BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Electrical Skills
Session: 2019-20 (Summer Semester)
B. Voc. Program, 1st Semester,
End – Sem. Examination

Course Code: ELE 1101 **Time: 2 Hours**
Course Name: Construction Electrician **Max. Marks: 50**

Instruction: Answer all questions from section A, each question carries one mark. Answer all questions from section B, each question carries four marks. Answer all questions from section C, each question carries six marks. Scientific calculator is allowed.

Section – A

10X01 = 10 Marks

1. What is the unit of electrical energy?
   (a) Watt-hours (b) Watts (c) Watts/hours (d) None of these
2. Which tool is used to cut PVC pipes faster?
   (a) Pipe wrench (b) Pipe cutter (c) Combination plier (d) None of these
3. Which measuring instrument is used to measure very high resistance.
   (a) Multi-meter (b) Mega ohmmeter (c) Megger (d) Both b and c
4. Which one is the symbol of combined 6A switch and socket?
   (a)  (b)  (c)  (d) 
5. Two-way switch is also called as?
   (a) SPST (b) DPDT (c) SPDT (d) DPST
6. Which electrical entity remains constant in electrical circuit?
   (a) Current (b) Voltage (c) Resistance (d) None of these
7. Drill bits are made of which material?
   (a) High speed steel (b) Cast Iron (c) Carbon steel (d) None of these
8. Waterproof lighting should be used where according to NEC?
   (a) Indoor (b) Outdoor (c) Both a and b (d) None of these
9. Which electrical device compares current in both phase and neutral wires?
   (a) MCB (b) ELCB (c) RCD (d) None of these
10. Resistivity is inversely proportional to which parameter.
    (a) Cross-sectional area (b) Length (c) Resistance (d) None of these

Section – B

04X04 = 16 Marks

1. Describe SPST and DPST switch with symbol.
2. Explain fuse and its working.
3. Explain soldering with its procedure.
4. Explain need of PPE and common types of PPE.

Section – C

04X06 = 24 Marks

1. Describe MCB and RCD used in house wiring.
2. Suppose, a consumer consumes 3500 watts' load per hour daily for one month. Calculate total energy bill of the consumer if per unit rate is 10 Rs. [Take 1 month = 30 Days].
3. Explain earthing and its types.
4. Explain house wiring and its types.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Electrical Skills
Session: 2019-20 (Summer Semester)
B. Voc. Program, First Semester,
End-Sem. Examination

Course Code: ELE1101 **Time: 2 Hour**
Course Name: Construction Electrician **Max. Marks: 50**

Answer Key

Section – A

10X01 = 10 Marks

A1. (a) Watt-hours
A2. (b) Pipe cutter
A3. (d) Both B and C
A4. (b)

A5. (c) SPDT
A6. (c) Resistance
A7. (a) High speed steel
A8. (b) Outdoor
A9. (c) RCD
A10. (b) Length

Section – B

04X04 = 16 Marks

Ans. 1.
Switches:
Single Pole Single Throw Switch (SPST):
This is the basic ON and OFF switch consisting of one input contact and one output contact.

- It switches a single circuit and it can either make (ON) or break (OFF) the load.
- The contacts of SPST can be either normally open or normally closed configurations.

Double Pole Single Throw Switch (DPST):
This switch consists of four terminals, two input contacts and two output contacts.

- It behaves like a two separate SPST configurations, operating at the same time.
- It has only one ON position, but it can actuate the two contacts simultaneously, such that each input contact will be connected to its corresponding output contact.
- In OFF position both switches are at open state.
- This type of switches is used for controlling two different circuits at a time.

Ans. 2.
Fuse: A fuse is a type of low resistance resistor that acts as a sacrificial device to provide over current protection, of either the load or short circuit.
Working Principle:

- The power consumed in an electrical circuit is reflected as the heat generated.
- The **fuse** wire is made of zinc, copper, silver, aluminium, or alloys. In general, it is an alloy of tin(Sn) and lead (Pb) having **composition** 63% Sn and 37% Pb.
- Resistance of the wire is constant. If current in the circuit exceeds more than the rated current, then the heat generated also exceeds and which causes the meltdown of fuse wire.
- Fuse is connected in series in a circuit.

Ans. 3.

Soldering: Soldering is a process in which two or more metal items are joined together by melting and flowing a filler metal into the joint, the filler metal having a relatively low melting point.

Procedure:

1. Place the component into the board.
2. Bend the legs of component.
3. Make sure the soldering iron has warmed up. There should be a soldering iron cleaner.
4. Pick up the Soldering Iron in one hand, and the solder in the other hand.
5. Feed a small amount of solder into the joint. The solder should melt on the pad and flow around the component leg.
6. Remove the solder, then remove the soldering iron.
7. Leave the joint to cool for a few seconds, then using a cutters trim the excess component lead.

Ans. 4.

Need of PPE:

- Making the workplace safe includes providing instructions, procedures, training and supervision to encourage people to work safely and responsibly.
- Even where engineering controls and safe systems of work have been applied, some hazards might remain. These include injuries to:
- the lungs, e.g. from breathing in contaminated air
- the head and feet, e.g. from falling materials
- the eyes, e.g. from flying particles or splashes of corrosive liquids
- the skin, e.g. from contact with corrosive materials
- the body, e.g. from extremes of heat or cold

PPE is needed in these cases to reduce the risk

Common Types of PPE:

1. Eye PPE: Needed when an employee work presents the potential of causing eye injury from physical, chemical, or radiation agents.

2. Face PPE: Needed when work presents the potential of causing facial injury from physical, chemical, or radiation agents.

3. Hand PPE: Needed when work presents the potential of causing hand injury from physical, chemical, or radiation agents.

4. Feet PPE: Needed when work presents the potential of causing feet injury from physical, chemical, or radiation agents.

5. Hearing PPE:

- Needed when the average (over an 8-hour period) noise level of an area reaches 90 decibels.
- Hearing protection must be made available to employees when the average (over an 8-hour period) noise level reaches 85 decibels.

6. Respiratory PPE: Needed when work presents an inhalation hazard.

Section – C

04X06 = 24 Marks

Ans. 1.

MCB: A MCB is a manually or automatically operated electrical switch designed to protect an electrical circuit from damage caused by overload or short circuit.

Working:

- An MCB functions by interrupting the continuity of electrical flow through the circuit once a fault is detected.
- There are two contacts one is fixed and the other moveable. When the current exceeds the predefined limit a solenoid forces the moveable contact to open (i.e., disconnect from the fixed contact) and the MCB turns off thereby stopping the current to flow in the circuit.

- In order to restart the flow of current the MCB is manually turned on. This mechanism is used to protect from the faults arising due to over current or over load.

