COMPUTER AIDED ELECTRICAL DRAWING LAB

LABORATORY MANUAL

For

B.E EEE IV SEMESTER

Prepared by: **Mr. G. RAVI KIRAN**

(Assistant Professor, EED)

MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY
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DEPARTMENT OF ELECTRICAL ENGINEERING

2021-22

DEPARTMENT VISION

To produce proficient engineers who illuminate the nation, drive the industry and innovate in the field of power and automation

DEPARTMENT MISSION

- Provide futuristic and comprehensive technical education to equip students with core competencies and relevant skill sets through effective teaching learning methods and state of art laboratories thus preparing them for global careers.

- Pursue need based research and provide consultancy and testing services to address contemporary issues in the fields of electrical and instrumentation engineering

EEE PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO1: Graduates will demonstrate core competence and leadership in their chosen fields of employment by identifying, formulating, analyzing and implementing engineering solutions using current techniques and tools

PEO2: Graduates will communicate effectively as individuals or team members and be successful in local and global cross cultural working environment

EEE PROGRAM SPECIFIC OBJECTIVES (PSOS)

PSO1: Apply Knowledge of power system configuration, electrical equipment and protection practices to the design and specification of electrical generation, transmission, and distribution and utilization system.

PSO2: To Design, analyze, test and evaluate the performance of the electrical machines and transformers.

PSO3: To develop the expertise in the technology associated with efficient conversion and control of electrical power by static means from available form to the required form.

MCET EED

EEE PROGRAM OUTCOMES (PO'S)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write

effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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COMPUTER AIDED ELECTRICAL DRAWING LAB

LIST OF EXPERIMENTS

CODE: (PC452EEE)

1. **To draw the Basic shapes like lines, arcs, curves, shape filling**
2. **To draw the Basic Electrical symbols**
3. **To draw house wiring diagram and layout**
4. **To draw the Electrical machine winding diagram**
5. **To draw Transmission tower**
6. **To draw construction feature of D.C motor**
7. **To draw 3 point and 4 point D.C starters**
8. **To draw lamps used in illumination**
9. **To draw single line diagram of power system**
10. **Simple power and control circuit diagrams**

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EXPERIMENT No. 1

Draw the Basic shapes like lines, arcs, curves, shape filling

AIM: To draw the Basic shapes like lines, arcs, curves, shape filling

SOFTWARE USED: MS Word, AUTOCAD.

PROCEDURE:

1) Open MS word.
2) Create a new document.
3) Select the insert tab.
4) Go to shapes and select the appropriate symbols according to the diagram.
5) Complete the diagram .

SHAPES:

LINES

Solid Line

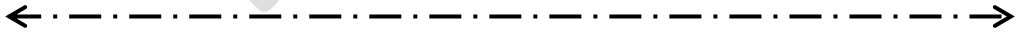
Round Dotted line

Square

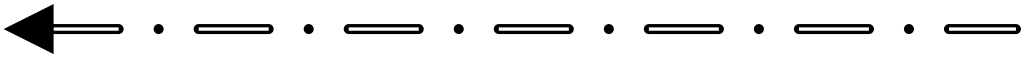
Dash Dotted line

Long Dash line

Long Dash Dotted line

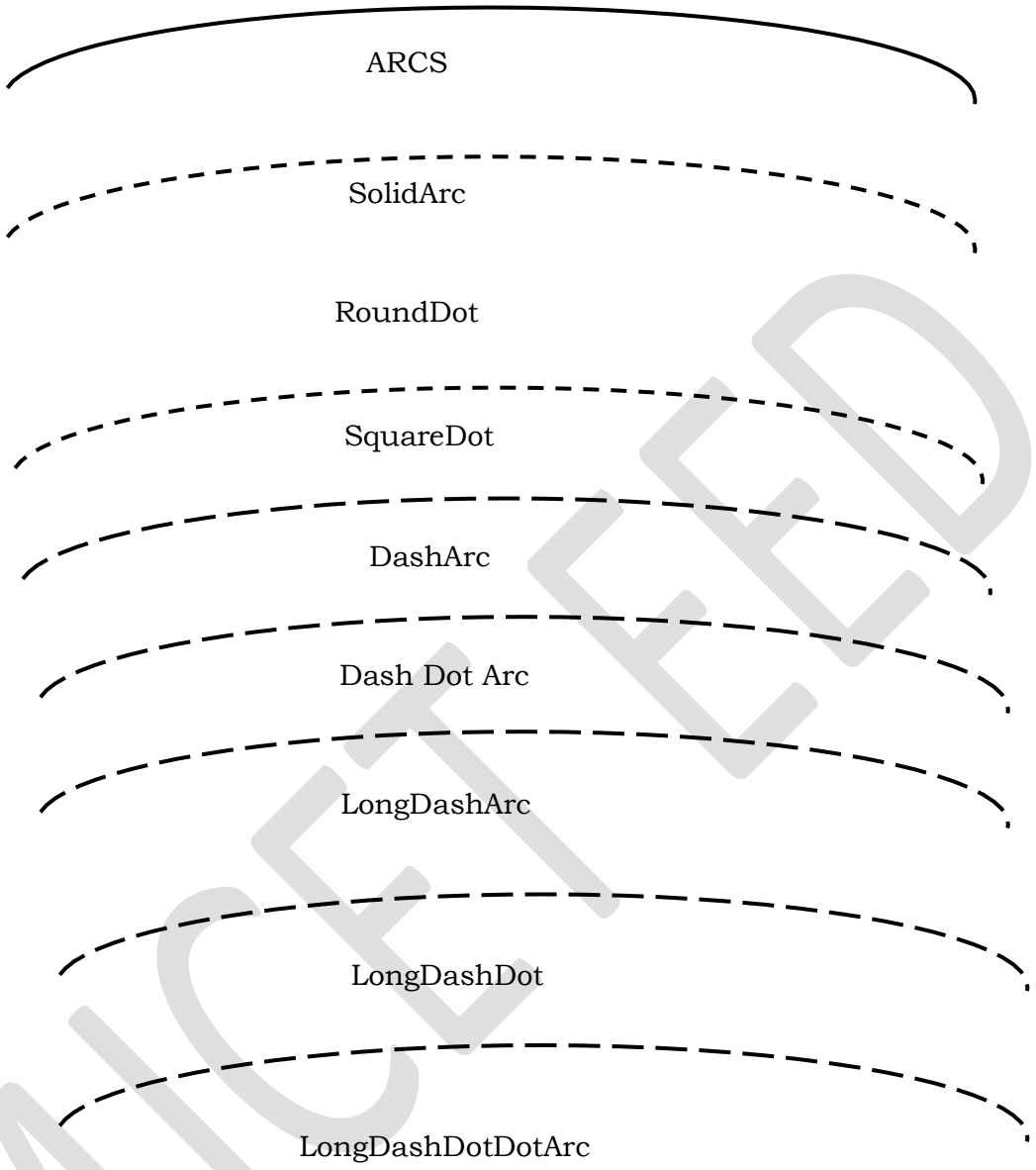


Double Head Arrow Long
Dash Dotted line



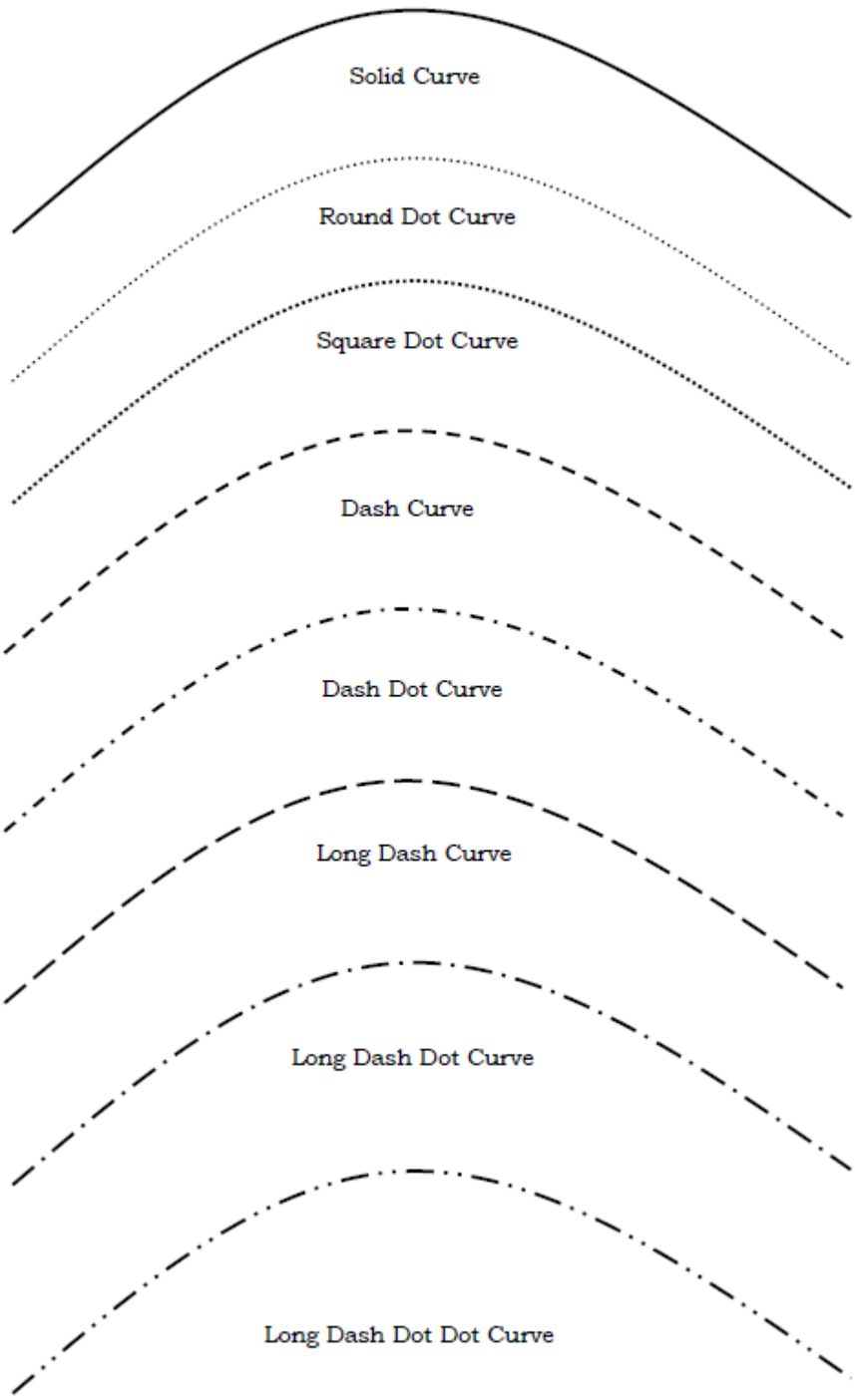
Single Arrow Head Square
Cap line

MJCET ED

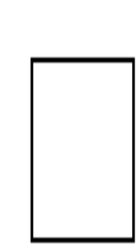

ARCS
SolidArc
RoundDot
SquareDot
DashArc
Dash Dot Arc
LongDashArc
LongDashDot
LongDashDotDotArc

