DEPARTMENT OF ELECTRICAL ENGINEERING

LAB MANUAL

SUBJECT: Electrical Estimating & Costing

B.TECH- 5th Semester BRANCH: - EE

KCT COLLEGE OF ENGG & TECH, FATEHGARH

Punjab Technical University

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3	To study the various light sources & lighting schemes.
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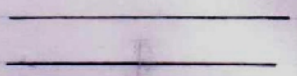
5	To study the design considering of panel board
6	To make wiring diagram of motor controls ckts for starting of 3 – phase induction motor.
7	To carry out wiring diagram residential building
8	Twisting of polarity.
9	To estimate the coast of overhead transmission line.

Experiment no.-1

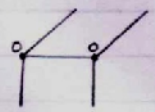
Aim :- Draw all the symbols of electricity

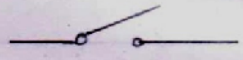
Aim :- To write the different - different electrical symbol.

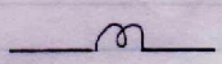
Direct current → 

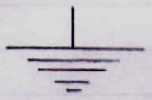
Alternating current → 

Switch → 

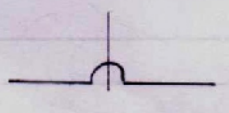
Double pole switch → 

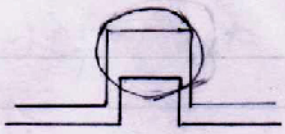
Two wire switch → 

Lamp → 

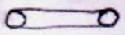
Earth → 

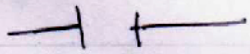
Joint → 

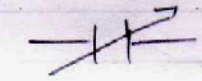
Crossing wire → 

Energy motor → 

Fuse → 

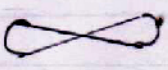
Natural link → 

capacitor → 

Variable capacitor → 

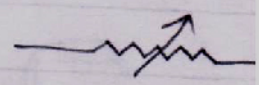
Arial → 

Indicator → 

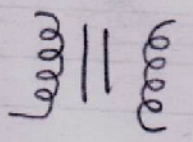
Fan → 

Resistance → 

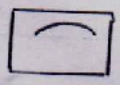
Variable resistance →



Transformer →



Fan regulator →



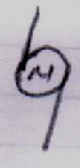
Voltmeter → (V)

Ammeter → (A)

Galvanometer → (G)

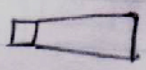
Generator → (G)

Single Phase motor →



Three phase motor →

Horn →



Siren →

Two Pin Socket →

Experiment no:-2

Aim:-To study Indian electricity rules.

Supply to consumer:-

The supplier shall not commence or continue to give supply of energy to any consumer unless:-

A) A suitable linked switch or a ckt breaker of requisite capacity to carry and break the current is placed as near as possible to what after the point of commencement of supply as defined under rule 58 , so as to be readily accessible and capable of being easily operated to completely isolated the supply to the installation such equipment being in addition to any equipment installed for controlling individual ckt or apparatus

B) A suitable linked switch or a ckt breaker of requisite capacity to carry and break the full load current is inserted on the secondary side of a transformer in the case of high or extra high voltage installation provided however , that the linked switch on the primary side of the transformer may be of such capacity so as to carry the full load current and to break only the magnetizing current of the transformer

C) Every distinct is protected against excess energy by means of a suitable cut out or a ckt breaker of adequate breaking capacity suitably located and so constructed as to prevent danger from overheating arcing or scattering of hot metal when it comes into operation and to permit of ready renewal of the fusible metal of the cut out without danger

D) The supply of energy to each motor or other apparatus is controlled by a suitable linked switch or a ckt breaker of requisite capacity in such a position as to be adjacent to the motor or other apparatus readily accessible to and easily operated by the person in charge and so connected in ckt by that its means all supply of energy can be cut off from the motor or apparatus.