RCD:

- Phase (line) and Neutral both wires connected through RCD.
- It trips the circuit when there is earth fault current.
- The amount of current flows through the phase (line) should return through neutral.
- It detects by RCD. any mismatch between two currents flowing through phase and neutral detect by -RCD and trip the circuit within 30 mili-second (or 0.03 amps).
- If a house has an earth system connected to an earth rod and not the main incoming cable, then it must have all circuits protected by an RCD (because you not be able to get enough fault current to trip a MCB)
- RCDs are an extremely effective form of shock protection.

Ans. 2.
Solution:

1unit = 1kWh.
So Total kWh = 3500 Watts x 24 Hrs x 30 Days
= 2520000 watts-hour.
we have to convert it into Units,
Where is 1unit = 1kWh.
So total Consumed units. 2520000/1000..... (k=kilo=1000).
Total Units = 2520.
Cost of per unit is 10 Rs.
So total Cost or Electricity bill= 2520 x 10 = 25200.Rs.

Ans. 3.
Earthing:

- The process of connecting metallic bodies of all the Electrical apparatus and equipment to earth by a wire having negligible resistance is called Earthing.
- The resistance of earthing is always less than 2 ohms.
- Earth resistance depends upon the moisture content in the soil.

Plate Earthing: A plate is fixed in the pit. The plate is connected via Copper conductor, or GI Conductor or concealed copper cable to the respective electrical set-up. A funnel is attached to add water at regular intervals.

Plate Earthing: A plate is fixed in the pit. The **plate** is connected via Copper conductor, or GI Conductor or concealed copper cable to the respective electrical set-up. A funnel is attached to add water at regular intervals.

Pipe Earthing:

- A galvanized steel and a perforated pipe of approved length and diameter is placed vertically in a wet soil in this kind of system of earthing. It is the most common system of earthing.
- The size of pipe to use depends on the magnitude of current and the type of soil.

Rod Earthing: It is the same method as pipe earthing. A copper rod of 12.5mm (1/2 inch) diameter or 16mm (0.6in) diameter of galvanized steel or hollow section 25mm (1inch) of GI pipe of length above 2.5m (8.2 ft.) are buried upright in the earth manually or with the help of a pneumatic hammer. The length of embedded electrodes in the soil reduces earth resistance to a desired value.

Strip Earthing:

- If at all round conductors are used, their cross-section area should not be too small, say less than 6.0mm^2 if it's a galvanized iron or steel.
- The length of the conductor buried in the ground would give a sufficient earth resistance and this length should not be less than 15m.

Ans. 4.

House wiring: House wiring consists of an electrical wiring system that distributes energy to be used in equipment and appliances around the house. It also involves the proper installation and operation of the electrical outlets, switches, breakers, meter base and different electrical circuits.

1. Cleat Wiring: This wiring comprises of PVC insulated wires or ordinary VIR that are braided and compounded. They are held on walls and ceilings using porcelain cleats with grooves, wood or plastic. It is a temporary wiring system, therefore making it unsuitable for domestic premises. Moreover, cleat wiring system is rarely being used these days.

2. Casing and Capping Wiring: It was quite popular in the past but it is considered obsolete these days due to the popularity of the conduit and sheathed wiring system. The cables used in this electric wiring were PVC, VIR or any other approved insulated cables. The cables were carried through the wooden casing enclosures, where the casing was made of a strip of wood with parallel grooves cut lengthwise for accommodating the cables.

3. Batten Wiring: This is when a single electrical wire or a group of wires are laid over a wooden batten. The wires are held to the batten using a brass clip and spaced at an interval of 10 cm for horizontal runs and 15 cm for vertical runs.

4. Conduit Wiring: There are two types of conduit wiring according to pipe installation:

- Surface Conduit Wiring When GI or PVC conduits are installed on walls or roof; it is known as surface conduit wiring. The conduits are attached to the walls with a 2-hole strap and base clip at regular distances. Electrical wires are laid inside the conduits.
- Concealed Conduit Wiring When the conduits are hidden inside the wall slots or chiseled brick wall, it is called concealed conduit wiring. Electrical wires are laid inside the conduits. This is popular since it is stronger and more aesthetically appealing.

Registration No.: ..... (B)

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Electrical Skills
Session: 2019-20 (Summer Semester)
B. Voc. Program, 1st Semester,
End – Sem. Examination

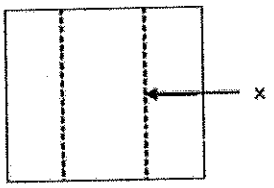
Course Code: ELE 1102 **Time: 2 Hours**
Course Name: Electrical Drawing **Max. Marks: 50**

Instruction: Answer all questions from section A, each question carries one mark. Answer all questions from section B, each question carries four marks. Answer all questions from section C, each question carries six marks. Scientific calculator is allowed.

Section – A

10X01 = 10 Marks

1. For what voltage is the H type of poles used?
   (a) 22 kV (b) 130 kV (c) 11 kV (d) All of these
2. _____ should be provided as the working space around the main switchboard according to IE rule 51.
   (a) 0.914 m (b) 0.523 m (c) 0.638 m (d) 0.814 m
3. To insure that everyone understands what the electrical symbols represent it is customary to include a _____ on the electrical sheet.
   (a) List (b) Part number (c) Electrical legend (d) Electrical layer
4. The untrimmed size for _____ sheet is 240 mm x 330 mm.
   (a) A1 (b) A3 (c) A4 (d) A5
5. What is the maximum number of lighting points that can be connected in a circuit?
   (a) 5 (b) 10 (c) 8 (d) 12
6. From the below figure, what is the name of the line X?



   (a) Outline
   (b) Section line
   (c) Hidden line
   (d) Hatching
7. What is the diameter of the GI pipe through which the earth wire needs to be taken out?
   (a) 13 mm diameter (b) 15 mm diameter
   (c) 19 mm diameter (d) 6 mm diameter
8. What is the type of scale in which the representative fraction is 1:1?
   (a) Enlarged scale (b) Reduced scale (c) Full size scale (d) Graphical scale
9. Which among these is a type of internal wiring?
   (a) Cleat wiring (b) Conduit wiring (c) CTS wiring (d) All of these
10. Dashed thick (wide) line is represented by _____
    (a) ——— (b) —·—·—·—·—·—
    (c) — — — — — (d) — — — — —

B

Registration No.: .....