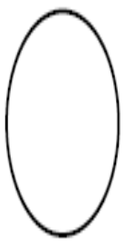
MJCET ED

CURVES


Solid Curve
Round Dot Curve
Square Dot Curve
Dash Curve
Dash Dot Curve
Long Dash Curve
Long Dash Dot Curve
Long Dash Dot Dot Curve

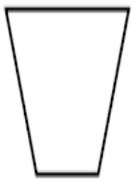
SHAPES

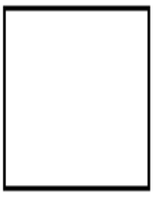


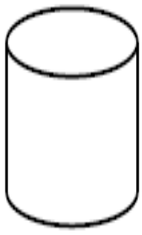


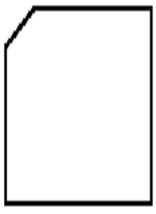
FLOWCHART

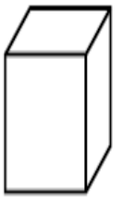
SYMBOLS

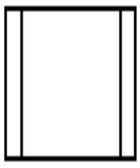


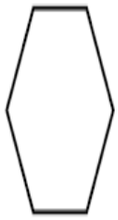


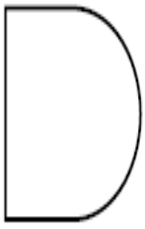




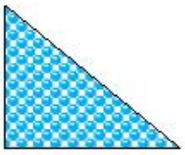


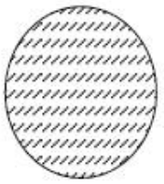




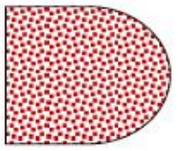


FILLING OF OBJECTS





FLOWCHART
SYMBOLS



EXPERIMENT No. 2

Draw the Basic Electrical symbols

AIM: To draw the Basic Electrical symbols

SOFTWARE USED: MS Word, AUTOCAD.

PROCEDURE:

1) Open MS word.
2) Create a new document.
3) Select the insert tab.
4) Go to shapes and select the appropriate symbols according to the diagram.
5) Complete the diagram.

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ELECTRICAL SYMBOLS

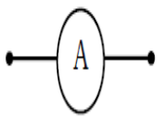


Figure 1: Ammeter

BATTERY

(Long Line Is Always Positive)

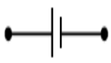


Figure 2.1: Single Cell

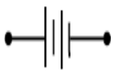


Figure 2.2: Multicell

CAPACITOR

Figure 3.1: Fixed Capacitor

Figure 3.2: Polarized Capacitor

Figure 4: Circuit Breaker

CONTACTS

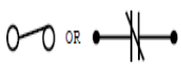


Figure 5.1: Closed (Break)

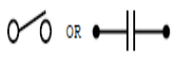


Figure 5.2: Open (Break)

CONNECTIONS

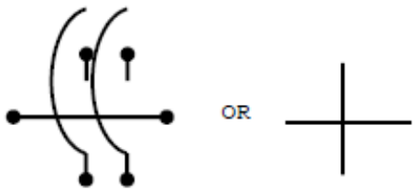


Figure 6.1: Cross, No Connection

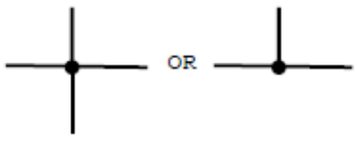


Figure 6.2: Connection

Figure 6.3: Connection, Chassis (Ground)

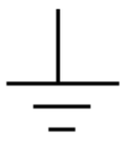
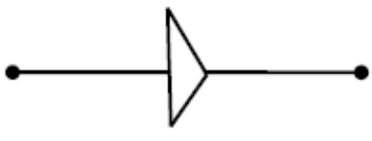


Figure 6.4: Connection, Earth Ground



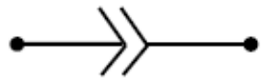


Figure 7: Connector

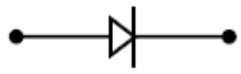


Figure 8: Semiconductor , Diode

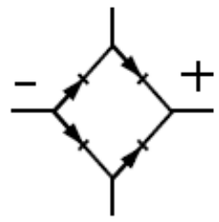


Figure 9: Full-Wave, Bridge Type Rectifier

Figure 10: Fuse

Figure 11.1: AC Generator

Figure11.2: DC Generator

z

Figure 12: Heater

IGNITOR

Figure 13.1: Spark Ignitor, Grounded

Figure 13.2: Spark Ignitor , Undergrounded

Figure 13.3: Glow Oil , Glow Bar , Hot Wire

INDUCTOR

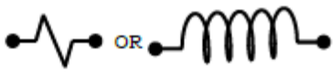


Figure 14.1: Inductor (Coil)

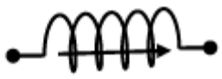


Figure 14.2: Inductor (Solenoid)

Figure 15: Lamp

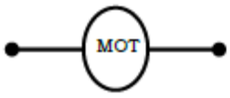


Figure 16.1: Motor , Ac

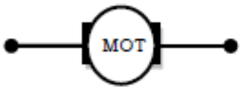


Figure 16.2: Motor , Dc

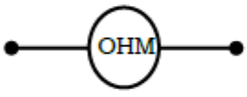


Figure 17: Ohmmeter

Figure 18: Piezoelectric Crystal Unit

RELAY

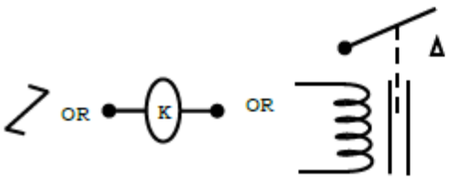


Figure 19.1: Basic Operatring Coil

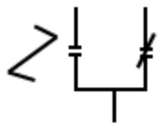


Figure 19.2: Relay With Transfer Contacts

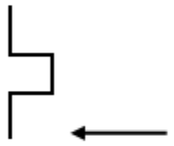


Figure 19.3: Thermal Operation Relay With Normally Open Contacts

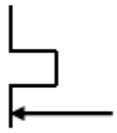


Figure 19.4: Thermal Operation Relay With Normally Closed Contacts

RESISTOR

Figure 20.1:Fixed Resistor

Figure 20.2: Variable Resistor

SWITCHES

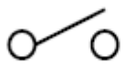


Figure 21.1: Single - Pole Single - Throw (SPST)

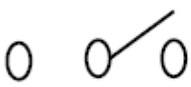


Figure 21.2: Single - Pole Double - Throw (SPDT)

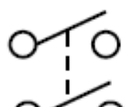


Figure 21.3: Double - Pole Single - Throw (DPST)

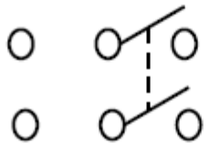


Figure 21.4: Double - Pole Double - Throw (DPDT)

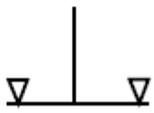


Figure 21.5: Push Button Momentary Normally Closed (PBNC)

Figure 21.6: Push Button Momentary Normally Open (PBNO)

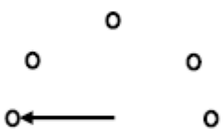


Figure 21.7: Rotary

Figure 21.8: Flow – Actuated Switch – Closes On Increase In Flow

Figure 21.9: Flow – Actuated Switch – Open On Increase In Flow

Figure 21.10: Pressure (P) Or Vacuum (V) Actuated Switch , Closes On Rising Pressure – Letter In Symbol

Figure 21.11: Temperature – Actuated Switch Closes On Rising Temperature

Figure 21.12: Pressure (P) Or Vacuum (V) Actuated Switch , Closes On Rising Pressure – Letter In Symbol

Figure 21.13: Temperature – Actuated Switch Opens On Rising Temperature

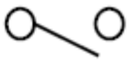


Figure 21.14: Open Switch With Time - Delay Opening (Tdc) Feature

Figure 21.15: Closed Switch With Time - Delay Opening (TDO) Feature

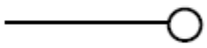


Figure 22: Terminal

Figure 23: Transformer , Iron Core

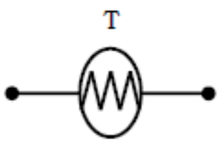


Figure 24: Thermistor

Figure 25: Thermoelectric Generator Single Thermocouple

Figure 26: Thermopile

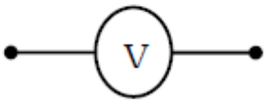
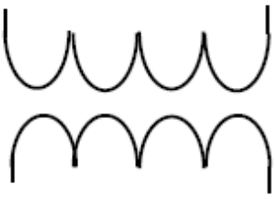