E) All install ling material is chosen with special regard to the circumstances of its proposed use , the mechanical strength being sufficient for its purpose and so for as in practicable is of such a character or so protected as to maintain adequately its installing properties under all working condition in respect of temp & moisture

Provisions applicable to medium, high or extra high voltage installation:-

The following provisions shall be observed where energy at medium, high or extra high voltage Is supplied, converted, transformed or used:-

A) All conductors shall be completely enclosed in mechanically strong metal casing or metallic covering which is electrically and mechanically continues ad equality protected against mechanical damage unless they said conductors are accessible only to an authorized person or are installed and protected of the satisfaction of the inspector so as to prevent danger
B) All metal work enclosing supporting or associated with the installation other than that the earth and the source of supply means the point at which energy is given to the system or ckt . which the electric supply line as a said forms part
C) Where an electric supply line as a for said has concentric cables and the external conductor insulated from an outer metal sheating and connected with earth the external conductor may be graded as the metal

Clearance above ground of the lowest conductor:-

1) No conductor of an overhead line including services line created across a street shall at any part thereof be at a height less than 6.
a) For low and medium voltage lines 5.791 m or 18 ft .
b) For high voltage lines 6.096 m or 20 ft
2) No conductor of an overhead line ,including service lines accepted along any street shall at any point thereof be at a height less than
A) For low and medium voltage lines 5.486m and 18ft .
B) For high voltage lines 5.791m or 19ft .

3) No conductor of an overhead lines , including service lines, accepted elsewhere than along or across any street shall be a height less than

a) For low , medium and high
Voltage lines upto and including
11000 volts , 4.572m or 15 ft

b) For low , medium and high voltage
Voltage lines upto and 3.963m or 13ft
Including 11000 volts , if insulated

c) For high voltage lines above 5,182m or 18 ft
11000 volts

4) For extra high voltage lines the clearance above ground shall not be less than 5.182m or 17 plus 0.3048m or I ft for every 33000 volts or part thereof by which the voltage of the line exceeds 11000 volts
Clearance from building of high and extra high voltage lines:-

1) Where a high or extra high voltage over head lines passes above or adjacent to any buildings or part of building it shall have on the basis of the maximum sag a vertical clearance above the highest part of the building immediately under such line of not less than :-

a) For high voltage lines up to
And including 33000 volts 3.658m and 12ft

b) For extra high voltage line 3.658m and 12ft plus
Or 1ft for every additional 33000 volts

2) The horizontal clearance b/w the nearest conductor basis of max. deflection due to wind press be not less than

a) For high voltage lines up to
And including 11000 volts 1.219m 4ft

b) For high voltage lines above
11000 volts and up to and 1.829m and 6ft
Including 33000volts

c) For extra high voltage 1.829m or 6 ft
Lines 1.829m or 6 ft plus
0.3048 m or 1ft for every
Additional 33000 volts or part therefore

Experiment no:-3

Aim:-To study the various light sources & lighting schemes.

Theory:-These are many type of lights of light sources, this includes both natural and artificial sources and process and devices

1) Combustion = fire
2) Natural = sunlight
3) Direct – chemical :- a) light sticks

   b) Fluorescence

   c) Phosphorescence

4) Electric powered:-

1) Fluorescent lamps

2) Incandescent lamps

3) CPLs

4) LED lamps

5) Fluorescent tubes

6) High intensity discharge lamp

The simplest schemes for lighting are

1) Direct lighting
2) Semi-direct lighting
3) Semi-indirect lighting
4) Indirect lighting
5) General lighting
   1) **Direct lighting:-** it is widely used lighting system . in this system more than 90 % of the total lighting flux to fall directly on the working plane with the help of deep reflectors .

2) **Semi –direct lighting:-** in this lighting scheme 60 to 90% of total light flux is made to fall down wards directly with the help of semi direct reflectors . Remaining light is used to illuminating the ceiling and walls.
3) **Semi-indirect lighting: -** in this 60 to 90% of total flux is thrown upwards to the ceiling for diffuse reflection and the rest reaches the working plane. direct excepts for some absorption by the low this lighting scheme in with soft shadow and glare free
4) **Indirect lighting : -** in this 90% of total flux is thrown upwards to the ceiling for diffuse reflection by using inverted or reflectors
5) **General lighting**:- in this scheme lamps made of diffusing glass are used which give nearly equal illumination in all direction