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Section – B

04X04 = 16 Marks

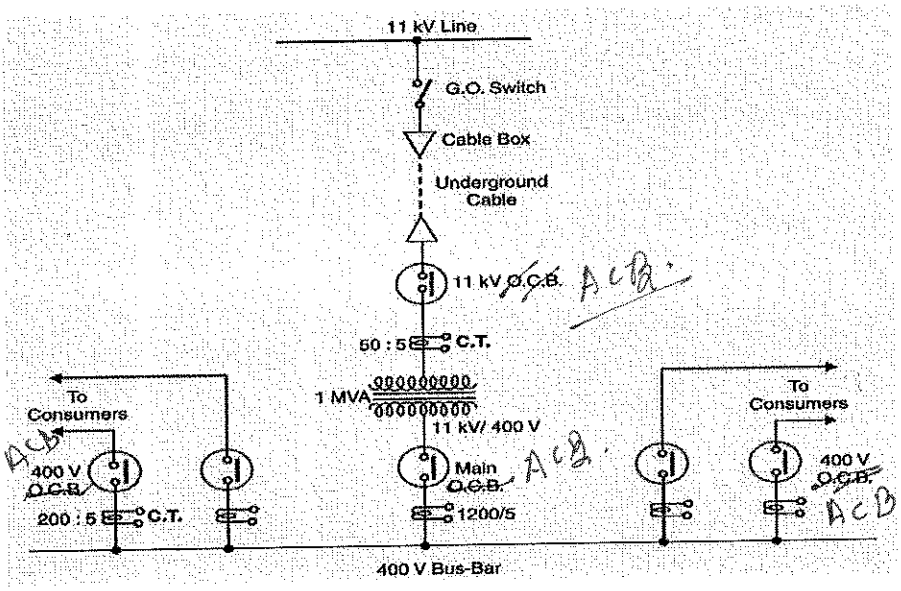
1. What are the necessary conditions for domestic installation?
2. Explain the following terms-

   (i) Earth (ii) Earth Electrode (iii) Grounding grid (iv) Ground current
3. What is step potential and touch potential?
4. Write classification of distribution substation on the basis of voltage.

Section – C

04X06 = 24 Marks

1. Draw symbols of different resistors, power sources, circuit breakers, switches, photodiode and LED.
2. Explain the single line diagram of a substation.



3. What is blueprint? Write types of blueprint and explain any one type in detail.
4. What is the necessity of earthing? Write its different types and sketch out details of any one type of earthing.

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School of Electrical Skills
Session: 2019-20 (Summer Semester)
B. Voc. Program, I Semester,
End-Sem. Examination

Course Code: ELE 1102 **Time: 2 Hours**
Course Name: Electrical Drawing **Max. Marks: 50**

Answers

Section – A

1. b. 130 kV
2. (a) 0.914 m
3. (c) Electrical legend
4. (c) A4
5. b. 10
6. c) Hidden line
7. a. 13 mm
8. c) Full size scale
9. d. All of these
10. c)

Section – B

Ans-1

- Height of switch board must be 1.3m to 1.75m from floor level
- Height of distribution board must be 1.5m to 1.75m from floor level
- The bottom of ceiling fan should have minimum clearance of 2.75m
- All lamp should be fitted with a minimum clearance of 2.75m above floor level
- For load above **4kw,3 phase supply must arrange**
- load should be equally shared.
- In any building light wiring and power wiring should be kept separate
- Power per circuit may take it as 800w or 1000w,(10points)

Ans-2 (a) Earth- The proper connection between electrical installation systems via conductor to the buried plate in the earth is known as Earth.

(b) Earth Electrode- When a conductor (or conductive plate) buried in the earth for electrical earthing system. It is known to be Earth Electrode. Earth electrodes are in different shapes like, conductive plate, conductive rod, metal water pipe or any other conductor with low resistance.

(c) Grounding grid- A meshed system of buried conductors used to provide contact with the underlying earth

(d) Ground current- A current flowing into or out of the earth or its equivalent serving as a ground.

Ans-3

Step Potential: Voltage between the feet of a person

When current is flowing from the tower to the earth ground, the ground potential rises at the tower and a voltage gradient will occur based on the resistivity of the soil, resulting in a potential difference between two points on the ground. This is called a Step Potential as it can cause voltage between a person's feet.

Touch Potential: Voltage between energized object and feet of a person

If the ground connection between the tower and the soil is high resistance (common with some soil conditions), the tower itself (and any conductive item touching the tower) can be energized. Touch potential is the voltage between the energized object and the feet of a person in contact with the object.

Ans-4

Distribution substation may be subdivided into the following types:

(i) H-pole mounted: Transformers of low rating say 25, 40, 63, 100 and 200 kVA are mounted on rolled steel fixtures which are rigidly fastened to the two poles.

(ii) Platform mounted: A platform is constructed on a four-pole structure for placing the transformer on it. Platform mounting is done for transformers of capacity 250, 300 and 400 kVA.

(iii) Plinth or foundation mounted: Transformers above 500 kVA are placed on a plinth or foundation with a wall or fence surrounding it.

Section – C

Ans-1

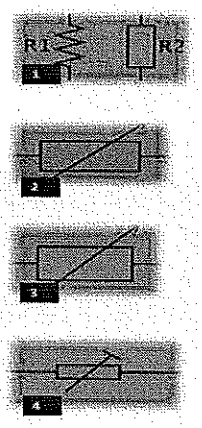
Resistors-

❖**Fixed Resistor:** This type of resistor resists the flow of current.

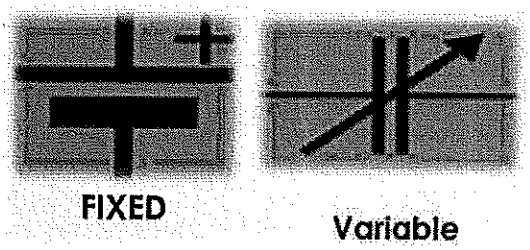
❖**Variable Resistor:** This type of resistor is used to control the current known as rheostat.

❖**Variable Resistor Potentiometer:** This type of resistor consist of 3 contacts. It is used to control the voltage.