Figure 27: V - Voltmeter

INDUSTIAL ELECTRIC SYMBOLS

TRANSFORMERS

Figure 28.1: Auto



CONTROL TRANSFORMER

Figure 28.2: Air Core

Figure 28.3: Current

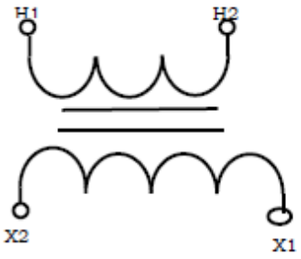


Figure 28.4a: Single -Voltage

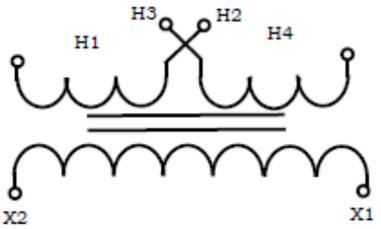


Figure 28.4b: Dual -Voltage

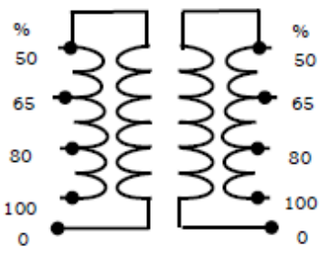


Figure 28.5: Autotransformer For Reduced-Voltage Starting

AC MOTORS

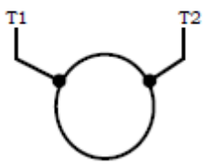


Figure 29.1: Single Phase

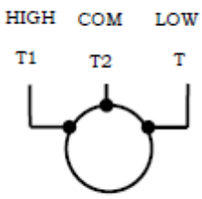


Figure 29.2: Separate Phase , Two-Speed

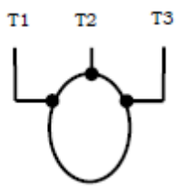


Figure 29.3: Three Phase

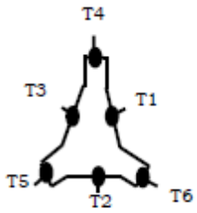


Figure 29.4: Constant – Torque , Two-Speed

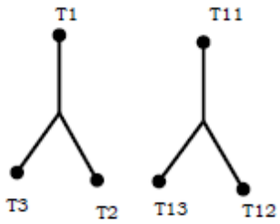


Figure 29.5: Separate Winding , Two-Speed

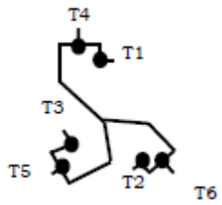


Figure 29.6: Variable – Torque , Two-Speed

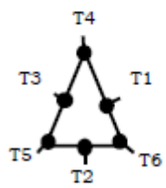


Figure 29.7: Constant Horsepower , Two-Speed

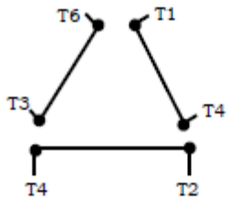


Figure 29.8: Wye/Delta , Reduced-Voltage

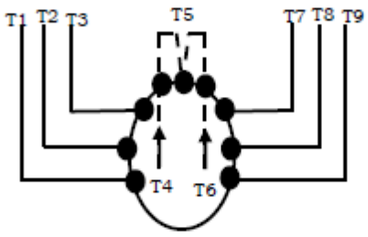


Figure 29.9: Wye Connected Part Winding, Reduced-Voltage

DC MOTORS

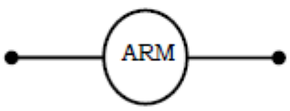


Figure 30.1: Armature

Shows 4 Loops

Figure 30.2: Shunt Field

Shows 3 Loops

Figure 30.3: Series Field

Shows 2 Loops

Figure 30.4: Comm Or Compens Field

WIRING

Figure 31.1: Power

Figure 31.2: Control

Figure 31.3: Wiring Terminal

CONNECTIONS

Figure 32.1: Mechanical

Figure 32.2: Mechanical Interlock

RESISTORS

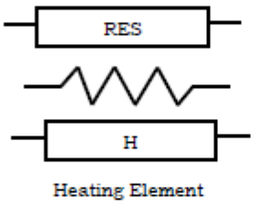


Figure 33.1: Fixed

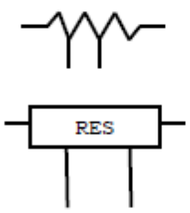


Figure 33.2: Adjustable By Fixed Taps

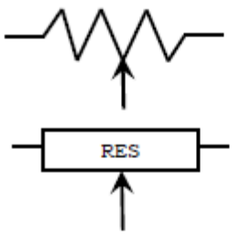


Figure 33.3: Rheostat, Pot, Or Adjustable Tap

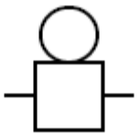


Figure 35: Bell

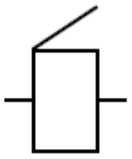


Figure 36: Buzzer

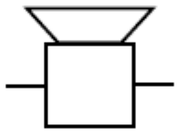


Figure 37: Horn, Siren, etc.

Figure 38: Half - Wave Rectifier

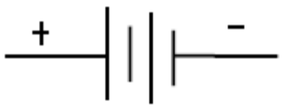


Figure 39: Battery

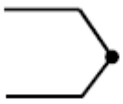


Figure 40: Thermocouple

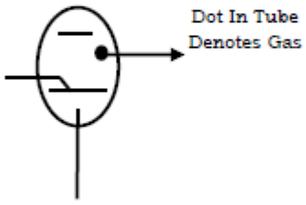


Figure 41: Ignition Tube

SEMICONDUCTORS

Figure 42.1: Diode

Figure 42.2: Tunnel Diode

Figure 42.3: Unidirectional Breakdown (Zener) Diode

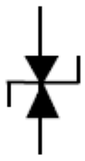


Figure 42.4: Bidirectional Breakdown Diode

Figure 42.5: Photosensitive Cell

Figure 42.6: Triac (Bidirectional Triode Thyristor)

Figure 42.7: Silicon Controlled Rectifier

Figure 42.8: Programmable Unit – Junction Transistor (PUT)

TRANSISTOR

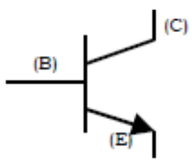


Figure 43.1: NPN Base

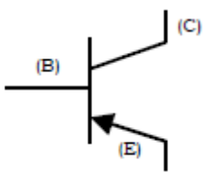


Figure 43.2: PNP Base

UNIJUNCTION TRANSISTOR

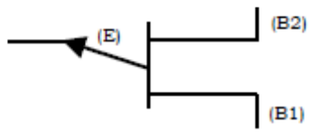


Figure 44.1: P Base

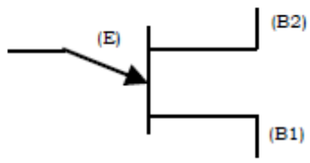


Figure 44.2: N Base

CONTACTS

INSTANT OPERATING

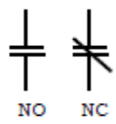


Figure 45.1b: Without Blow

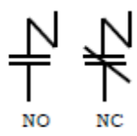


Figure 45.1a: With Blow

TIMED CONTACTS – CONTACT ACTION RETARDED AFTER COIL IS :

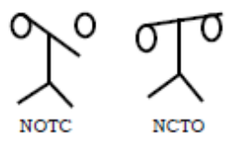


Figure 45.2a: Energized

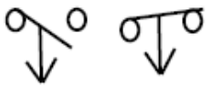


Figure 45.2b: De-Energized

OVERLOAD RELAYS

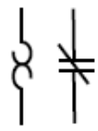


Figure 46.1: Thermal

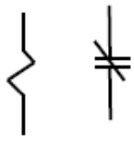


Figure 46.2: Magnetic

SUPPLEMENTARY CONTACT SYMBOLS

SPST NO

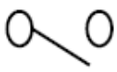


Figure 47.1a: Single Break

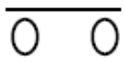


Figure 47.1b: Double Break

SPST NC

Figure 47.2a: Single Break

Figure 47.2b: Double Break

SPST NO

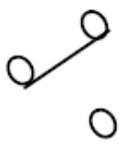


Figure 47.3a: Single Break

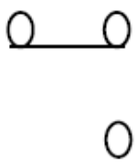


Figure 47.3b: Double Break

DPST, 2NO

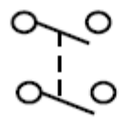


Figure 47.4a: Single Break

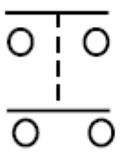


Figure 47.4b: Double Break

DPST, 2NC

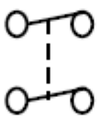


Figure 47.5a: Single Break

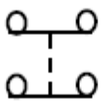


Figure 47.5b: Double Break

DPDT

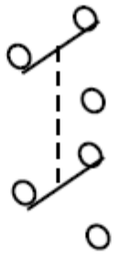


Figure 47.6 : Single Break

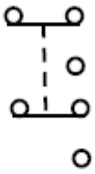


Figure 47.6b: Double Break

PILOT LIGHTS

INDICATE COLOUR BY LETTER

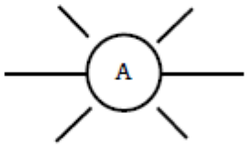


Figure 48.1a: Non Push-To-Test

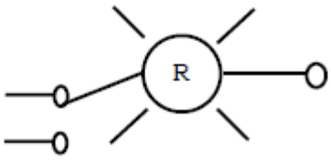


Figure 48.1b: Push-To-Test

INDUCTORS

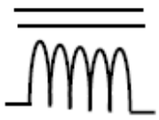


Figure 49.1a: Iron Core

Figure 49.1b: Air Core

COILS

DUAL - VOLTAGE MAGNET COILS

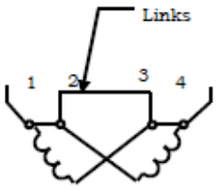


Figure 50.1: High - Voltage

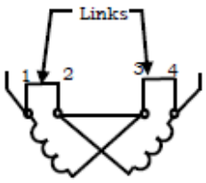


Figure 50.2: Low - Voltage

Figure 51: Blowout Coil

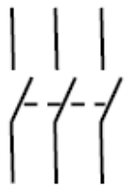


Figure 52: Disconnect

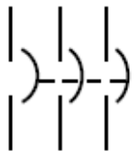


Figure 53: Circuit

Figure 54: Circuit Breaker with Thermal Ol

Figure 55: Circuit Breaker with Thermal Ol

LIMIT SWITCHES

Figure 56.1: Normally Open

Figure 56.2: Normally Closed

Figure 56.3: Help Closed

Figure 56.4: Help Open

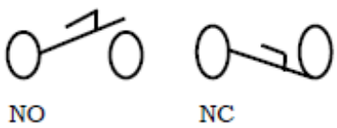


Figure 57: Foot Switches

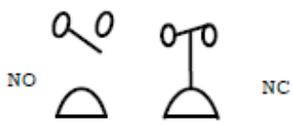


Figure 58: Pressure and Vacuum Actuated Switch

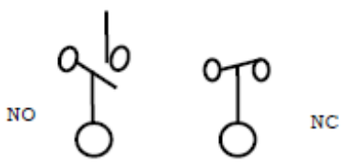


Figure 59: Liquid Level Switch

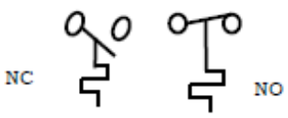


Figure 60: Temperature Actuated Switch

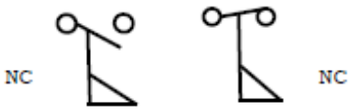


Figure 61: Flow Switch (Air, Water, Etc)

