

(INTERNAL WIRING)General rules for wiring:-

1. To be protected near the point of entry of supply cables by a two pole linked main switch & fuse.
 - A 3 pole switch and fuse unit is to be used in 3-phase supply.
 - No CB or fuse in neutral / earthed wire.
2. Conductor size depends upon the load current.
3. The conductor installed is to be safe in all respects.
4. Every sub-ckt is to be connected to a distribution fuse board.
5. Every line is to be protected by a fuse of suitable rating as per requirements.
6. A switch board is to be installed so that its bottom lines 1.25 metres above the floor.
7. All incandescent lamps, unless otherwise required, are to be hung at a height of 2.5 metres above the floor level.
8. Ceiling fan to be hung 2.75 metres above the floor.
9. Each sub-ckt is not to have more than a total of ten points of lights, fans & socket outlets.
10. No fuse or switch is to be provided in earthed conductor.
11. Every apparatus is to be provided with a separate means of isolation such as a switch.
12. ~~An apparatus~~ In any building, light and fan wiring and power wiring are to be kept separate.

13. In a 3 phase, 4-wire installation the load is to be distributed equally on all the phase.
14. Metal sheath of Conduit for all wiring & metal covering are to be properly earthed.
15. Each sub-circuit is to be protected against excessive current by fuse or automatic CB.
16. All light conductors are to be insulated or otherwise safeguarded to avoid danger.
17. After completion of work the installations are to be tested before energisation.

Wiring Estimate:

- a. Drawing Installation Plan.
- b. Calculations for total Connected load in amperes.
- c. Selection and Rating of main switch and sub-main switch.
- d. Selection and rating of main distribution board.
- e. Assumptions.
- f. Calculations for length of casing capping or Conduit pipe.

Stage-1 is the Conduit installed from switch boards upto horizontal run including from main switch or DB OR HR.

Stage-II - The Conduit on walls running parallel to floor. i.e. the HR running below Ceiling.

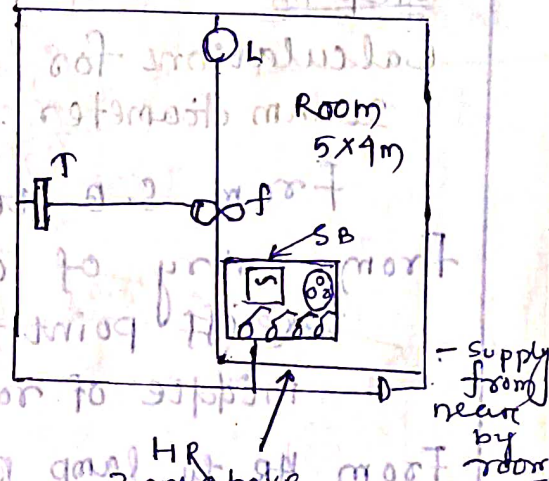
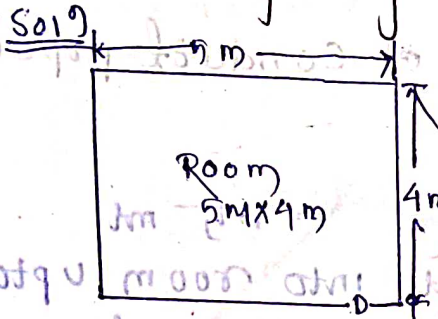
Stage-III

The Conduit installed between HR and Ceiling and Ceiling to last point on HR.