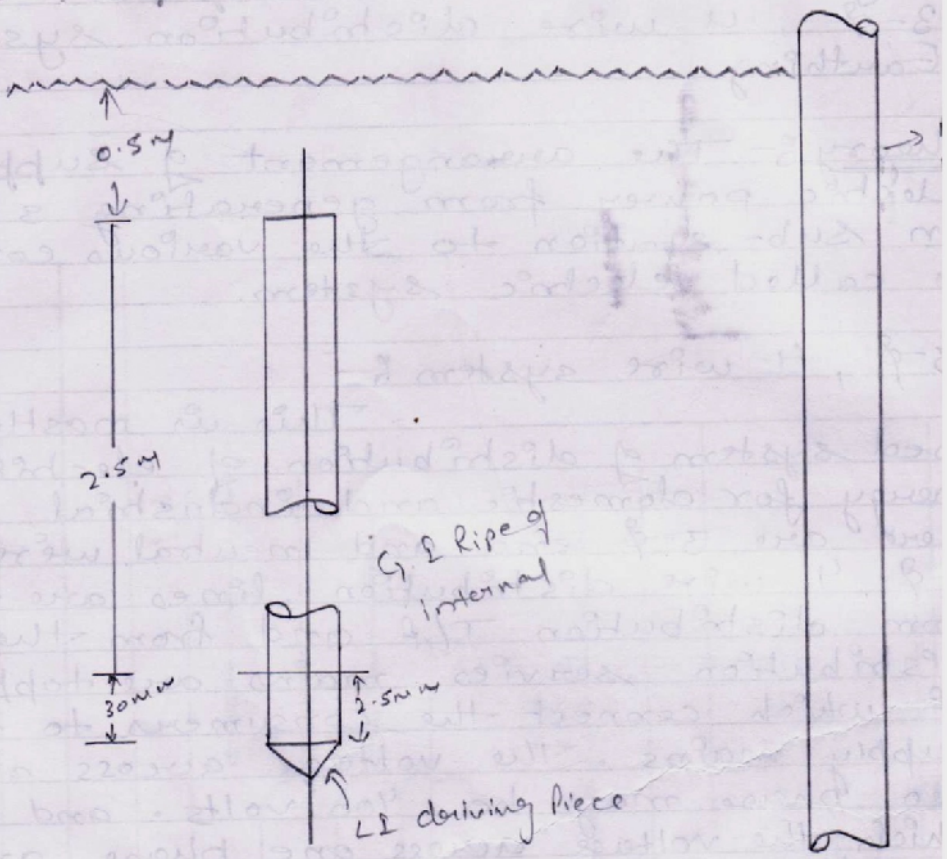
Experiment no:-4

Aim:- to study the design concentration of various electrical system
Distribution system
3 phase, 4 wire distribution system
Earthing

Theory: - the arrangement of supplying electric power from generating station on sub-station to the various consumers is electric system

1) 3 phase,4 wire system :- this is mostly widely used system of distribution lines are radiated from distribution t/f and from this distribution services mains are tapped of which connect the consumers to the supply mains .the voltage across any two phase may be 400 volts and 140 volts which the voltage across one phase and neutral is 230 volts or 250 volts respectively . the lighting loads are connected across motor loads are connected across the 3 phase is shown in fig.
2) Earthing :-the meaning of term earthing as grounding is to connect the electrical eq:-to earth i.e. , to connect the electrical equipments to earth i.e.to connect the apparatus with a water pipe or an artificial earth electrode throw a conductor having negligible resistance when a body is earthed it is said to have zero potential and thus will avoid to shock to as operator .