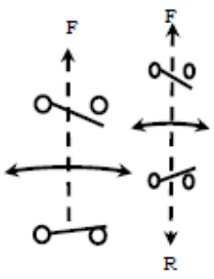


Figure 62.1: Speed Plugin

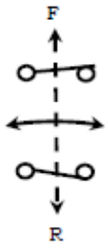


Figure 62.2: Anti Plugin

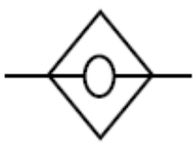


Figure 63.1: Input Coil

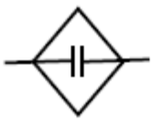


Figure 63.2: Output NO

Figure 63.3: Limit Switch NO

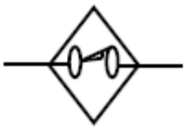


Figure 63.4: Limit Switch NC

MOMENTARY CONTACT

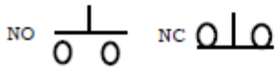


Figure 64.1a: Single Circuit

SYMBOLS FOR STATIC CONTROL SWITCHING DEVICES

NO AND NC

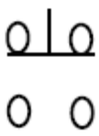


Figure 64.1b: Double Circuit

Double Circuit

Figure 64.1c: Mushroom head

Figure 64.1d: Wobble stick

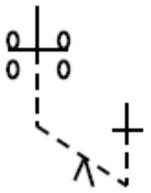


Figure 64.2b: One Double Circuit

Figure 64.2a: Two Single Circuit

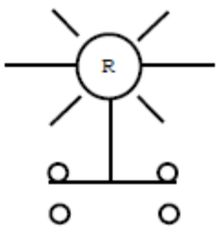


Figure 65: Illuminated

EXPERIMENT No. 3

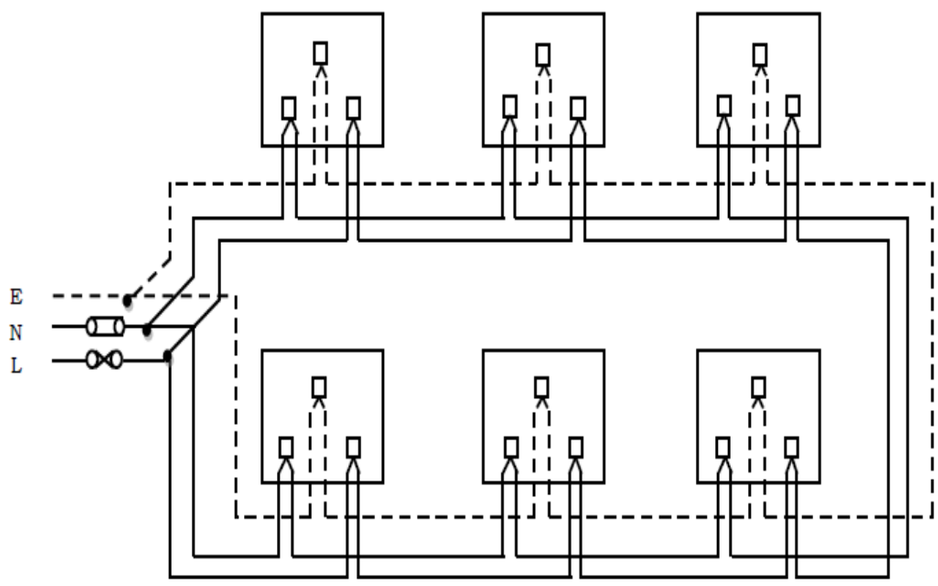
AIM: To draw house wiring diagram and layout

SOFTWARE USED: MS Word, AUTOCAD.

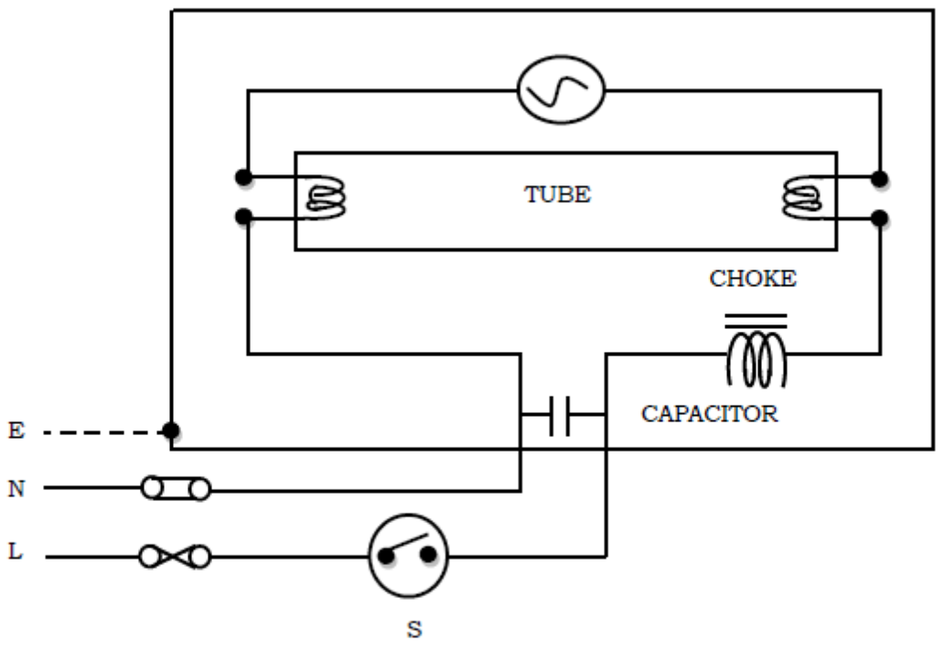
PROCEDURE:

1) Open MS word.
2) Create a new document.
3) Select the insert tab.
4) Go to shapes and select the appropriate symbols according to the diagram.
5) Complete the diagram .