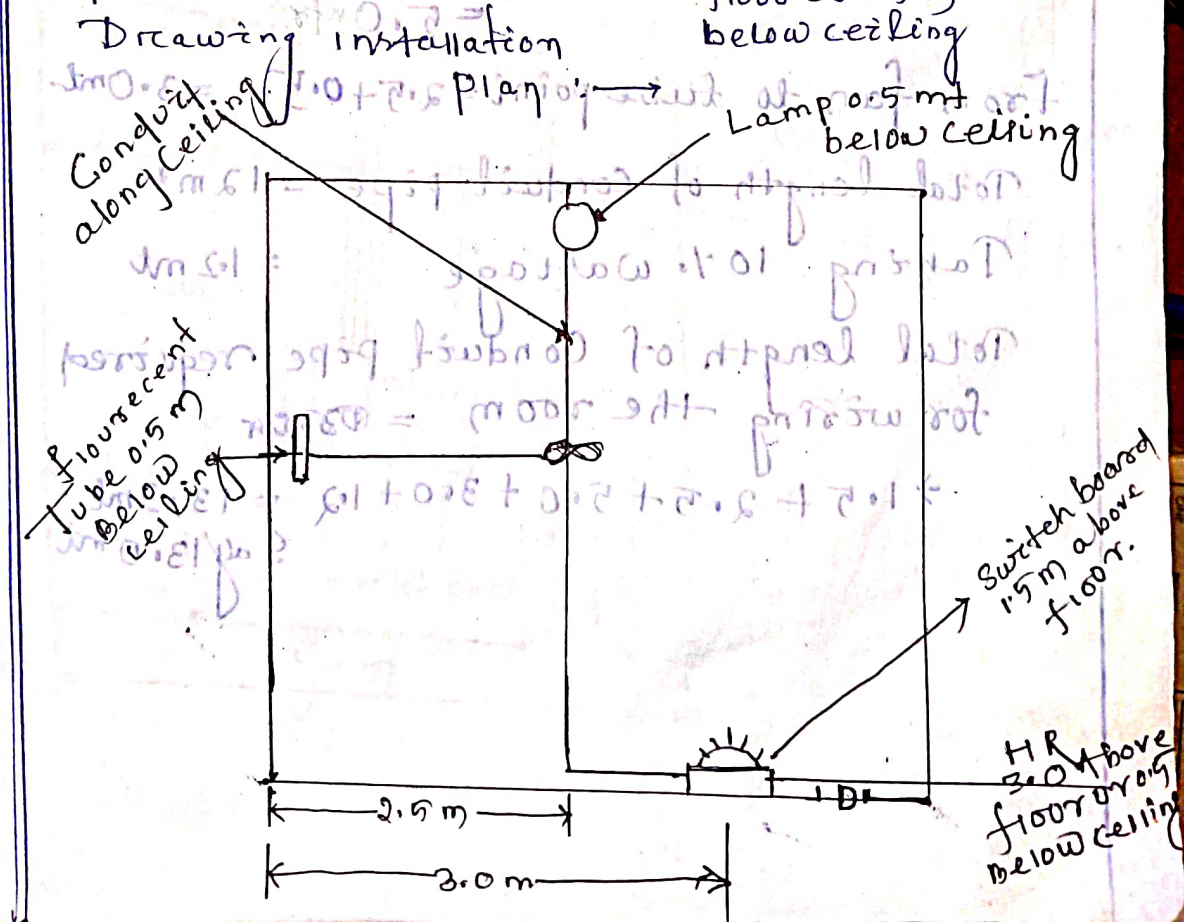
- (g) Calculation for Length of phase wire & neutral wire.
- (h) Calculation for length of earth wire.
- (i) Preparing Material Table.

Example - 01

The plan of a single room of size 5m x 4m given below. The room is required to be provided with one lamp, one fan, one fluorescent tube and one 5 amp socket outlet. Each of the points is controlled by its individual switch. Mark the location of the electrical points suitably and draw the installation plan. Also draw the wiring diagram. Calculate the total length of wire & other material & prepare complete list of material required for wiring the room in concealed steel conduit system of wiring. No main switch is to be provided as the entry of the sub-ckt. is from the adjoining room.



Step - 01



Step-02 Assume:

- Total height from floor to ceiling = 3.5 mtr.
- Height of horizontal run from floor = 3.0 mtr.
- Height of switch board from floor = 1.5 mtr.
- Height of light and tube points from ceiling = 0.5 mtr.
- H.R. = conduit ~~wires~~ running parallel to floor half meter below ceiling.
- W.P. = wires or conduit running between switchboard and H.R.