b) Earthing



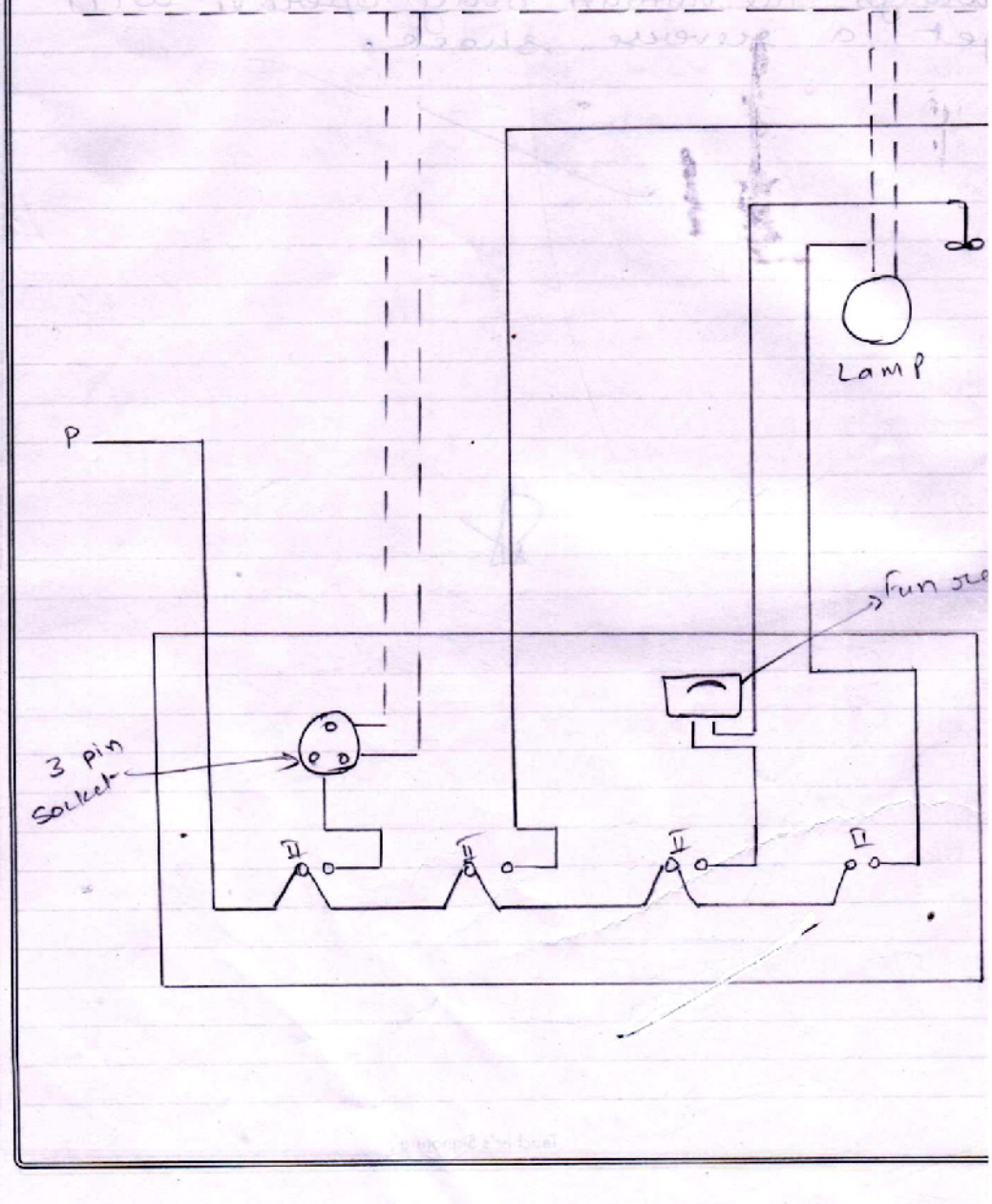
Experiment no:-5

Aim: - to study the design considering of panel board

Theory:- a distribution board(or panel board) is a component of an electrical supply system which divides on electrical power feed into subject ckts while providing a protective fuse or ckt breaks for each ckt in a common in closer normally a main switch in recent boards one or more residual devices or residual current breaks with our current protection will also be insure.

Sometimes it is desired to have a portable brakes panel for example for special events in this case a breaker panel is mounted to a board together with various sockets.