❖**Variable resistor Preset:** Preset resistors are used in circuits when it is necessary to alter the resistance.



power sources-



circuit breakers

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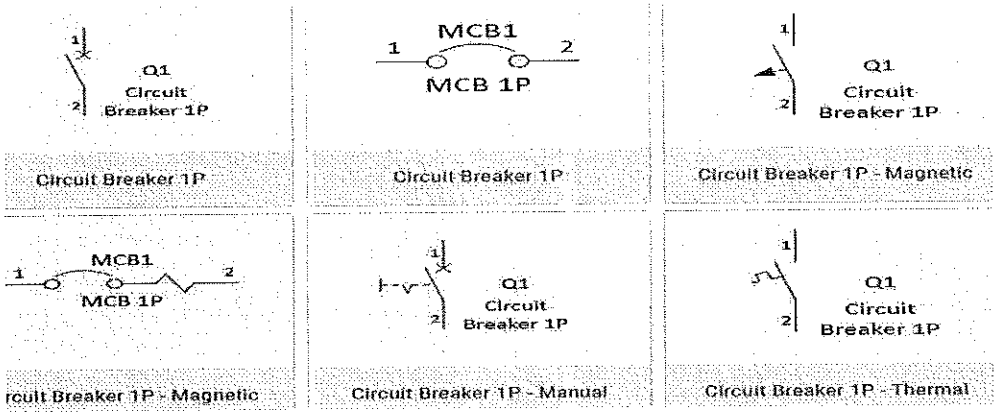
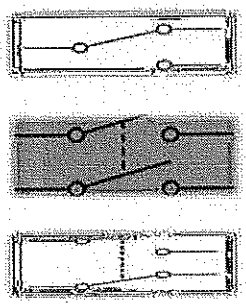


switches

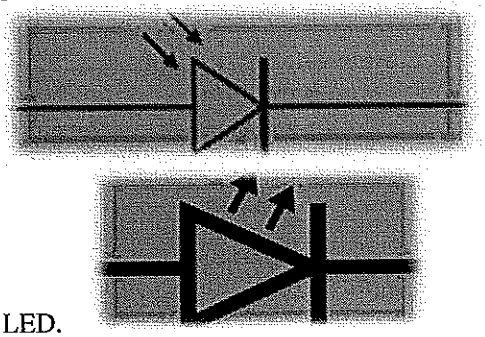
4. **SPDT:** Single Pole, Double Throw: They are described as on off on switch.

DPST: Double Pole, single Throw: A dual on off switch often used to switch main electricity.

6. **DPDT:** Double Pole, Double Throw: They are used in motors.



photodiode



LED.

Ans-2 The 3-phase, 3-wire 11 kV line is tapped and brought to the gang operating switch installed near the substation. The gang operated switch (G.O. switch) consists of isolators connected in each phase of the 3-phase line.

From the G.O. switch, the 11 kV line is brought to the indoor substation as underground cable. It is fed to the HV side of the transformer (11 kV/400 V) via the 11 kV C.B. The transformer steps down the voltage to 400 V, 3-phase, 4-wire.

The secondary of transformer supplies to the busbars via the main circuit breaker. From the busbars, 400 V, 3-phase, 4-wire supply is given to the various consumers via 400 V C.B. The voltage between any two phases is 400 V and between any phase and neutral it is 230 V. The single phase residential load is connected between any one phase and neutral whereas 3-phase, 400 V motor load is connected across 3-phase lines directly.

Ans-3 A *blueprint* is a photographic print of a prepared drawing with the lines and lettering in white on a bright blue background; it's used for mechanical, electrical, and architectural drawings

Types of blueprint-

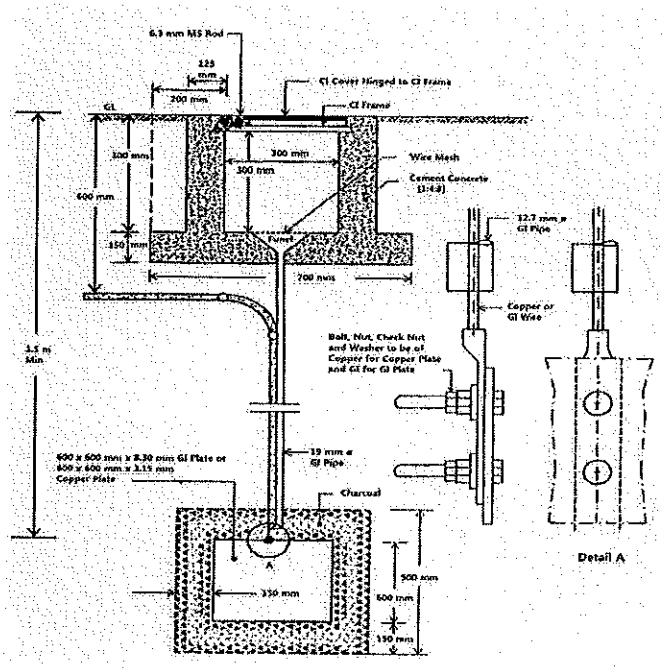
1. Electrical Construction Drawings
2. Schematic or Wiring Diagrams
- One-line diagram
- Three-line diagram
- Ladder diagram
3. Panel and Switchgear Drawings
4. Bill of Material
5. Schedules
- Panels
- Light fixture
- Motor
- Conduit and cable
6. Lighting and Power Plans
- Lighting
- Power
- Ancillary system

Electrical Construction Drawings- It show the physical arrangement of specific electric apparatus or their parts, including shape and dimensions. The wiring necessary for connection to the power source is generally shown. These drawings give all the plans, elevations, sections, and details necessary to erect a structure. They indicate how the structure will look when it's erected. In other words, these drawings give the complete physical information for installing or erecting the equipment.

Ans-4

Effective earthing safeguards people from risk of electric shock. Hazardous-live-parts shall not be accessible and accessible conductive parts shall not be hazardous live. Ensures a low impedance route to the general mass of earth for currents in the electrical system, under both normal and fault conditions. The various methods employed in earthing (in house wiring or factory and other connected electrical equipment and machines) are (a) plate earthing, (b) pipe earthing and (c) rod earthing.

Plate Earthing-



Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Electrical Skills
Session: 2019-20 (Summer Semester)
B. Voc. Program, 1st Semester,
End – Semester Examination

Course Code: ELE 1103 **Time: 2 Hours**
Course Name: Basic Electrical Engineering **Max. Marks: 50**

Instruction: Answer all questions from section A, each question carries one mark. Answer all questions from section B, each question carries four marks. Answer all questions from section C, each question carries six marks. Scientific calculator is allowed.

Section – A

10X01 = 10 Marks

1. Which of the following quantities consists of SI units as watt?
   (a) Force (b) Charge (c) Power (d) Current

2. How many neutrons are there in a nucleus of an atomic number 11 and mass number 23?
   (a) 34 (b) 12 (c) 23 (d) 11

3. Which of the following are the passive elements of energy?
   (a) Voltage and Current (b) Inductor and Voltage
   (c) Capacitor and Current (d) Resistance, Inductor and capacitor

4. Joule is the unit of:
   (a) Energy (b) Work (c) Speed (d) Force

5. Which of the following is not responsible for the flow of current in a conductor?
   (a) Neutrons (b) Electrons (c) Both a and b (d) None of these

6. Which relation defines Ohm's law from the following provided load is constant?
   (a) Current is α voltage (b) Voltage α Current
   (c) Both a and b (d) None of these

7. Screw rule is applied to determine:
   (a) Magnetic field direction (b) Current direction
   (c) Force direction (d) None of these

8. Lenz's Law which gives us the direction of:
   (a) Induced emf (b) Flux (c) Field (d) None of these

9. If, permeability of magnetic material is infinity then its reluctance will be:
   (a) Zero (b) Very high (c) Infinity (d) None of these

10. A wattmeter is used to measure:
    (a) Electrical Power (b) Voltage (c) Energy (d) Current

B

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Section – B

04X04 = 16 Marks

1. Write the names of different types of induction motors and their applications.
2. Why is the core of transformer is laminated?
3. In an a.c. circuit there is no power consumption in a pure inductor. Why?
4. What is the maximum value of power factor and when does it occur?