HOUSE-WIRING DIAGRAMS AND LAYOUT



Socket Outlets –Ring Circuit Connection



6 Single fluorescent light point controlled by a one way switch

MJCET

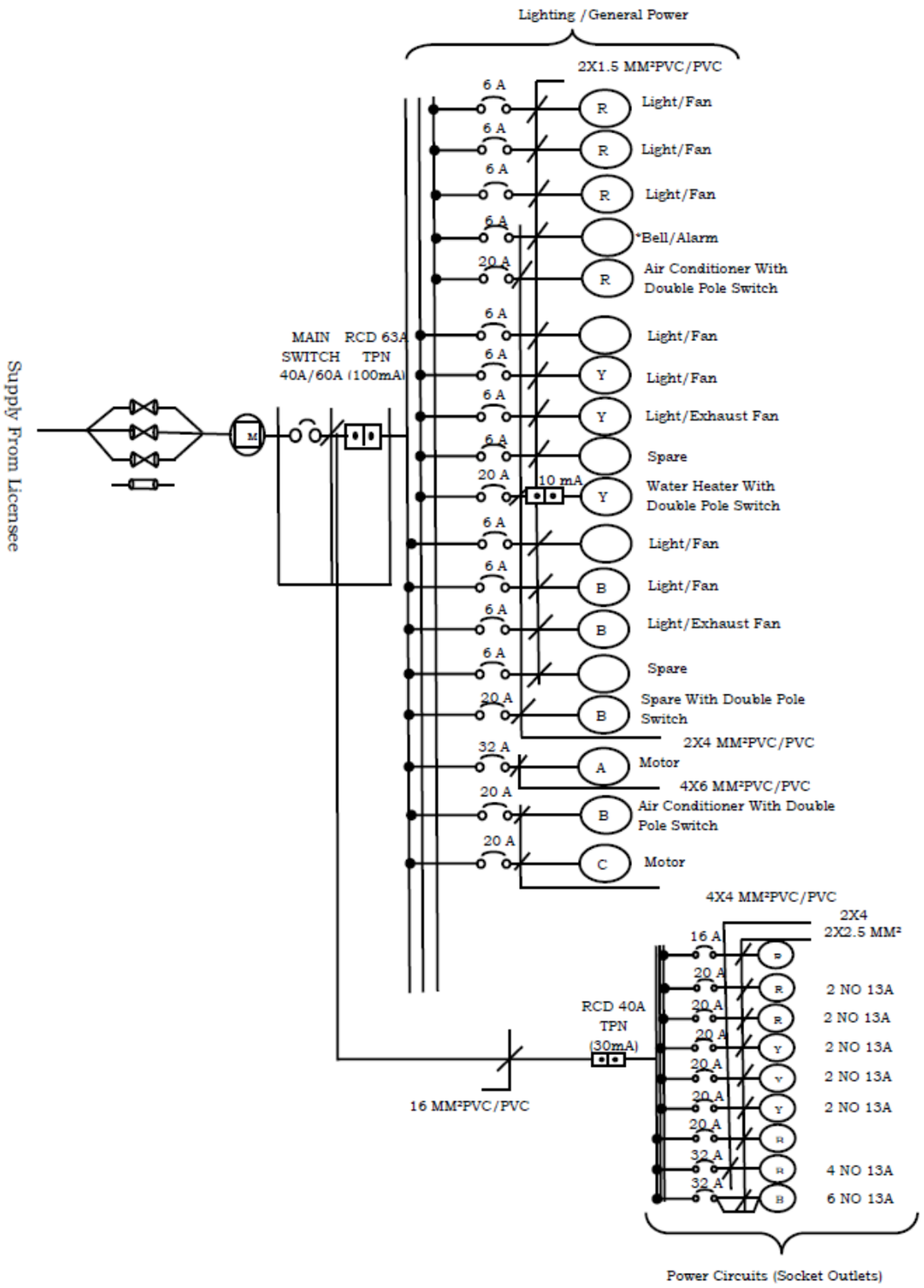


Figure 70: Three Phase Consumer Electrical Wiring

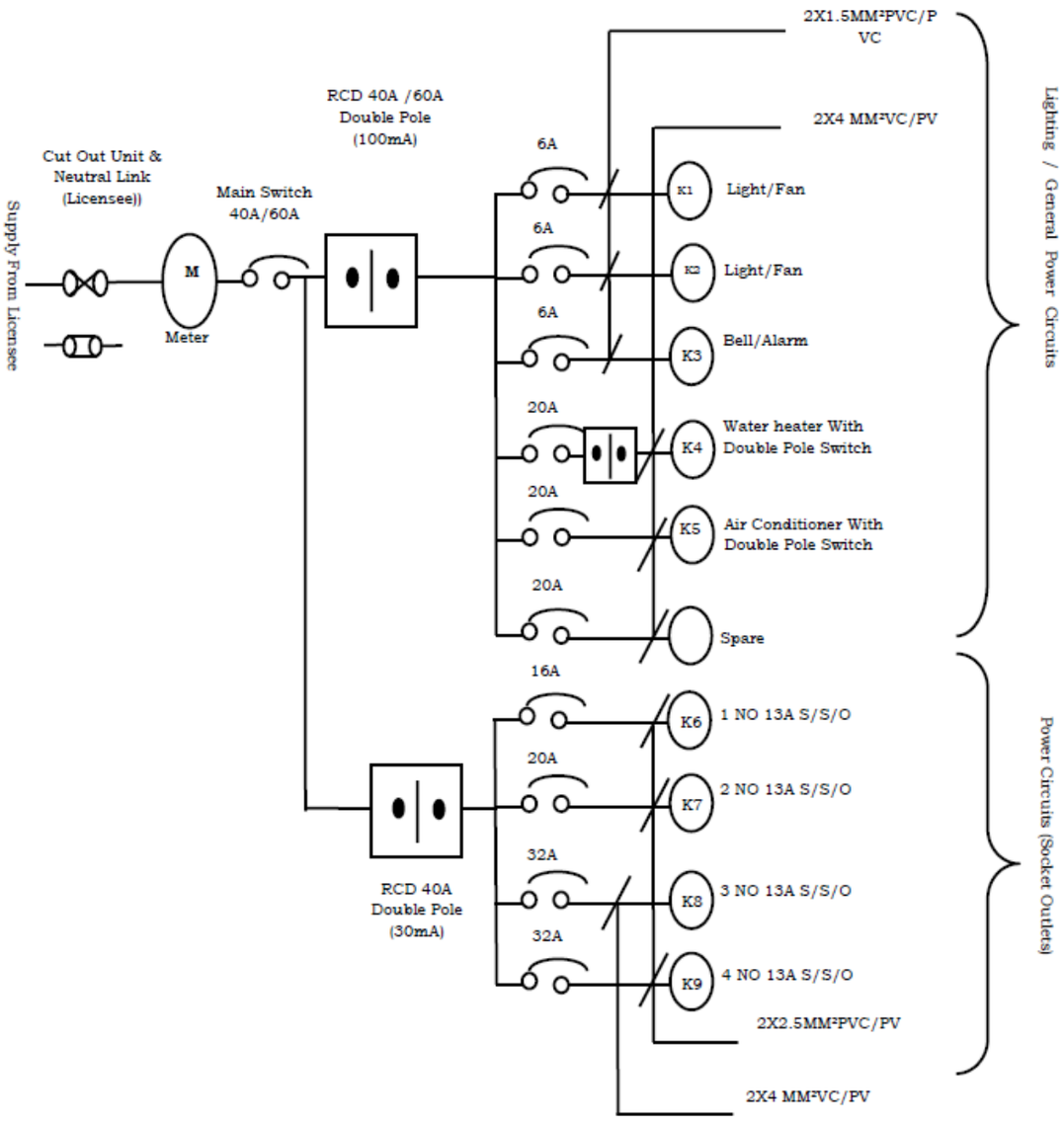
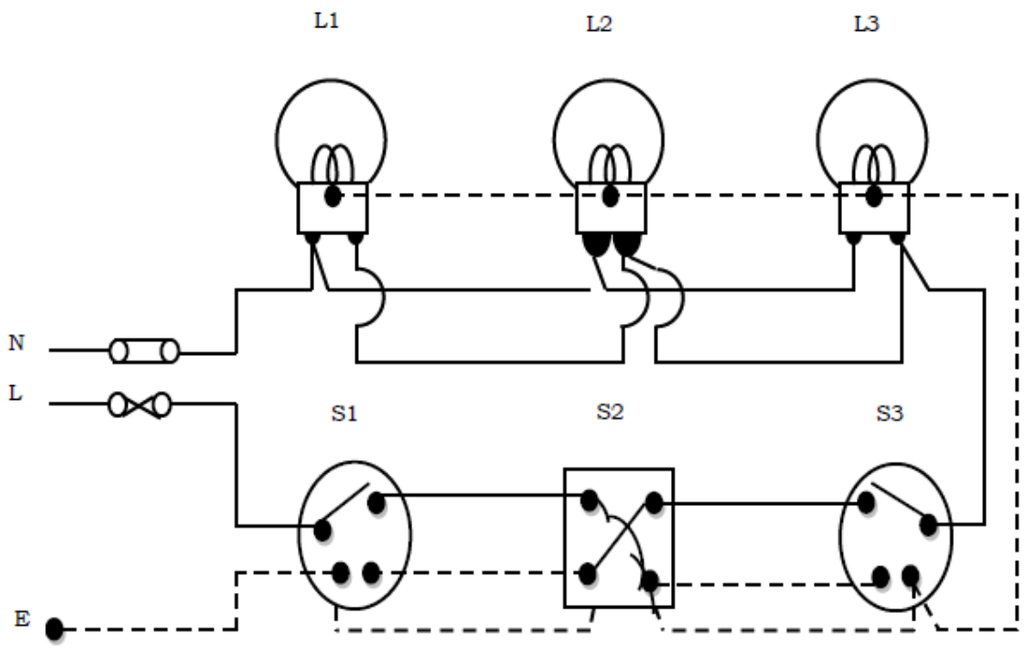


Figure 69: Single Phase Consumer Electrical Wiring



5 Three light points controlled by two way switch and intermediate switch

MJCET EE

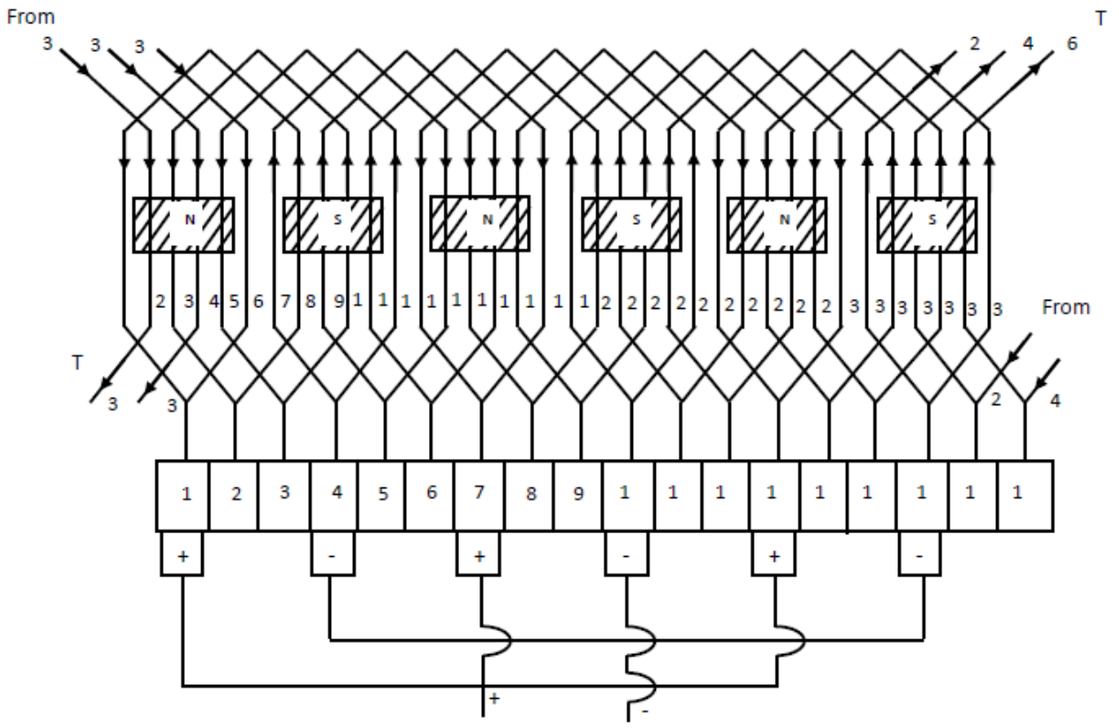
EXPERIMENT No. 4

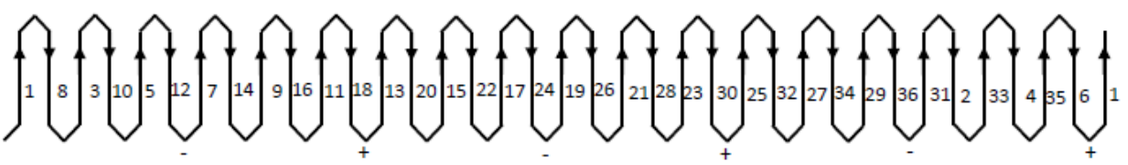
AIM: To draw the Electrical machine winding diagram

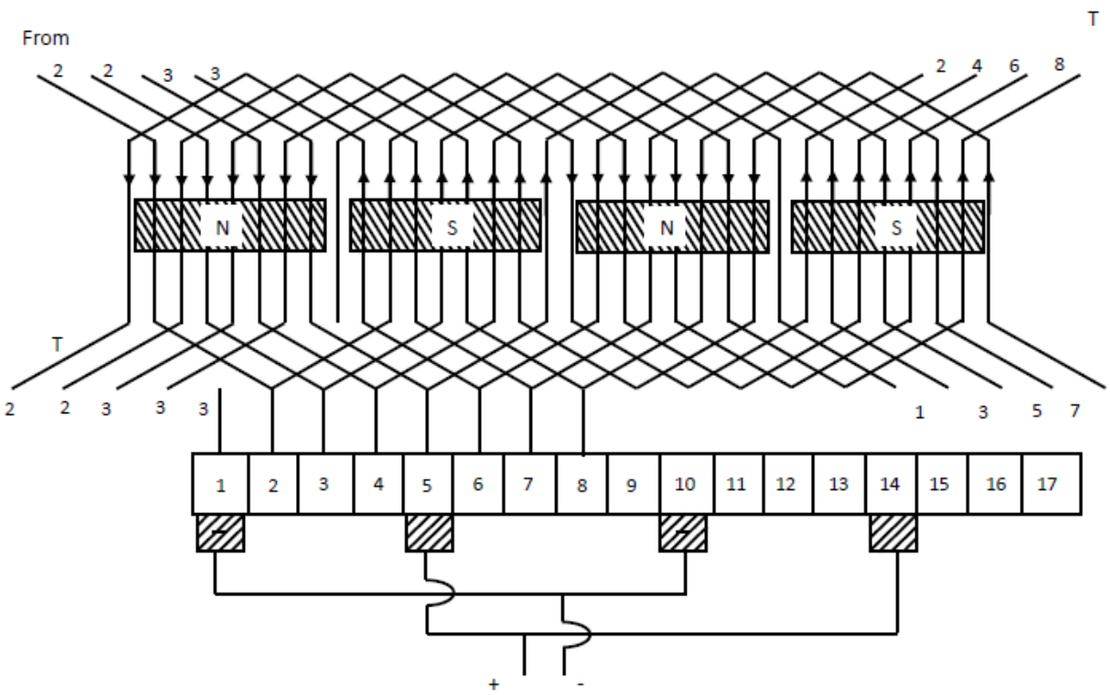
SOFTWARE USED: MS Word, AUTOCAD.

PROCEDURE:

1) Open MS word.
2) Create a new document.
3) Select the insert tab.
4) Go to shapes and select the appropriate symbols according to the diagram.
5) Complete the diagram .