Aim & To study a design considering of Panel Board



Experiment no:-6

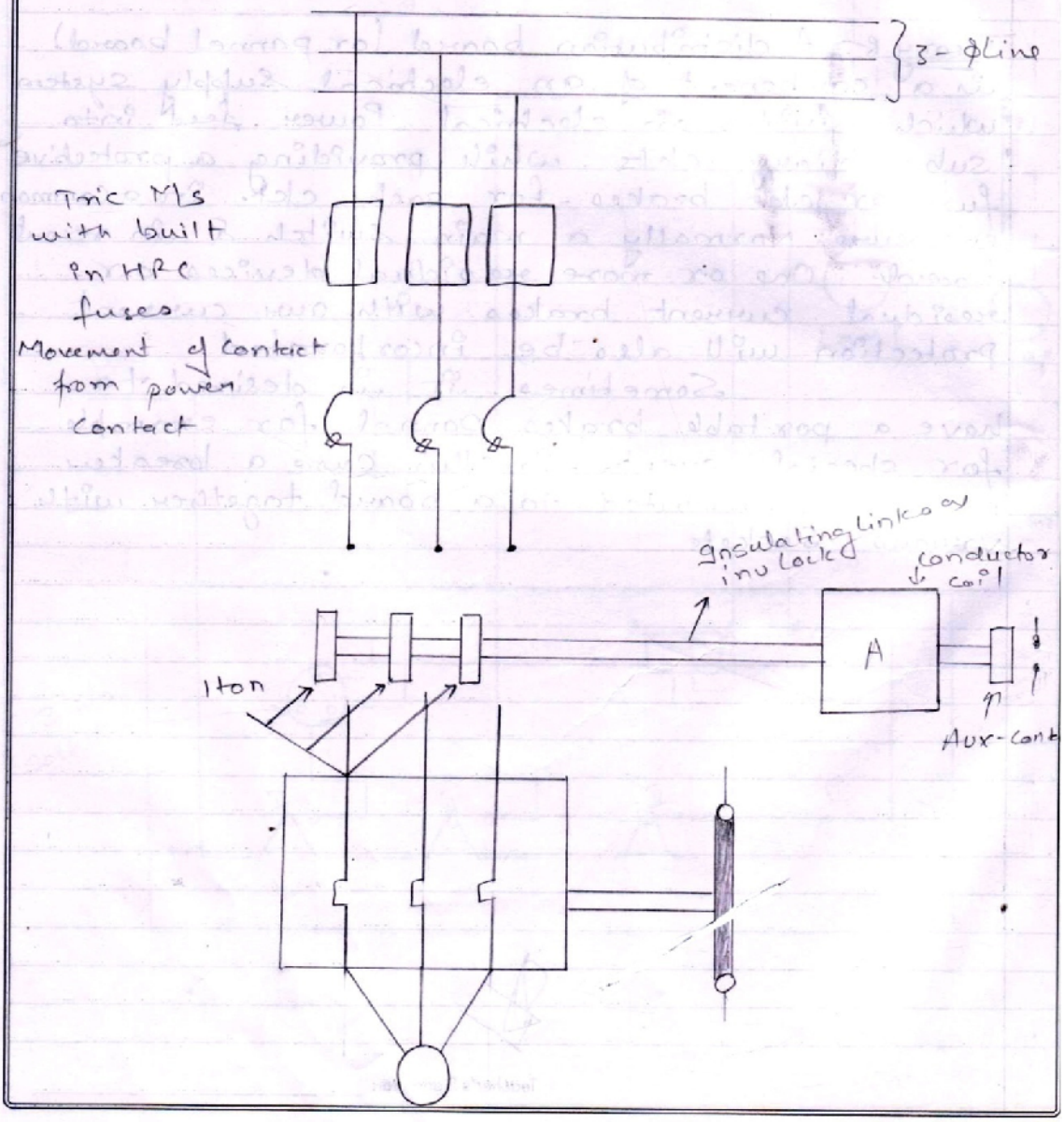
Aim: - to make wiring diagram of motor controls ckts for starting of 3 – phase induction motor.

Theory:-

Practically power supply contractor's coils auxiliary contractors are close to each other. When supply is given to the coils the electromagnetic action will attracts connect toward

Since power contractors auxiliary conductor are mounted over armature the power conductor a & a (2) close and a (3) and a will open.