Section – C

06X04 = 24 Marks

1. A transformer has 1000 turns in the primary winding and 500 turns in the secondary winding. The primary voltage is 440 Volts. Calculate the secondary voltage.
2. Calculate the speed of squirrel cage induction motor of 2 poles when the motor has been given the supply of 415 Volts at 60 cycles.
3. A house hold circuit has a fuse of 5 A rating. Calculate the maximum number of bulbs of rating 60W, 220V, which can be connected in this house hold circuit.
4. What are the main cause for energy loss in transformers?

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Electrical Skills

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End – Semester Examination

Course Code: ELE 1103 **Time: 2 Hours**

Course Name: Basic Electrical Engineering **Max. Marks: 50**

Section – A

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9. If, permeability of magnetic material is infinity then its reluctance will be:

(a) Zero (b) Very high (c) Infinity (d) None of these

10. A wattmeter is used to measure:

(a) Electrical Power (b) Voltage (c) Energy (d) Current

Section – B

04X04 = 16 Marks

1. Write the names of different types of induction motors and their applications.

Ans.

Three-phase AC induction motors are widely used in industrial and commercial **applications**. These are of two **types**, squirrel cage and slip ring **motors**. Squirrel cage **motors** are widely used due to **their** rugged construction and simple design. Slip ring **motors** require external resistors to have high starting torque. **Alternating-current motors are of three general types, induction, synchronous, and series, and are defined as follows:**

- Induction Motors. ...
- Squirrel-Cage Induction Motor. ...
- Wound-Rotor Induction Motor. ...
- Synchronous Motor. ...
- Series-Wound Motor. ...
- Polyphase Motors. ...
- Design Letters. ...
- Single-phase Motors.

Three-phase squirrel-cage **induction motors** are widely used as industrial drives because they are self-starting, reliable and economical. Single-phase **induction motors** are used extensively for smaller loads, such as household appliances like fans.

2. Why is the core of transformer is laminated?

Ans.

The **core** is **laminated** to reduce these to a minimum as they interfere with the efficient transfer of energy from the primary coil to the secondary one. The eddy

currents cause energy to be lost from the **transformer** as they heat up the **core** - meaning that electrical energy is being wasted as unwanted heat energy. The core of a transformer is laminated because it minimizes energy losses due to eddy current's.

3. In an a.c. circuit there is no power consumption in a pure inductor. Why?

   Ans. In an a.c. circuit continuing a pure inductor only. The voltage leads the current by angle $\pi/2$ so average power consumed per cycle is zero.

   $P_{av} = V_{rms}\ I_{rms} \cos\theta = 0$ since $\cos \pi/2 = 0$

4. What is the maximum value of power factor and when does it occur?

   The maximum value of power factor is one. It occurs in a pure resistor circuit. As in AC circuits, the power factor is the ratio of the real power that is used to do work and the apparent power that is supplied to the circuit. So, power factor lies within a range from 0 to 1.J

   One for a pure resistive circuit $\emptyset = 0$

   Power factor $\cos \emptyset = \cos 0 = 1$

Section – C

06X04 = 24 Marks

1. A transformer has 1000 turns in the primary winding and 500 turns in the secondary winding. The primary voltage is 440 Volts. Calculate the secondary voltage.

   Ans.

   We know that $V_1/ V_2 = N_1/ N_2$

   $= 440 / V_2$

   $= 1000/500$

   $V_2 = 440x500/1000$

   $= 220$ V. Answer.

2. Calculate the speed of squirrel cage induction motor of 2 poles when the motor has been given the supply of 415 Volts at 60 cycles.

   Ans.

N = 120 f / P

= 120/2x60

= 3600 RPM Answer

3. A house hold circuit has a fuse of 5 A rating. Calculate the maximum number of bulbs of rating 60W, 220V, which can be connected in this house hold circuit.

Ans. current drawn by the bub = P/V

= 60/220

= 3/11 A.

No. of bulbs that can safely be used with 5 A fuse = 5/ 3/11A

= 55/3

= 18.33

Hence 18 bulbs can be used safely.

4. What are the main cause for energy loss in transformers?

Ans. Although transformers are very efficient devices, small energy losses do occur in them due to four main causes:

- Resistance of windings – the low resistance copper wire used for the windings still has resistance and thereby contribute to heat loss
- Flux leakage – the flux produced by the primary coil may not be all linked to the secondary coil if the design of the core is bad.
- Eddy currents – the changing magnetic field not only induces currents in the secondary coil but also currents in the iron core itself. These currents flow in little circles in the iron core and are called eddy currents. The eddy currents cause heat loss. The heat loss, however, can be reduced by having the core laminated. (thin sheets of soft iron insulated from one another). (See image below)
- Hysteresis – The magnetization of the core is repeatedly reversed by the alternating magnetic field. The repeating core magnetization process expends energy and this energy appears as heat. The heat generated can be kept to a minimum by using a magnetic material which has a low hysteresis loss. Hence, soft iron is often chosen for the core material because the magnetic domains within it changes rapidly with low energy loss.

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Electrical Skills

Session: 2019-20 (Summer Semester)

B. Voc. Program, 1st Semester,

End – Sem. Examination

Course Code: ELE1104 **Time: 2 Hours**

Course Name: Maintenance Technician electrical **Max. Marks: 50**

Instruction: Answer all question from section A, each question carries one marks. Answer all question from section B, each question carries four marks. Answer all question from section C, each question carries six marks. Scientific calculator is allowed.