Step-03

Calculations for length of conduit pipe of 20mm diameter: \rightarrow

From S.B. to H.R. = 1.5 mt
From entry of circuit into room upto take-off point i.e. along H.R. upto middle of room = $2.0 + 0.5 = 2.5$ mt

From H.R. to lamp point = $0.5 + 4.0 + 0.5 = 5.0$ mtr

From fan to tube point = $2.5 + 0.5 = 3.0$ mt.

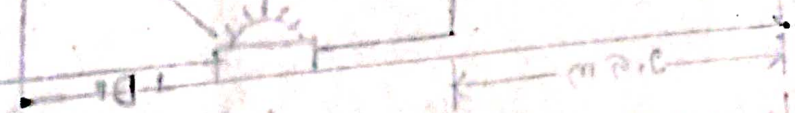
Total length of conduit pipe = 12 mts

Taking 10% wastage = 1.2 mt

Total length of Conduit pipe required for wiring the room = 13.2 mt

$\rightarrow 1.5 + 2.5 + 5.0 + 3.0 + 1.2 = 13.2$ mt
Say 13.0 mt

Switch board
1.5 m
H.R.
0.5 m



Step-04 Calculation for Length of Phase wire

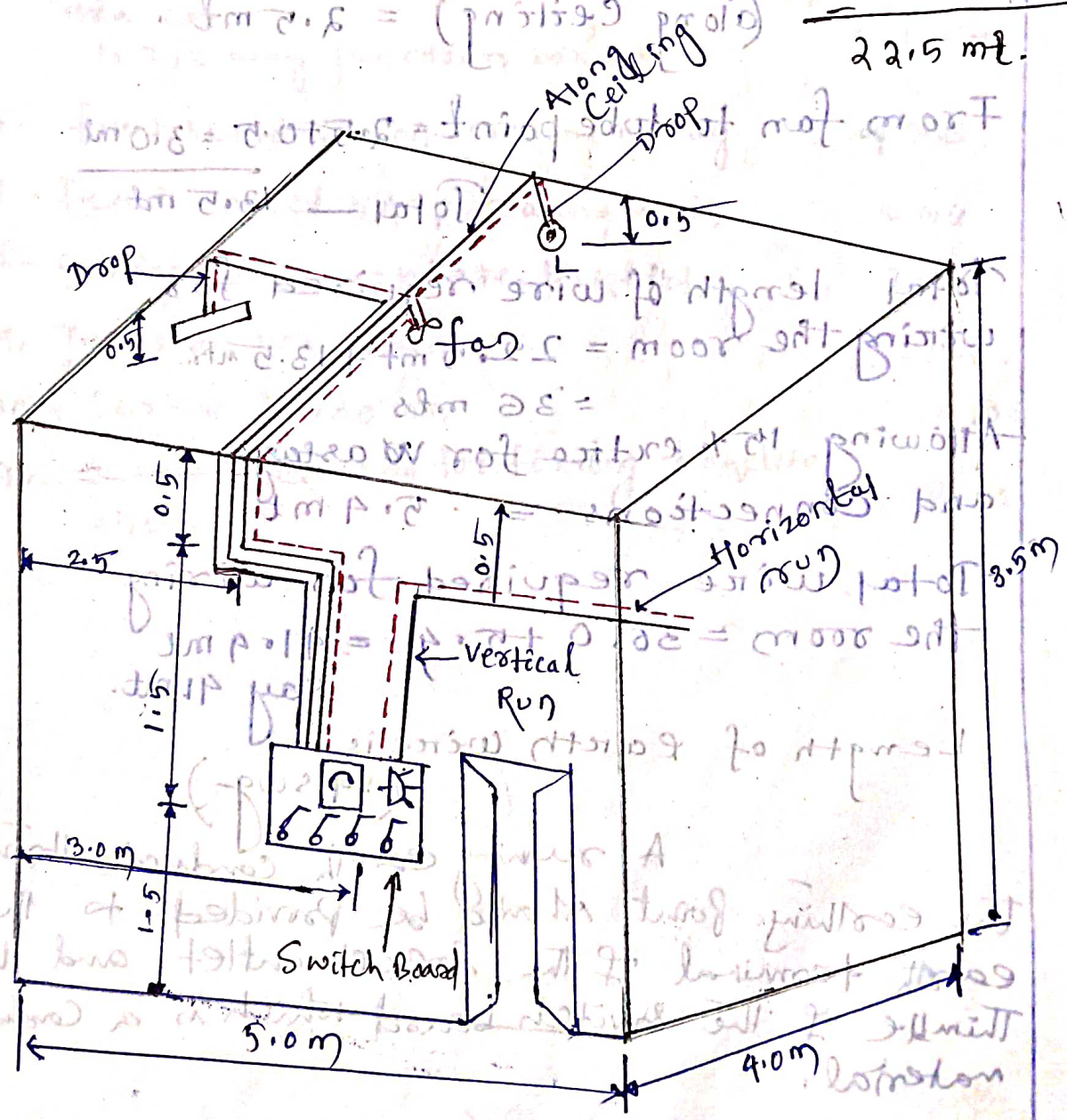
from point of entry of ckt into room upto
 $SB = 2.0(LHR) + 1.5(LVR) = 3.5 \text{ mt}$