From
T
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N
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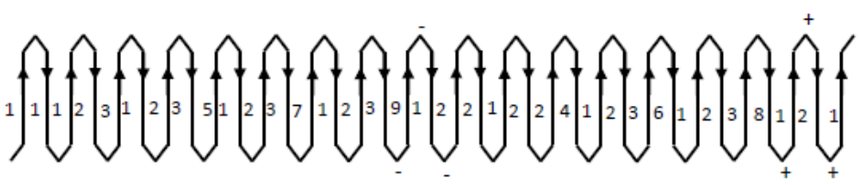
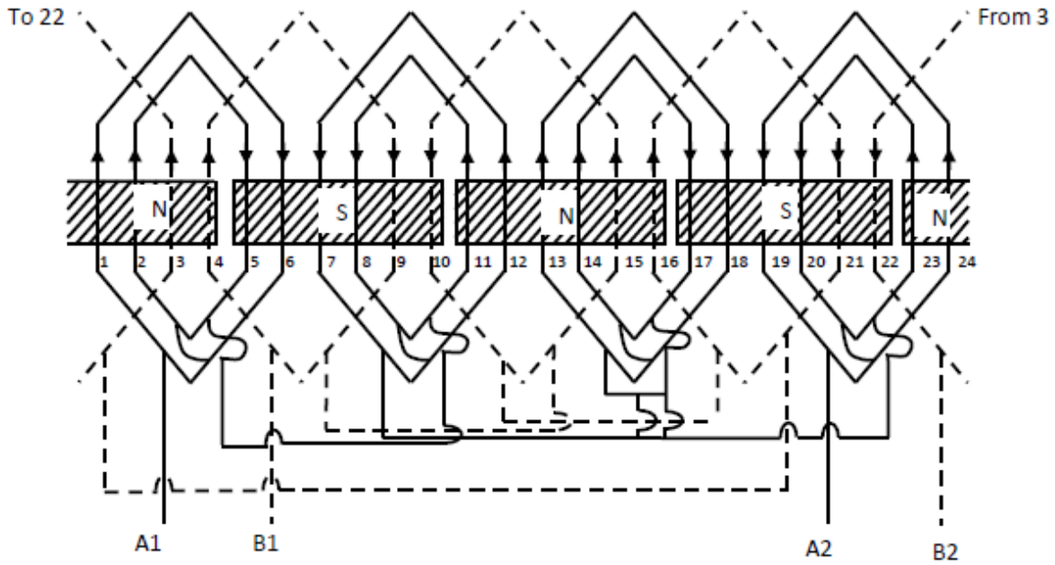
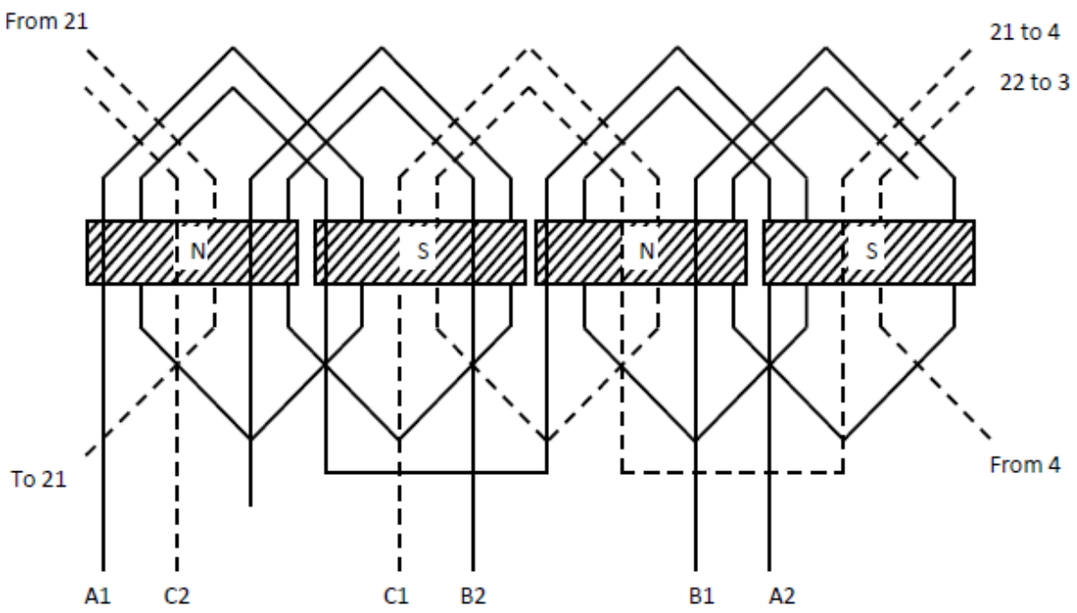
N
S
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
+
-


1 1 1 2 3 1 2 3 5 1 2 3 7 1 2 3 9 1 2 2 1 2 2 4 1 2 3 6 1 2 3 8 1 2 1


To 22
From 3
N
S
N
S
N
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
A1
B1
A2
B2


From 21
21 to 4
22 to 3
N
S
N
S
To 21
From 4
A1
C2
C1
B2
B1
A2

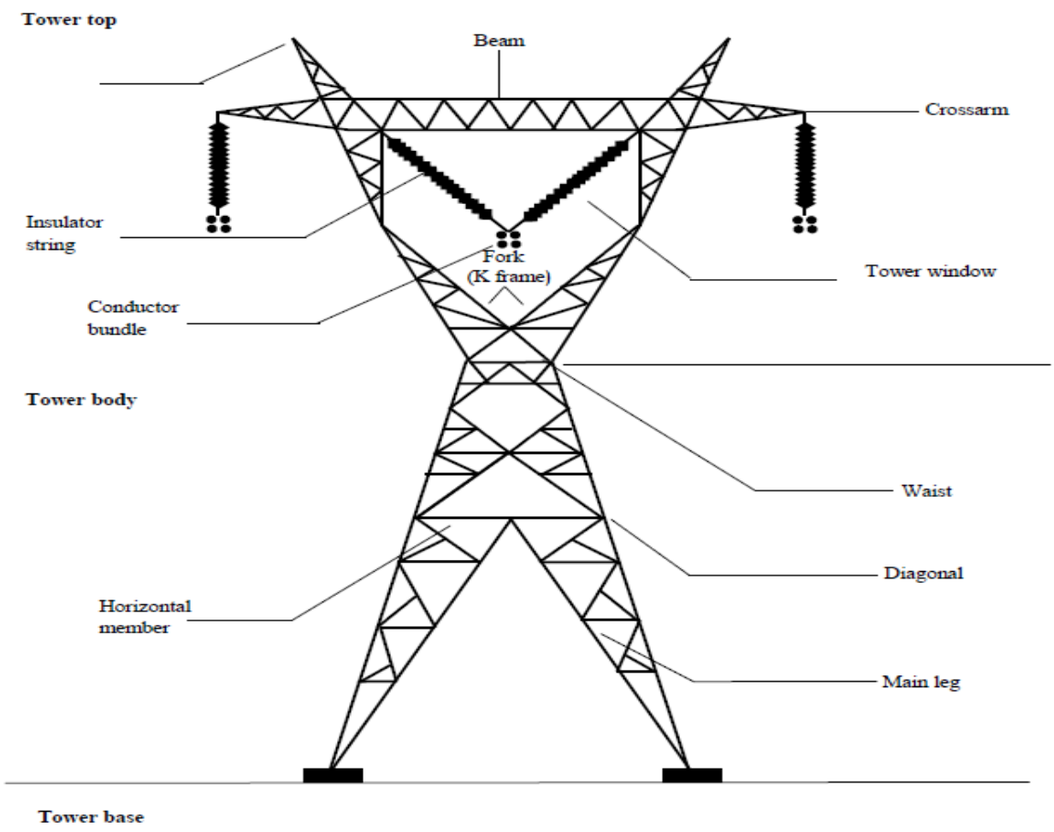
EXPERIMENT No. 5

AIM: To draw Transmission tower

SOFTWARE USED: MS Word, AUTOCAD.

PROCEDURE:

1) Open MS word.
2) Create a new document.
3) Select the insert tab.
4) Go to shapes and select the appropriate symbols according to the diagram.
5) Complete the diagram .



EXPERIMENT No. 6

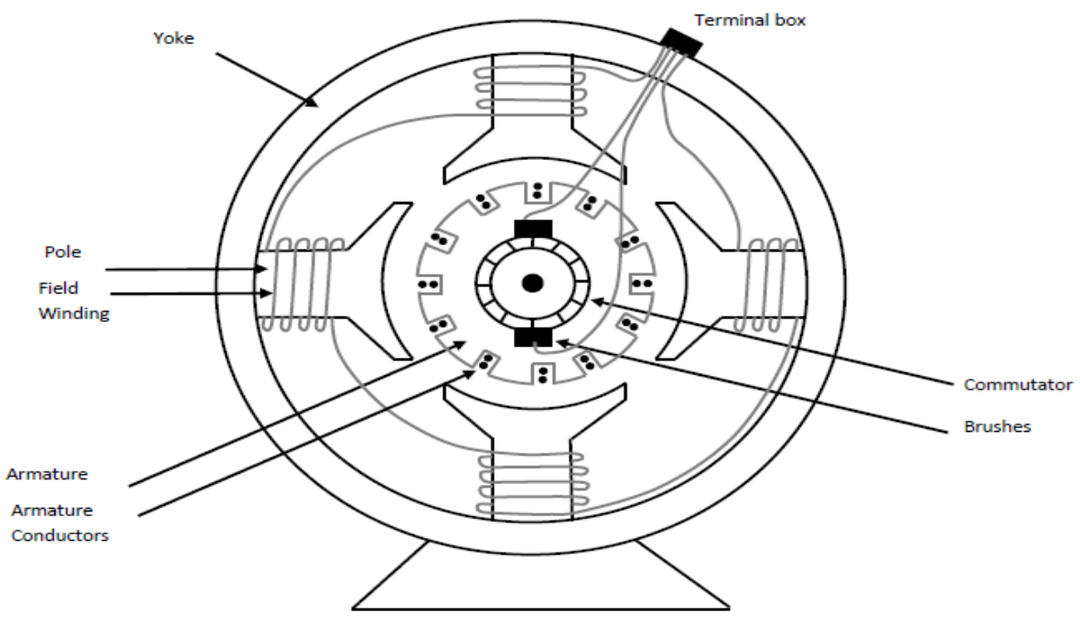
AIM: To draw construction feature of D.C motor

SOFTWARE USED: MS Word, AUTOCAD.

PROCEDURE:

1) Open MS word.
2) Create a new document.
3) Select the insert tab.
4) Go to shapes and select the appropriate symbols according to the diagram.
5) Complete the diagram .