Section – A

10X01 = 10 Marks

1. Do not use appliances, if they are:
   (a) Damaged (b) Wires damage
   (c) Working properly (d) Both a and b
2. A soldering iron 'bit' is made of:
   (a) Brass (b)Tin (c) Copper (d) Steel
3. Full form of PPE is:
   (a) Personal protective Equipment (b) Personally part of equipment
   (c) Personal protective of Equipment (d) None of these
4. Megger is used to measure:
   (a) Insulation resistance (b) Current (c) Resistance (d) Voltage
5. Black wire in used for:
   (a) Phase (b) Earth (c) Neutral (d) None of these
6. Internal resistance of voltmeter is:
   (a) Very low (b) Very high (c) Medium range (d) None of these
7. Frequency of AC in India:
   (a) 60 Hz (b) 70 Hz (c) 50 Hz (d) None of these
8. Internal resistance of ammeter is:
   (a) Medium range (b) 10 ohms (c) Very low (d) Very high
9. Which of these benefits of 5S are of value to your company?
   (a) Improved safety (b) Increase productivity
   (c) Increase profitability (d) All of these.
10. What is the use of crimping tool?
    (a) To fix the lugs on wire (b) To remove the insulation of wire
    (c) Both (a) & (b) (d) None of the above

Section – B

04X04 = 16 Marks

1. Define PPE (Personal Protective equipment) with example.
2. Name the basic tools which are used for maintenance of any machine
3. Write down the advantages and disadvantages of preventive maintenance.
4. What is electrical Troubleshooting? and explain the any one step of electrical troubleshooting.

Section – C

04X06 = 24 Marks

1. What is the general faults, cause and remedies of ceiling fan?
2. Define megger. Draw neat sketch with block diagram of multi-meter.
3. What is electrical Maintenance? explain the types of maintenance.
4. Write down the troubleshooting chart of OVEN.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY
School of Electrical Skills
Session: 2019-20 (Summer Semester)
B. Voc. Program, 1st Semester,
End – Sem. Examination

Course Code: ELE1104 **Time: 2 Hours**
Course Name: Maintenance Technician electrical **Max. Marks: 50**

Section A

1.(d)

2.(c)

3.(a)

4.(a)

5.(b)

6.(b)

7.(c)

8.(c)

9.(a)

10.(a)

Section B

Ans. 1.
Safety is a major issue for day laborers and skilled laborers. Each year, accidents happen frequently in the construction industry and often times it is due to the absence of Personal Protective Equipment (PPE) or failure to wear the provided PPE. PPE is equipment that will protect workers against health or safety risks on the job.

1. Head Protection
2. Eye and Face Protection
3. Hand & Skin protection
4. Hearing protection

Ans. 2.

Tools used for maintenance:

- Combination plier
- Side cutter
- Inch tap
- Ruler
- Gloves
- Spirit level
- Knife
- Tape
- Engineering square
- Wire stripper
- Cable stripper
- Multimeter, etc.

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Ans. 3.

Advantage of preventive maintenance

Equipment will be more efficient. Technicians and managers can have more faith that equipment will function smoothly and without complications.

Savings on your resources. One example of how preventive maintenance can save you money is when a device is faulty. Any piece of equipment that is showing signs of wear and tear or is approaching the end of its usability, there is a good chance it will be using far more energy than it is worth. By implementing periodic reviews, you can better prepare for these situations and make more informed decisions on whether to replace this device or to continue with reparation works.

Longer lasting equipment. As well as helping you to save money on faulty equipment, implementing preventive maintenance can extend the life of functioning equipment by keeping all parts in good working order.

Full and accurate information on operations. Preventive maintenance provides the manager with access to more holistic information on operations such as on consumption and income. This can help to make well informed decisions, such as when it comes to opening new equipment.

The creation of a Preventive Maintenance Plan (PMP). Another advantage is the integration of a preventive maintenance plan. This generates an annual calendar (or biannual/triennial, depending on the preferences of management) which helps to schedule a events for the coming months.

A more motivated and efficient team. Having better organised progression plans and a more transparent system to reward strong performance will help to motivate your team and encourage yet more improvement. It is far more satisfying to see everything working than to constantly be rectifying failure after failure.

By investing just, a small amount of time into implementing preventive maintenance, managers can save considerably more time and money on annual plans, certifications, equipment warranties, and team calendars. Utilizing a software solution such as Intraspeaker can help you to optimize your work strategy and reap the best possible rewards from your team's hard work.

Disadvantage of preventive maintenance

More Money Upfront- When initially starting a preventative maintenance plan, it will cost you more to regularly maintain equipment and the building, than it would be if you waited for things to simply break down.

Over Maintenance- Because there is a regular plan, sometimes items may not need to be checked as often as planned. If this is the case, you can change your maintenance plan to checking the specific equipment or areas less often, while still maintaining a schedule.

More Workers- Preventative maintenance require more workers because regular checks are a must. When compared to reactive maintenance, you simply need to call someone in for a onetime fix. Instead this method requires workers to always be on site and perform daily works

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Ans. 4.

It is the process of analyzing the behavior or operation of a faulty circuit to determine what is wrong with the circuit. It then involves identifying the defective components and repairing the circuit

Depending on the type of equipment troubleshooting can be very challenging task. Sometimes problem is easily diagnosed and the problem component easily visible. Other times the symptoms as well as the faulty component can be difficult to diagnose. A defective relay with visual signs of burning should be easy to spot, whereas an intermittent problem caused by a high resistance connection can be much more difficult to find.

Gather Information: Gathering information is a logical first step in any troubleshooting endeavor. Ask about or perform the following:

- What technical documentation about the equipment is available?
- How exactly is the equipment supposed to operate?
- Are there any previous lessons learned?
- Review any material history that exists for the equipment
- Identify similar equipment to which you can compare the malfunctioning equipment. (This can be especially helpful if there is limited technical data available for the equipment that is malfunctioning.)

Section C

Ans. 1.

Fault	Cause	Remedy
Noise	It is due to worn out bearing and absence of lubricating oil or grease	The bearing must be replaced if worn out, otherwise lubricate with proper lubricant
Low Speed	It is due to defective or leaky capacitor. Low applied voltage	Replace the capacitor with one of the same value and voltage. Check the voltage and adjust if possible.
Jamming of the rotor	It is due to defective or leaky capacitor	Dismantle and assembly property after proper lubrication
Not Starting	Low applied voltage. Supply failure	Check the voltage and adjust it, if possible. Check the supply points at switch, regulator ceiling rose and terminal of fan.
	Open winding	Check for the continuity of auxiliary and main windings.
	Condenser open and short	Check the capacitor with megger.
	Open in regulator resistor/ switch	Check for open or loose contact in the resistor or contact.