From SB upto fan = $1.5 + 0.5$ i.e from top point of VR upto start of rise to $0.5 + 2.0$ along ceiling upto fan = 4.5 mt

From SB to lamp = 4.5 (upto fan) + $2.0 + (0.5) \text{ drop} = 7.0 \text{ mt}$

From SB top tube point = 4.5 upto fan + 2.5 along ceiling to 0.5 drop = 7.5 mt

22.5 mt.



Step 2 = 05

Calculation for length of neutral wire :-

(The neutral wire is shown in dotted line on the isometric view of the room)

- From point of entry of CNL into room upto switch board = 2.0 along HR + 1.5 (VR) = 3.5 mt

= From SB to fan = $1.5 + 0.5 + 0.5 + 0.2$

along ceiling = 4.0 mt.

- From SB to fan = ~~1.5 + 0.5 + 2.0~~

(along ceiling) = 2.5 mt.

From fan to tube point = $2.5 + 0.5 = 3.0$ mt

Total = 13.5 mt

Total length of wire required for wiring the room = 22.5 mt + 13.5 mt.
= 36 mts

Allowing 15% extra for wastage and connections = 5.4 mt

Total wire required for wiring the room = $36.0 + 5.4 = 41.4$ mt
Say 41 mt.

Length of earth wire is

(14 swg)

A running earth conductor through the earthing point should be provided to the earth terminal of the socket outlet and the thumb of the switch board which is a conducting material.

Material Table.

- | | |
|---|-------------|
| 1. ^{Steel} Conduit pipe 20mm dia
black enamel, light gauge | 13 mt |
| 2. PVC insulated, aluminium
conductor, single core, 250 volt
grade wire of size 1.5 mm ² or
1/1.40 mm dia | 41 mt |
| 3. Earth wire 14 swg. GI | 0.25 mt. |
| 4. Iron clad, concealed type,
switchboard with bakelite
sheets 20 cm x 25 cm | 1 NO |
| 5. Conduit pipe accessories for 20mm
dia ckt
1, 2, 3 way junction box. | 2, 1, 2 NOS |
| 6. Flush switch, 5 amp, rating one way | 1 NOS |
| 7. Flush socket 5 amp, rating 3 pin | 1 NO |
| 8. Ceiling roses, 2-plate, bakelite | 2 NOS. |
| 9. Junction box covers, | 2 NOS. |
| 10. Screw 25/30 mm | 10 NOS |
| 11. Screw 15 mm long for fixing bakelite
sheets. | 8 NOS. |