period referred to as "Defects Liability period" in the appendix hereto from the date of virtual completion or soon after the expiration of such period as the works shall have been finally completed and all defects made good according to the true intent and meaning hereof whichever shall last happen. Provided always that the issue of the employer of any certificate during the progress of the work set or after their completion shall not relieve the contract or from his liability in case of fraud, dishonesty or fraudulent concealment relating to the works or materials or to any matter dealt. Within the certificate and in case of all defects and insufficiencies in the works or materials which a reasonable examination would not have disclosed. No certificate of the employer shall of itself be conclusive evidence that any works or materials to which it relates are in accordance with the contract.
The employer shall have power to withhold any certificate if the works or any parts thereof are not being carried out to their satisfaction.
Payments on interim certificate shall be made within the period named in the appendix "Period of honoring Certificate" after such certificate have been delivered to the employer and vetted by the CPCB.

14. Certificate of Virtual completion

The works shall not be considered as completed until the employer have certified in writing that they have been virtually completed and the defects liability period shall commence from the date of such certificate.

15. Employer delay in progress

The employer may delay the progress of the works without vitiating, the contract and grant such extension of time for the completion of contract as they may think proper and sufficient in consequence of such delay, and the contractor shall not make any claim for compensation of damages in relation thereto.

16. Restriction of work to be carried out

if at any time after commencement of the work, the employer shall for any reason what so ever not require the whole work or part thereof as specified in the tender to be carried out, the contractor shall have no claim to any payment of compensation whatsoever on account of any profit / advantage / on which he might have derived from the execution of the work in full but which he did not derive in consequence of the full amount of the work not having been carried out nor shall be have any claim for compensation by reason of any alterations having been made in the original specifications, drawings, designs and instructions which shall involve any curtailment of the work as originally contemplated.
Provided that the contractor shall be paid the charges on the cartage only of materials actually and bonafide brought to the site of work by the contractor and tendered surplus as result of abandonment or curtailment of the work or any portion thereof and then taken back by the contractor, provided however, that the employer shall have in such cases the option of taking over all or any such materials at their purchase price or at local current rates which ever may be less.

In case of such stores having been issued from employer stores and returned by the contractor to employer stores, credit shall be given to the contractor at rates not exceeding those at which they were originally issued to him after taking in to consideration and deduction for claims on account of any deterioration or damage while in custody of the contractor and in this respect the decision of the employer shall be final.

17. Suspension

If the contractor except on account of any legal restraint upon the employer preventing the continuance of work shall suspend the works or in the opinion of the employer shall neglect or fail to proceed with due diligence in the performance of his part of the contract or if he shall more than once make default in respect of clause No.2 the employer shall have the owner to give notice in writing to the contractor requiring that the work be proceeded within reasonable manner and with reasonable dispatch, such notice shall purport to be a notice under this clause. After such notice shall have been given the contractor shall not be at liberty to remove from the site of the work or from any ground contiguous thereto any plant and materials belonging to him which will have been placed there on for the purpose of the works and the employer shall have a lien upon all such plant and materials subsist from the date of such notice being given until the notice shall have been compiled with. If the contractor shall fail for seven days after such notice have been given to proceed with the works as therein prescribed the employer may proceed as provided in clause No.17.

18. Termination of contract by employer

Termination of contractor (being an individual or a firm) commit any "Act of insolvency" or shall be adjudged insolvent, shall make an assignment or composition for the benefit of the greater part in number or amount of his creditors or shall enter into a deed of assignment with his creditors or (being an incorporated company) shall have an order made against him or pass an effective resolution of winding up either compulsorily or subject to the supervision of the court or voluntarily or if the official assignee of the contractor shall repudiate the contractor if the official assignee or the days after notice to him requiring him to do so, to show to the reasonable satisfaction of the employer that he is able to carry out and fulfill the contract and if required by the employer to give security therefore or if the contractor (whether an individual, firm or incorporated company) shall suffer execution to be issued, or if the contractor shall suffer any payment contractor shall assign or sublet the contract, without the consent in writing of the Employer first obtained, or any payments due or which may become due to the contractor there under, of if the employer shall certify in writing that in their opinion the contractor;

I. Has abandoned the contract.
II. Has failed to commence the work, or has without any lawful excuse under these conditions suspended the progress of the work for fourteen days after receiving from the employer written notice to proceed, or
III. Has failed to proceed with the works with such due diligence and failed to make such due progress as would enable the works to be completed within the time agreed upon, or
IV. Has failed to remove materials from the site or to pull down and replace works within seven days after receiving from the employer written notice that the said materials or work were condemned and rejected by the employer under these conditions, or
V. Has neglected or failed persistently to observe and perform all or any of the acts, matters or things by this contract to be observed and performed by the contractor to observe perform the same, or

Any other decision, opinion, direction, certificate or valuation of the employer to give any of the same shall be subject to the right of Arbitration and review in the same way in all respects (including the provision as to opening the reference) as if it were a decision of the employer.

