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. 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?

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?

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

(a) Distinguish between AC and DC generators.

(b) What is the difference between schematic and circuit diagrams?

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

(a) *(i)* Explain with diagram a ladder diagram. 2

(ii) What do you understand by impedance of an AC circuit? How is it different from resistance? 2+1=3

(b) 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 : 1×3=3

(a) How can you identify whether a motor is single-phase or three-phase?

(b) State the relation between the speed and power of an AC motor.

(c) What is a rectifier?

(d) Why we use a shunt in an electric circuit?

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

(a) State the factors that control the performance of an AC motor.

(b) Explain how an inductor and a capacitor respond to a DC current.

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

(a) Explain with circuit diagram how diodes can be used as a half-wave and a full-wave rectifier.

(b) *(i)* What is the difference between fuse and relay? Are circuit breakers and relays the same? 2+1=3

(ii) Explain the necessity of grounding and isolation. 2

UNIT—V

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

(a) What is the difference between wire and cable?

(b) What is the function of MCB?

(c) Name the instrument to measure voltage and power in an AC circuit.

(d) What are the different types of cables used in electric circuits?

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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