

**2024/TDC (CBCS)/EVEN/SEM/  
PHSSEC-401T/094**

**TDC (CBCS) Even Semester Exam., 2024**

**PHYSICS**

**( 4th Semester )**

**Course No. : PHSSEC-401T**

**( Electrical Circuits and Networks )**

Full Marks : 50

Pass Marks : 20

**Time : 3 hours**

*The figures in the margin indicate full marks  
for the questions*

**UNIT—I**

**1. Answer any three of the following questions :**

**1×3=3**

- (a) Define resistance of a conductor.**
- (b) Write the expression for power of an electric circuit.**
- (c) State Ohm's law.**
- (d) Distinguish between direct current and alternate current.**

( 2 )

2. Answer any *one* of the following questions : 2

- (a) Why is DC not used at home?
- (b) State the different uses of a multimeter.

3. Answer any *one* of the following questions : 5

- (a) Find the equivalent resistance of a group of resistors for (i) series combination and (ii) for parallel combination.
- (b) (i) State the working principle of a multimeter.
- (ii) State the difference between ammeter and voltmeter. 3+2=5

## UNIT—II

4. Answer any *three* of the following questions :  
1×3=3

- (a) Is there any voltage drop in DC? Explain your answer.
- (b) What are the main elements of an electric circuit?
- (c) State the rules relating to Kirchhoff's law for DC circuits.
- (d) What do the real and imaginary components of an AC source signify?

( 3 )

5. Answer any *one* of the following questions : 2

- (a) State the basic laws for analysis of electric circuit.
- (b) Distinguish between power and power factor.

6. Answer any *one* of the following questions : 5

- (a) (i) State the rules to analyze an AC circuit. 2
- (ii) State how power is derived in an AC circuit. 3
- (b) (i) State and discuss the different DC power supply types. 3
- (ii) What is wattless current in an AC circuit? What does it signify? 2

## UNIT—III

7. Answer any *three* of the following questions :  
1×3=3

- (a) Draw the symbols of resistance, capacitance, inductance and variable resistance.
- (b) State the necessity of a schematic diagram of an electrical circuit.
- (c) What are the different DC power sources?
- (d) What is the function of a transformer?

( 4 )

8. Answer any *one* of the following questions : 2
- Distinguish between AC and DC generators.
  - What is the difference between schematic and circuit diagrams?
9. Answer any *one* of the following questions : 5
- Explain with diagram a ladder diagram. 2
    - What do you understand by impedance of an AC circuit? How is it different from resistance?  $2+1=3$
  - Discuss the working principle of a transformer. What are step-up and step-down transformers? Discuss transformer losses.  $3+1+1=5$

## UNIT—IV

10. Answer any *three* of the following questions :  $1 \times 3 = 3$
- How can you identify whether a motor is single-phase or three-phase?
  - State the relation between the speed and power of an AC motor.
  - What is a rectifier?
  - Why we use a shunt in an electric circuit?

( 5 )

11. Answer any *one* of the following questions : 2
- State the factors that control the performance of an AC motor.
  - Explain how an inductor and a capacitor respond to a DC current.
12. Answer any *one* of the following questions : 5
- Explain with circuit diagram how diodes can be used as a half-wave and a full-wave rectifier.
  - What is the difference between fuse and relay? Are circuit breakers and relays the same?  $2+1=3$
    - Explain the necessity of grounding and isolation. 2

## UNIT—V

13. Answer any *three* of the following questions :  $1 \times 3 = 3$
- What is the difference between wire and cable?
  - What is the function of MCB?
  - Name the instrument to measure voltage and power in an AC circuit.
  - What are the different types of cables used in electric circuits?

( 6 )

14. Answer any *one* of the following questions : 2
- (a) Explain how the star and delta connection works.
  - (b) Discuss the different types of cable insulations.
15. Answer any *one* of the following questions : 5
- (a) Discuss the voltage drop and losses in a cable. Explain how this can be measured and hence minimized. 3+2=5
  - (b) (i) Distinguish between solid and standard cables stating their different utilities. 3
  - (ii) What is the necessity of insulation in an electric circuit/connection? What is a conduit? 2

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