19. Deposit

The amount deposited by the contractor along with his tender shall be retained with the employer and it shall be returned to the contractor on the virtual completion of the works. In case of default in any of the foregoing conditions the deposit amount shall be forfeited the employer.

20. The contractor undertakes to ensure due and complete compliance with all laws, regulations, rules etc. whether of the central government or the state government or of any other competent authority applicable to the workmen employed or whose services, are otherwise availed of by the contractor whether in connection with the construction work at the site or otherwise. The employer shall have the right to inspect the records maintained by the contractor concerning such workmen from time to time and contractor shall whenever required by the employer produce such records as the employer's may call upon the contractor produce for the employer inspection in order to ascertain whether or not the requirement of all such laws, regulations, rules etc., have been compiled by the contractor. In the event of any contravention of such laws, regulations, rules etc., coming to light as a result of such inspection or otherwise the employer shall have the right to require the contractor effect such.

21. The employer shall not be responsible if any accident or death is caused during the continuer of work the contractor shall be responsible to pay the compensations.

Settlement of Dispute and Arbitration

I. All disputes and differences arising out of or in connection with the contract and works of any nature assigned under the same (whether during the progress of the works or after their completion), determination, abandonment or breach of the contract shall be referred to a team of three men arbitrator appointed by the Chairman, CPCB. The arbitrators shall elect an umpire among them. In case of conflicting findings by the arbitrators, the decision of the umpire shall be final and binding. It will not be an objection to any such appointment that the arbitrators are the government servants and had any interest in the board or the contract entered into directly or indirectly. In all cases, the arbitrators shall state their decision in writing and if amount of claims in dispute is Rs.50,000/- and above, the arbitrators shall give reasons for award.
Subject as aforesaid the provisions of the arbitrations cancellation act or any statutory modification or re-enactment thereof and the rules made there under and for the time being inforce shall apply to the arbitration proceeding under this clause.

II. It is a term of the contract that the party involving the arbitration shall specify the dispute or dispute to be referred to the arbitrator under this clause together with the amount or amounts claimed in respect of each such dispute.

III. It is also a term of the contract that if the contractor's do not make any demand for arbitration in respect of any claims in writing within 90 days of receiving the intimation from the CPCB that final bill is ready for payment, the claim of the contractor's will be deemed to have been waived and absolutely barred and the board will be discharged and released of all liabilities under the contract in respect of these claims.

IV. The decision of the employer regarding the quantum of reduction as well as justification thereof in respect of rates for sub-standard work which may be decided will be final and would not be open to arbitration. Provided always that no compensation shall be payable for any loss in always that no compensation shall be payable for any loss in consequence of hostilities or war-like operation (a) unless the contractor had taken all such precautions against Air raid as are deemed necessary by A.R.P officers or the Engineers In Charge, (b) for any materials etc., not on the site of work or for any tools and plant, machinery, scaffolding temporary buildings and other things not intended for the work.
In the event of the contractor having to carry out reconstruction as aforesaid, he shall be allowed such extension of time for its completion as is considered reasonable by the employer compliance within such time as the employer may prescribe in that behalf and in the event of the contractor failing to effect such compliance within the time prescribed by the employer then the employer shall without prejudice to his other rights be entitled to withhold from the amount payable to the contractor any amount payable to the workmen under any such laws, regulations or rules and to make payment thereof to the workmen. The employer shall also have in that event the right to terminate the contract with immediate effect and to exercise powers reserved to their employer under the contract as a result of termination.

_____ _____

CPCB CONTRACTOR

Witnesses

1.

2.

APENDIX

1.	Date of Commencement	10th day from the date of issue of letter of award.
2.	Date of completion	4 months from the date of commencement.
3.	Insurance	As directed.
4.	Liquidated damages	1% of the contract value per week subject to a maximum of 10% of the contract value.
5.	Period of final measurements	Within 03 months from the date of completion.
6.	Value of work for Interim Certificate	Two running payment of 80% of the work completed
7.	Security deposit	10% of the contract amount subject to a maximum upto Rs. 10.00 lakhs. The security deposit will be collected by deductions from the running bills of the contractor at the rate of 10%.
8.	Defects liability period	One year

TENDER DOCUMENT

Renovation of Air Lab and Treatability Lab - Civil and Electrical works

At

Central Pollution Control Board
Parivesh Bhawan, East Arjun Nagar
Delhi – 110 032

Central Pollution Control Board
Parivesh Bhawan, East Arjun Nagar
Delhi – 110 032