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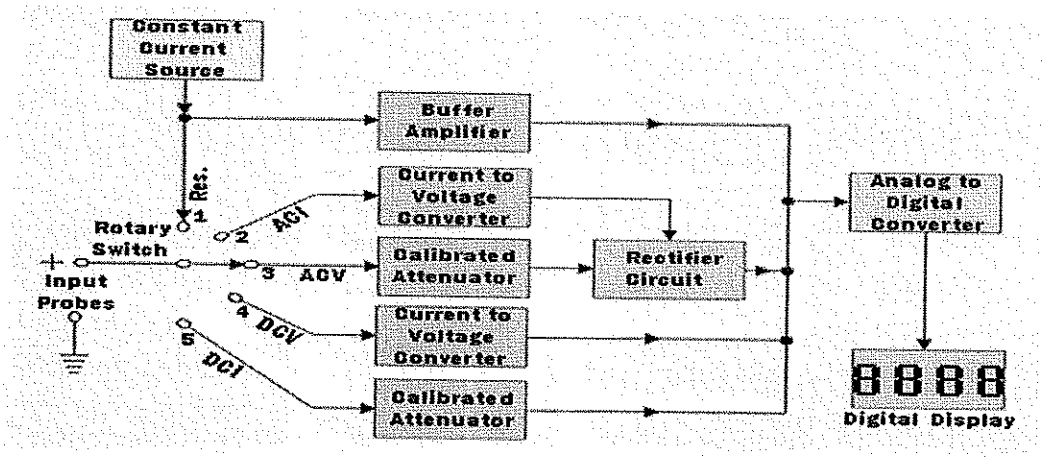
Ans. 2.

Megger: The device enable us to measure electrical leakage in wire, results are very reliable as we shall be passing electric current through device while we are testing. The equipment basically uses for verifying the electrical insulation level of any device such as motors, cables, generators, windings, etc. This is a very popular test being carried out since very long back. Not necessary it shows us exact area of electrical puncture but shows the amount of leakage current and level of moisture within electrical equipment/winding/system.



Ans. 3.

It is essentially important to carry out electrical maintenance on a regular basis; maintaining all the electrical material fittings, appliances and devices in and around your home. Maintenance enhances the smooth running of all the electricity powered items in your home, while creating a safe environment that will be free from all sorts of hazards. Maintenance involves fixing any sort of mechanical or electrical device which has become out of order or broken. It also includes performing routine actions which keep device in working order or prevent trouble from arising.

The maintenance department is responsible and accountable for maintenance. It is responsible for the way equipment run and looks and for the coasts to achieve the queried level of performance. The maintenance function responsible for the frequency and level of maintenance

Types of Maintenance:

1. Preventive Maintenance:
2. Corrective Maintenance:

Preventive maintenance:

Preventive maintenance can be described as maintenance of equipment or systems before fault occurs. Preventive maintenance is conduct to keep equipment working or extend the life of equipment. Preventive maintenance is applied by technician's teams and managers before any

breakdown or failure occurs. Its aim is to reduce the probability of breakdown or degradation of a piece of equipment, component or spare part. In order to implement such maintenance, teams have to take the part's history into consideration and keep track of the past failures. They are therefore able to identify the time ranges during which a piece of equipment might break down.

Corrective Maintenance:

This type of maintenance is described as planned because it's based on well-established maintenance programs and hard facts. It is possible to apply preventive maintenance thanks to a computerized maintenance management system (CMMS), an essential tool for any company wishing to organize its maintenance department and therefore to ensure long-lasting productivity. A CMMS is a truly useful tool for maintenance teams as they enter every detail of their interventions and exchange with colleagues in order to keep track of all the operations, maintenance plans, etc. Technicians, thanks to their work and the information they give in, progressively build a whole history of past breakdowns and failures.

Ans. 4.

Problem	Possible Cause	Corrective Action
Oven will not heat	Selector switch if off Blown fuse Open circuit in oven element Loose connection Timer inoperative	Set selector switch Check fuse Check circuit continuity Check circuit continuity Tighten all connection Check timer setting
Oven too hot or cold	Thermostat calibration. Improve oven door fit.	Check thermostat adjustment. Check Door seal and fit.
Oven will not turn off.	Inoperative selector switch. Inoperative timer	Check selector switch. Check timer setting
Oven door opens under heat	Door needs adjustment. Loose or worn pin.	Check door seal and fit. Replace bracket
Surface unit does not heat	Blown main fuse. Loose connection. Inoperative switch. Open unit. Incorrect connection, Broken wire	Check fuse. Tighten. Replace switch. Check wiring diagram. Check wiring diagram. Continuity check

Registration No.: ..... (B)

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Electrical Skills
Session: 2019-20 (Summer Semester)
B. Voc. Program, 1st Semester,
End – Semester Examination

Course Code: ELE 1105 **Time: 2 Hours**
Course Name: Electrical Safety **Max. Marks: 50**

Instruction: Answer all questions from section A, each question carries one mark. Answer all questions from section B, each question carries four marks. Answer all questions from section C, each question carries six marks. Scientific calculator is allowed.

Section – A

10x01 = 10 Marks

1. Each stay wire should be earthed unless:
   (a) A insulator has been placed in it at a height not less than three meters from the ground
   (b) A insulator has been placed in it at a height not less than one meters from the ground
   (c) A insulator has been placed in it at a height not less than five meters from the ground
   (d) None of the above
2. When current is flowing in the primary of current transformer then secondary should never be kept:
   (a) Open (b) short circuited (c) No load to be connected (d) None of these
3. Portable fire extinguishers' performance and construction specifications to be followed as per:
   (a) IS 15683 (b) IS 325 (c) IS 1164 (d) None of these
4. The first-aid boxes to be updated:
   (a) After three months (b) After six months
   (c) After 1 Year (d) Time to time
5. The danger boards are always being provided for unsafe:
   (a) Voltage (b) Current (c) Power (d) Power factor
6. A written intimation of a fatal accident to be reported to the electrical inspector within:
   (a) 48 hours (b) 24 hours (c) 72 hours (d) 7 days
7. Clearance above the ground of the lowest overhead conductor of 11 kV lines in the field:
   (a) 4.6 meters (b) 5.8 meters (c) 6.1 meters (d) None of these
8. The worst of fire accident occurred on 23rd December 1995 in which 540 people killed due to fire caused by an electric generator short circuit and the stampede:
   (a) Multistory market complex Kolkata
   (b) At Shri Krishna Aided higher secondary school at Kumbakonam Tamilnadu
   (c) Uphaar Cinema at Delhi
   (d) At Dabwali in Haryana
9. When making electrolyte for storage batteries always we must pour:
   (a) Acid in to water (b) Water in to acid
   (c) Both simultaneously (d) None of these
10. For the electrical circuits the value of earth resistance should be less than:
    (a) 1 Ω (b) 2 Ω (c) 10 Ω (d) 1000 Ω

Section – B

04x04 = 16 Marks

1. What is the function of lightning arrestor?
2. What do you understand by the term used as "Dead Circuit"?
3. What are the benefits of LLF in the industry?
4. When to use class A type fire extinguisher?