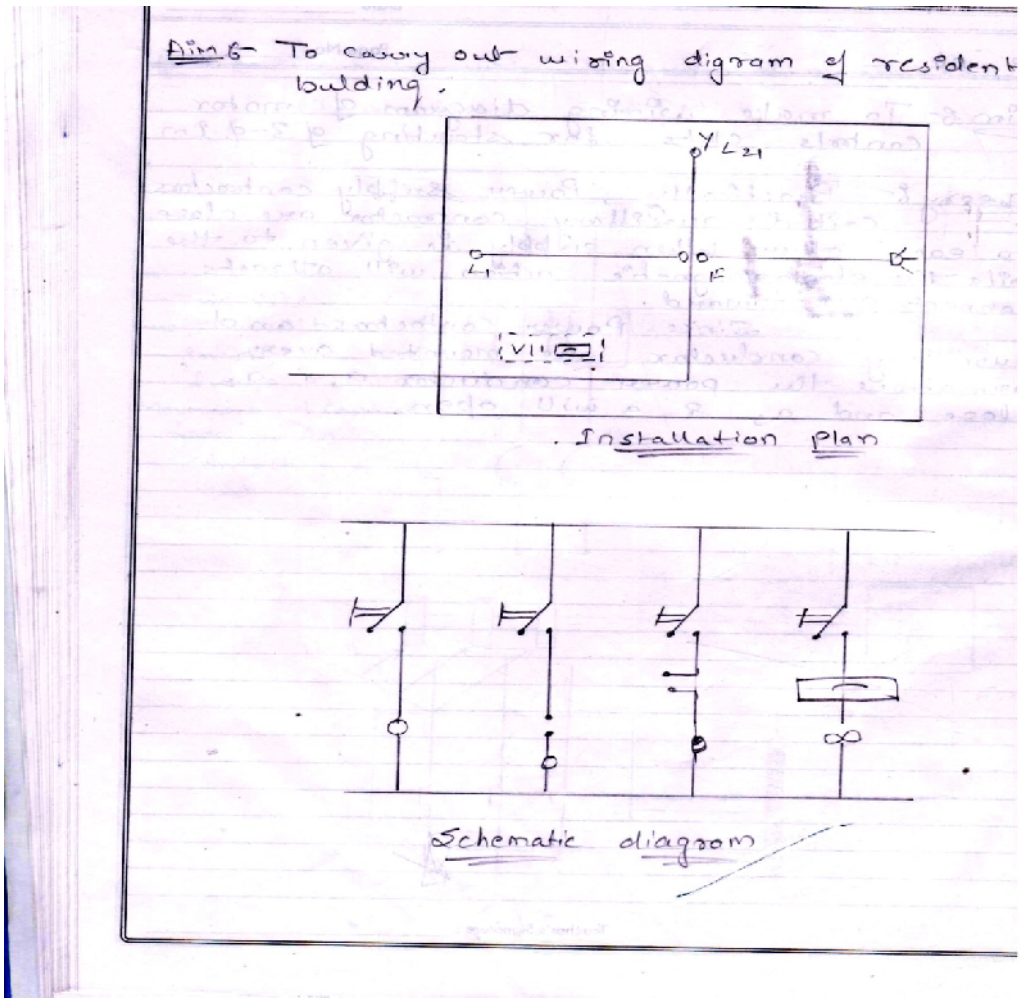
Aim :- To make wiring diagram of motor control ckt for starting of 3-ϕ IM

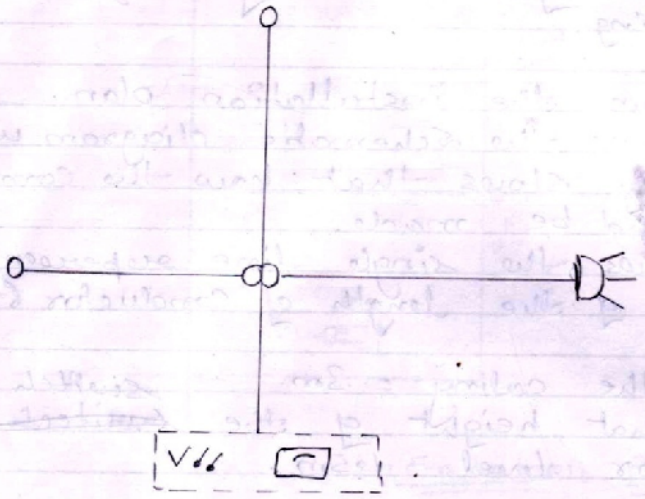


Experiment no:-7

Aim:- To carry out wiring diagram residential building

1) Fig:- shows the installation plan
2) Fig:- shows the schematic diagram which closely shows that how the connection should be made
3) Fig:- shows the single line representation
4) Calculation of the length of conductor





Single Line Representation

Height of the caliny
= 3m
Assume that the height of the switch board from floor level
=105m
Let the height of the horizontal run from floor level
=2.5m
Therefore, vertical run
=3.0-2.5=0.5m
Downward run
=2.5-1.5=1m
Let the height of the socket from the floor level be
=0.2m
Length of the phase wire
From junction box j to switch board
=1m
From two ways switch board to the 0.2 m
Other two way switch
=14m
From two way switch to lamp c
=1m
From switch board to lamp to l (1)
=6.75m
From junction box j to socket
= 8.05m
Total length of fuse wire
=33.53m
Length of neutral wire:-
From junction box j to lamp l (1)
= 5.75m
From f on f to lamp l
= 2.25m
From fan f (2) socket
=5.3m
Total length of neutral wire
= 13.30 m

Total length of (neutral= phase)
=46.83m
Cutting angle wastage
=15%
Total length of conductor required
=54m