Constructional Feature of D.C. Motor



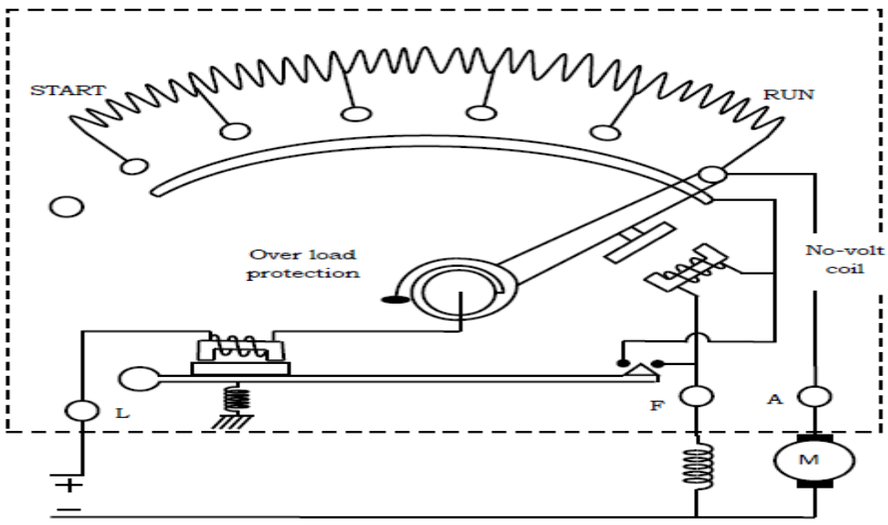
EXPERIMENT No. 7

AIM: To draw 3 point and 4 point D.C starters

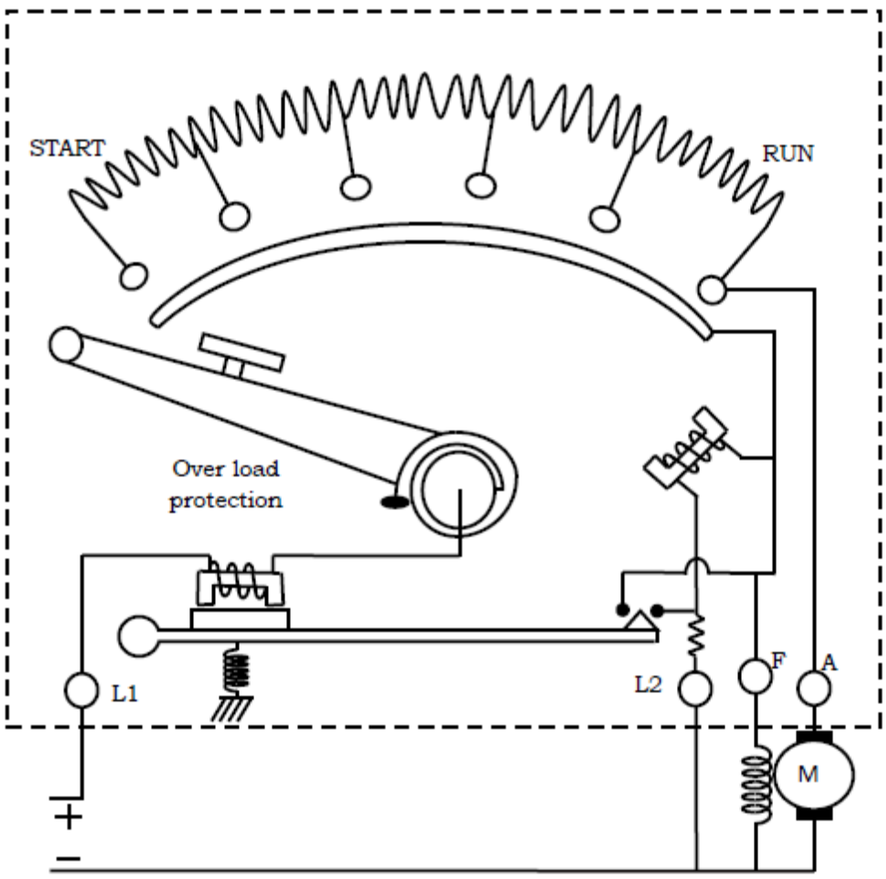
SOFTWARE USED: MS Word, AUTOCAD.

PROCEDURE:

1) Open MS word.
2) Create a new document.
3) Select the insert tab.
4) Go to shapes and select the appropriate symbols according to the diagram.
5) Complete the diagram .



4.1: Three-point Starter for a Shunt Motor



4.2: Four-point Starter for a Shunt Motor

MJCET-D

EXPERIMENT No. 8

AIM: To draw lamps used in illumination

SOFTWARE USED: MS Word, AUTOCAD.

PROCEDURE:

1) Open MS word.
2) Create a new document.
3) Select the insert tab.
4) Go to shapes and select the appropriate symbols according to the diagram.
5) Complete the diagram .

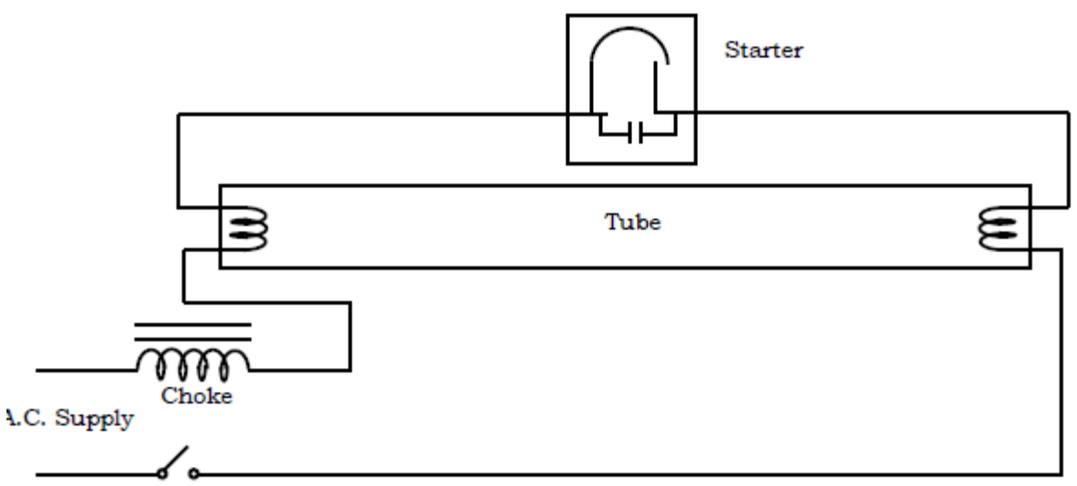


FIG. 68(i) Fluorescent Lamp A.C.

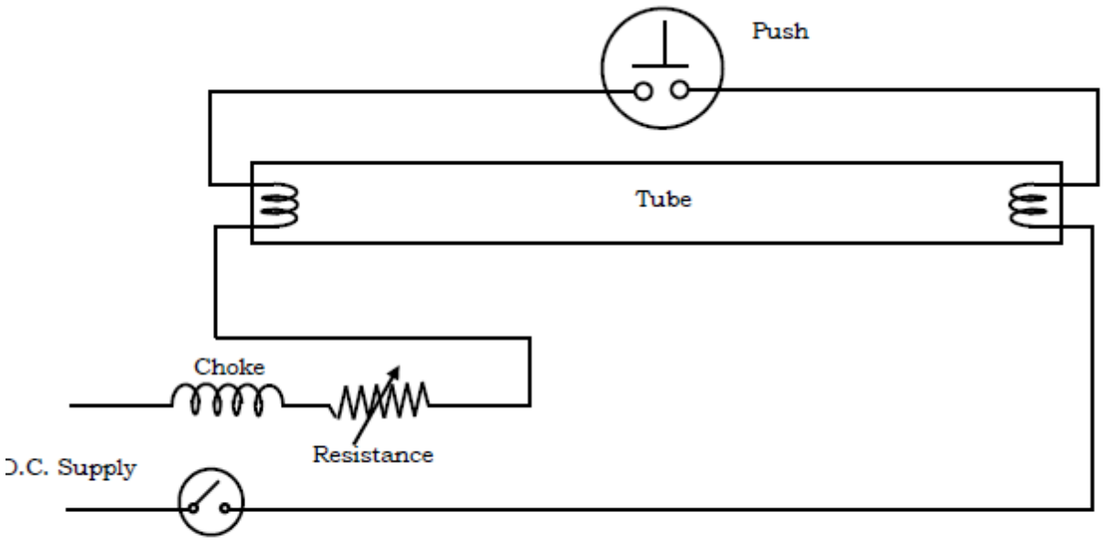


FIG. 68(ii) Fluorescent Lamp (a ii)

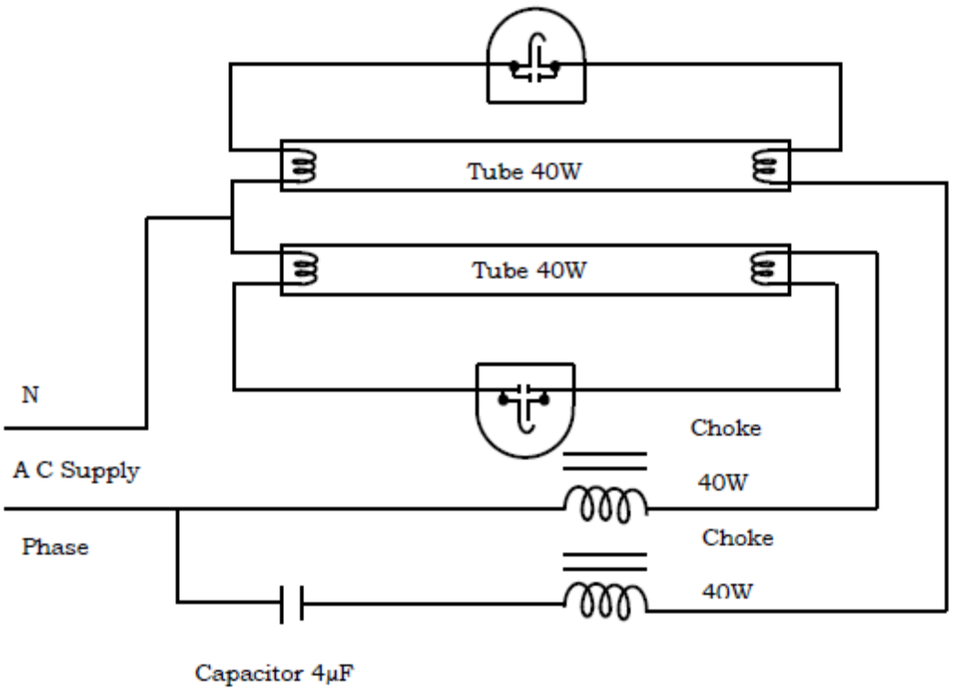


Fig 68(ii a)

