

2025

(November-December)

PHYSICS

Paper: SEC-PHY-101

Electrical Circuits and Installation Skills**Time: 1½ Hours****Total Mark: 30****Pass marks: 09***(The figures in the right margin indicate full marks of the questions)*

1. Choose the correct option:

1×4=4

- a) A galvanometer has a full-scale deflection current of 1 mA and an internal resistance of $100\ \Omega$. To use it as a 0-1 A ammeter, a shunt resistor should be connected:
- In series with a resistance of $0.1\ \Omega$
 - In parallel with a resistance of $0.1\ \Omega$
 - In series with a resistance of $100\ \Omega$
 - In parallel with a resistance of $100\ \Omega$
- b) When a forward bias is applied to a p-n junction, it
- Raises potential barrier
 - Lowers potential barrier
 - Does not change potential barrier
 - Reduce the majority carrier current to zero
- c) A carbon resistor has color bands Red, Violet, Orange, and Gold. What is its resistance and tolerance?
- $27\ \Omega \pm 5\%$
 - $2.7\ \text{k}\Omega \pm 5\%$
 - $27\ \text{k}\Omega \pm 5\%$
 - $270\ \text{k}\Omega \pm 5\%$

d) The main purpose of earthing (grounding) in an electrical circuit is to:

- i. Increase the circuit voltage
- ii. Provide a path for electric current to the appliance
- iii. Protect users from electric shock by providing a safe path for fault current
- iv. Reduce the resistance of the circuit.

2. Answer the followings (any six): 2×6=12

- a) State Ohm's law. Define resistance and write its SI unit.
- b) Draw the basic electrical symbols for Switch, Antenna, SPST relay and Isolator.
- c) A transformer has 600 turns of the primary winding and 20 turns of the secondary winding. Determine the secondary voltage if the secondary circuit is open and the primary voltage is 140 V.
- d) Explain briefly about the importance of wire number in an electrical circuit.
- e) Two electrical appliances, a fan rated 200 W 230 V and a bulb rated 100 W 230 V, are connected in parallel to the same supply. Calculate the minimum fuse rating required for the circuit.
- f) Obtain an expression for the equivalent power when the loads are connected in series.
- g) Name the main components present in electrical power cables.
- h) What is rectifier? Draw the Schematic circuit diagram for a full wave rectifier circuit?

3. What is an ammeter? Discuss the working of a multirange ammeter capable of measuring in four different ranges using suitable diagram. 4

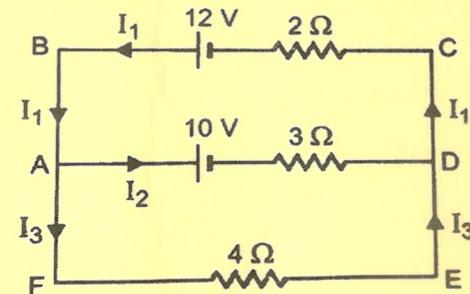
Or

Discuss the method of preparation of an extension board with necessary block diagrams. 4

4. Discuss the construction and working of a bridge rectifier. 4

Or

Find the current I_1 , I_2 and I_3 in the following network by using Kirchhoff's law.



5. Write short notes on (any two): 3×2=6

- (a) Star and Delta connection scheme for the supply of three phase AC.
- (b) Half wave rectifier
- (c) Electrical Earthing