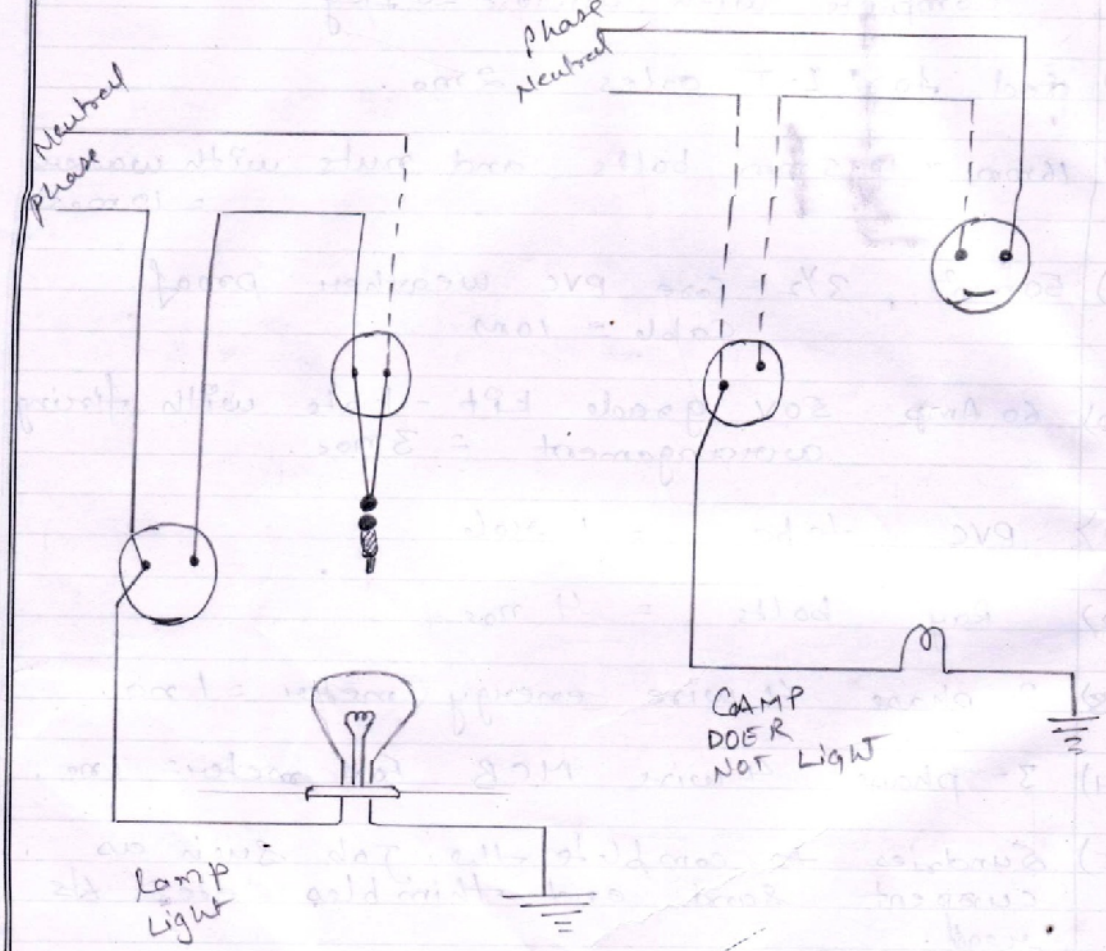
Experiment No. 8

Aim: Twisting of polarity.

it is necessary to avoid possibility of short circuit by assuming that all the single pole switch are connected in the line wire or phase wire. by doing so the lamp hold or any other can be make quite dead. when the switch is off otherwise if the switch is installed on natural wire the holder or inlet point will alive even when the switch is open.un der these conditions a peasons replacing on the point is liable to get a short circuit.

or ensuring that all the switches are connected in live wire the lamps are removed from the lamp holder and the test is performed with a test lamp. one end of the test lamp is connected through a head to a switch and the other end of the test lamp is earthed as shown is correctly co incised and if it does not glow then switch is not properly connected.

Aim & Testing of polarity



Experiment No. 9

Aim: To estimate the coast of overhead transmission line.

A brief layout of the installation is shown in the fig.

Selection of Conductor Size:- While selecting a conductor for overhead line, the mechanical strength of conductor is taken into account along with the current to be carried by the conductor. for this purpose on 611*2.11 mm ACSR conductor will be used for the overhead line and 3 1/2 core aluminium conductor PVC cable of 50 mm size is required for connecting the energy motor to the overhead line. this cable can carry the current of 45 amps. for earth wire an 85 and 65 wire will be used.