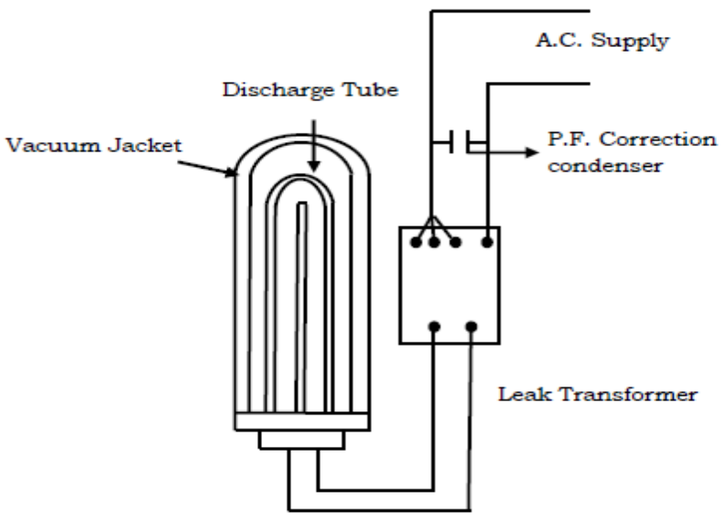


FIG. 68(iii) Sodium Vapour Lamp

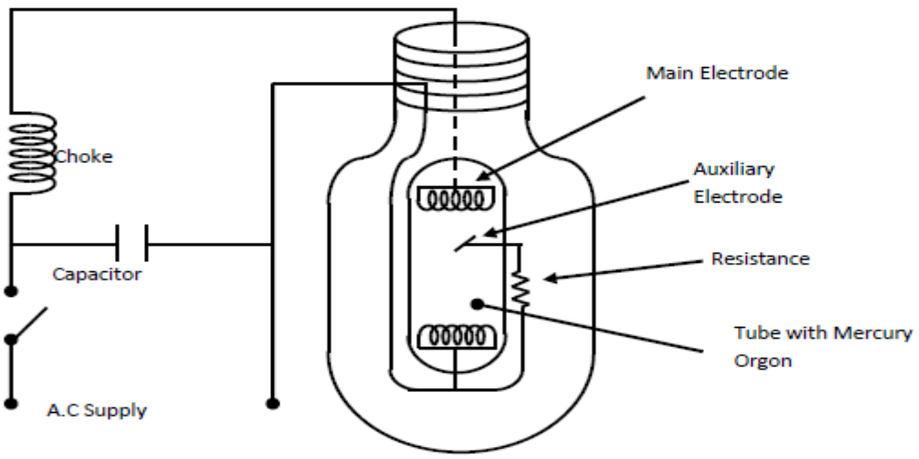


FIG. 68(iv) Mercury Vapour Lamp

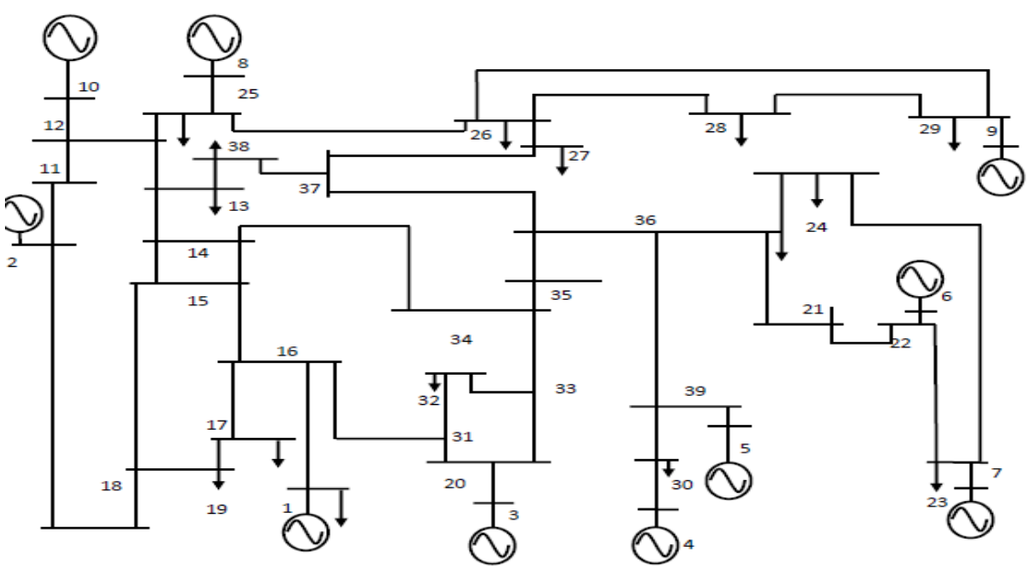
EXPERIMENT No. 9

AIM: To draw single line diagram of power system

SOFTWARE USED: MS Word, AUTOCAD.

PROCEDURE:

1) Open MS word.
2) Create a new document.
3) Select the insert tab.
4) Go to shapes and select the appropriate symbols according to the diagram.
5) Complete the diagram .



IEEE 39 BUS NEW ENGLAND POWER SYSTEM

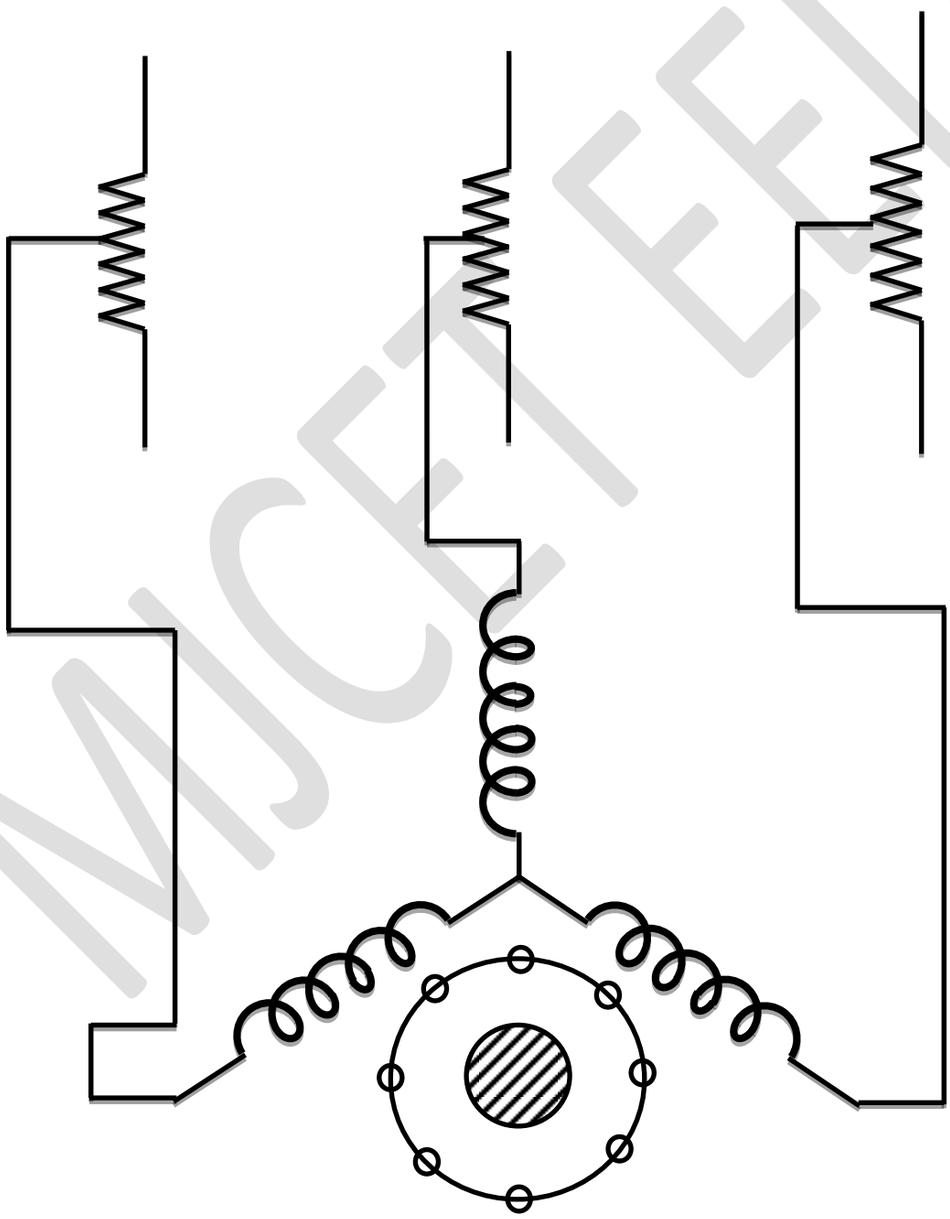
EXPERIMENT No. 10

AIM: To draw Simple power and control circuit diagrams

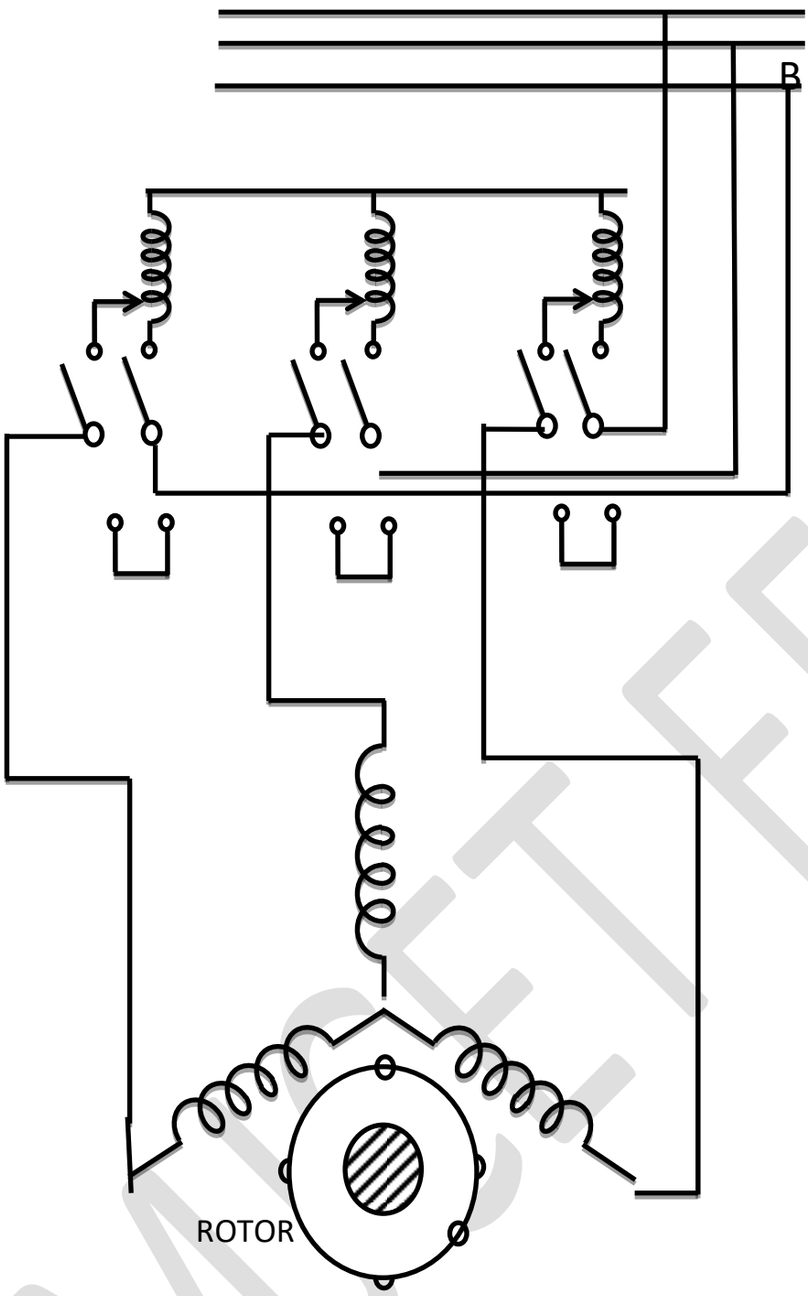
SOFTWARE USED: MS Word, AUTOCAD.

PROCEDURE:

1) Open MS word.
2) Create a new document.
3) Select the insert tab.
4) Go to shapes and select the appropriate symbols according to the diagram.
5) Complete the diagram .



MJCET ED



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