Section – C

04x06 = 24 Marks

1. Which fire Extinguisher types are used for each class of fire and how to operate a CO_2 fire extinguisher?
2. Write the First – Aid steps to be taken to reduce the suffering of the patient after an electrical accident until the doctor arrives.
3. What are the reasons of electrical fire?
4. What precautions to be taken for avoiding any electrical fire?

B

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Electrical Skills
Session: 2019-20 (Summer Semester)
B. Voc. Program, 1st Semester,
End – Semester Examination

Course Code: ELE 1105 **Time: 2 Hours**
Course Name: Electrical Safety **Max. Marks: 50**

Section – A

10x01 = 10 Marks

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   (c) A insulator has been placed in it at a height not less than five meters from the ground
   (d) None of the above
   Ans. (a)
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   (a) Open (b) short circuited (c) No load to be connected (d) None of these
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   Ans. (a)
10. For the electrical circuits the value of earth resistance should be less than:
    (a) 1 Ω (b) 2 Ω (c) 10 Ω (d) 1000 Ω
    Ans. (b)

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Section – B

04x04 = 16 Marks

1. **What is the function of lightning arrestor?**
   Ans. The function of lightning arrestor is to arrest the voltage which is above normal level of voltage. Lightning arrestor behaves as open circuit for normal voltage but more than the normal voltage it becomes conductive and gets grounded.

2. **What do you understand by the term used as "Dead Circuit"?**
   Ans. The Circuit in which there is no supply is termed as "Dead Circuit".

3. **What are the benefits of LLF in the industry?**

   Ans. The LLF stands for Look, Listen and Feel. By this process the supervisors notice the abnormal conditions, abnormal sounds and high temperature in the electrical equipment. Which helps in advance to avoid a big breakdown by doing timely rectification of the abnormalities.

4. **When to use class A type fire extinguisher?**

   Ans. When there is a fire in ordinary solid materials such as wood, coal, paper, rags, rubbish and packing material.

Section – C

04x06 = 24 Marks

1. **Which fire Extinguisher types are used for each class of fire and how to operate a CO_2 fire extinguisher?**
   Ans.

Type	CLASS A Combustible materials (e.g. paper & wood)	CLASS B Flammable liquids (e.g. paint & petrol)	CLASS C Flammable gases (e.g. butane and methane)	CLASS D Flammable metals (e.g. lithium & potassium)	Electrical Electrical equipment (e.g. computers & generators)	CLASS F Deep fat fryers (e.g. chip pans)	Comments
Water	✓	✗	✗	✗	✗	✗	Do not use on liquid or electric fires
Foam	✓	✓	✗	✗	✗	✗	Not suited to domestic use
Dry Powder	✓	✓	✓	✓	✓	✗	Can be used safely up to 1000 volts
CO2	✗	✓	✗	✗	✓	✗	Safe on both high and low voltage
Wet Chemical	✓	✗	✗	✗	✗	✓	Use on extremely high temperatures

The different types of extinguisher tackle different types of fire extinguish.

To operate a CO_2 fire extinguisher simply follow the following steps "PASS" :

P – Pull the pin

A – Aim the nozzle low

S – Squeeze the handle, lever

S - Sweep

- P - Pull the pin. It is there to prevent accidental discharge.
- A - Aim low at the base of the fire. This is the where the fuel source is.
- S - Squeeze the lever above the handle. Release to stop the flow. ...
- S - Sweep from side to side. ...

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2. Write the First – Aid steps to be taken to reduce the suffering of the patient after an electrical accident until the doctor arrives.

Ans. GENERAL

First Aid means what one should do to reduce the suffering of the patient after an accident until the doctor

arrives, it may give life to dying person.

FIRST AID INSTRUCTIONS

1. Remove the patient from the source of accident / remove the cause of injury.
2. Keeps the injured person lying down in a comfortable position.
3. If the breathing has ceased, immediate measures must be taken to restore it.
4. If the patient has received burns attend to them.
5. When the patient has fractured a bone, no attempt must be made to move him.
6. Treat the patient for shock.
7. Send for medical help.
8. Never give water to patient.
9. Keep by standards away from the patient.
10. Keep the patient warm.

3. What are the reasons of electrical fire?

Ans. Electrical fire takes place or originates due to the following reasons:

Short Circuit/ leakage, faults in wiring/ cabling or equipment.
Damage of cables/ wires during installation
Poor quality of cables/ wires
Inherent fault in equipment
Installations with PVC propagate fire causing dense and toxic smoke Excessive heating of electrical equipment either due to continuous over load or loose contact.
Continuous over loading
Lose contacts in switch gear or at terminals, improper cable termination.
Mechanical/ electrical failures of switching equipment
Improper operations due to failure of switchgear contacts and insulation degradation
Such failures particularly related to switchgear contacts and insulation degradation go unnoticed if the system is in operation but erupt when switching is done.
Air conditioning of buildings is another cause of concern as the central AC system ducts can

propagate fire form one area to another very fast unless proper care is taken.

4. What precautions to be taken for avoiding any electrical fire?

Ans. Any fire causes immense loss of property and life. Hence, due care should be taken to minimize the risk of fire so that fire does not start. Same is true in case of electrical fire.

If due care is taken while selecting equipment and installation methods, the possibility of electrical fire can be reduced to a very large extent.

Proper Material

Selection of Good Quality and proper material is essential as cheap and low quality material may not have good electrical & mechanical properties.

These can lead to faults. Also, new fire retardant, fire retardant low smoke or Halogen free fire resistant cables, wires are available. These can be used in high density areas. These materials emit lower smoke and also resist the propagation of fire.

Proper Installation Method

All openings in walls, beams, slabs used for carrying electrical systems/ cables/ wires etc. form one area to another must be sealed by fire retardant/ fire resistant material.

This can stop propagation of fire from one area to another. Vertical shafts in buildings must also be sealed at every level.

This stops the smoke from moving up as smoke is a major reason for fatalities in any fire.

Electrical Protection

Restrict electrical faults in the form of over load, short circuit protection, gas operated relays, over voltage protection, proper earthing and surge arrestors, earth leakage relays.

Necessary protections as demanded by IS standards need to be employed at every level right from substation.

Proper selection of switch gear, EF and OC relays, relay settings, proper rating in terms of current carrying capacities & breaking capacities of MCCB's & MCB's exact OC relay ranges for motor feeders, Earth leakage detection devises where ever required should be employed.

All these protections either preempt the tripping before actual disastrous faults or restrict the electrical faults there by restricting damage to equipment and avoid fire.

Elaborate Pre-Commissioning testes of Pre-commissioning testing of entire electrical installation including continuity, insulation resistance.

Insulation strength, physical and functional checks, earthing resistance need to be done properly and as recommended.

Faulty material and installation can be detected prior to commissioning in most cases if proper testing is done. This avoids accidents both electrical & fire.