Calculation of conductor length and member of poles:-

resistance of consumer plane from overhead line = 100m

assume a voltage span = 50 m

member of spans = 100/50 = 2m

number of poles = 2

length of 611 * 2.11 mm ACSR conductor

= 4*100+2%

= 408 m

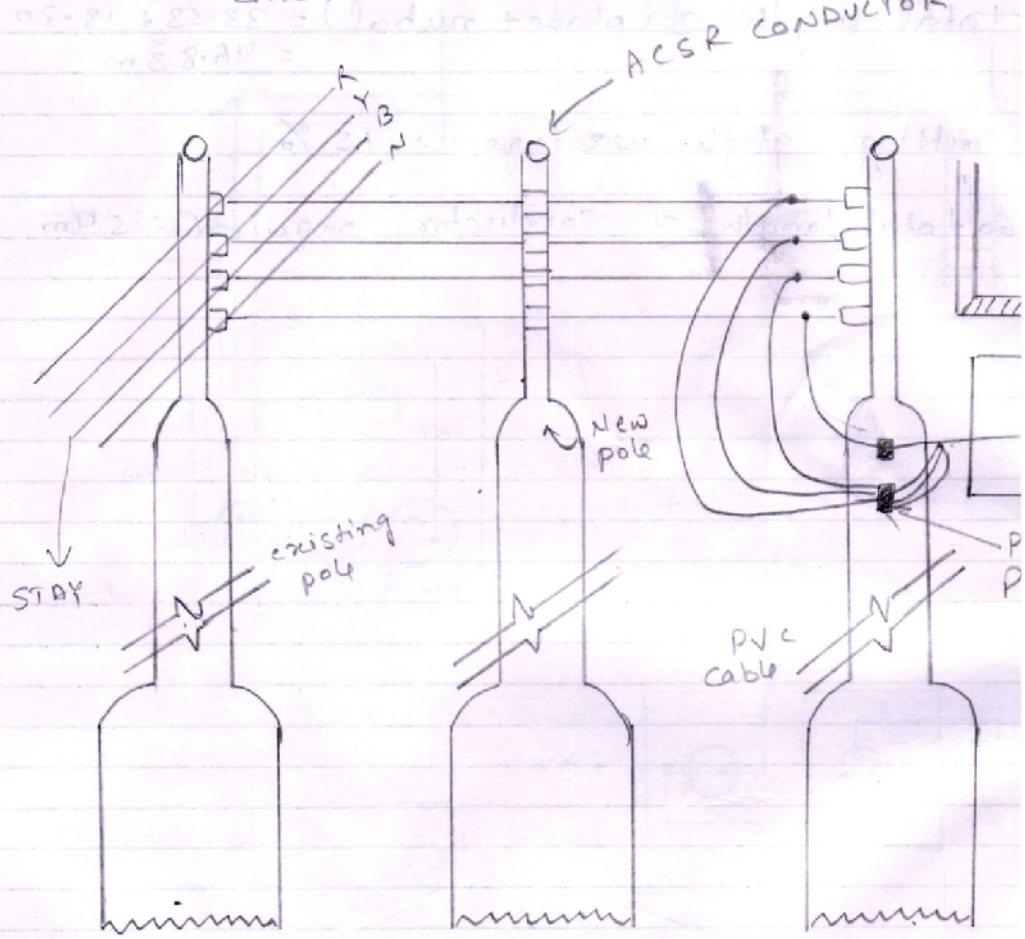
length of 8 SWC , C9.5 wire = 2.5 m

length of 7/36 SWC , catnaly required for supporting the = 10 m

length of PVC Cable= 10 m

Schedule of Materials:-

Aim & To estimate the Cost of overhead transm
—ion Line.



Description of the material with quantity required specifications.

1) 9 m long steel tabular poles = 2 hours
2) 611*2.11 mm SWC ACSR Conductor = 08
3) 8 SWG G.S wire= 1.5 kg
4) 7/36 SWG catenery = 3kg
5) L.p Shackle insulators with D Straps = 8m
6) 14 SWG aluminium winding wire stay set complete with anclose = 1kg
7) rod for L.T poles= 2m
8) 16mm*12.5 bolts and nuts with washers =10 m
9) 50 mm2 ,3 1/2 core PVC weather proof cable = 10m
10) 60 amp 50 v grade kpt-kats with firing arrangement= 3 nos
11) PVC Tape = 1 role
12) ray bolts = 4 nos
13) 3 phase 4 wire energy meter = 1no
14) 3 phase 4 wire MCB for meter =1 no
15) Sundries to complete the job such as current sand and the thimbles etc = as regd.