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Reg. No. :

Code No. : 20296 E Sub. Code : CMPH 31

B.Sc. (CBCS) DEGREE EXAMINATION,
APRIL 2025.

Third Semester

Physics — Core

ELECTRICITY AND ELECTROMAGNETISM

(For those who joined in July 2021 and 2022 only)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 1 = 10$ marks)

Answer ALL questions.

Choose the correct answer :

1. Thermocouple works on
 - (a) Peltier effect
 - (b) Kelvin effect
 - (c) Thomson effect
 - (d) Seebeck effect

2. Faraday's laws of electrolysis are related to the
 - (a) atomic number of the cation
 - (b) atomic number of the union
 - (c) equivalent mass of the electrolyte
 - (d) speed of the cation
3. A ohms law defines current flow through _____ substance.
 - (a) Conducting
 - (b) Insulating
 - (c) Non conducting
 - (d) Both (a) and (c)
4. The power factor at resonance in a series R-L-C circuit is
 - (a) 0.7
 - (b) unity
 - (c) zero
 - (d) 0.5
5. The unit of magnetic flux density
 - (a) Weber/meter²
 - (b) Tesla
 - (c) Newton/ampere-metre
 - (d) All of the above

6. The equation of the magnetic field according to Biot-Savart's law

- (a) $Idl \sin \theta / r^2$ (b) $\frac{\mu_0 Idl \sin \theta}{4\pi r^2}$
(c) $\frac{\mu_0 Idl \sin \theta}{4\pi r^2}$ (d) $\frac{\mu_0 Idl \sin \theta}{4\pi}$

7. The SI unit of mutual inductance

- (a) Ohm (b) Henry
(c) Volt (d) Siemens

8. Eddy currents have negative effects. Because they produce

- (a) Harmful radiation
(b) Heating and damping
(c) Damping only
(d) Heating only

9. The poynting vector is given by

- (a) $\vec{E} \times \vec{H}$ (b) $\vec{H} \times \vec{E}$
(c) $\vec{\nabla} \times (\vec{E} \times \vec{H})$ (d) $\vec{\nabla} \times \vec{H}$

10. Electromagnetic waves are transverse in nature is evident by

- (a) Polarisation (b) Interference
(c) Reflection (d) Diffraction

PART B — (5 × 5 = 25 marks)

Answer ALL questions by choosing (a) or (b).

Each answer should not exceed 250 words.

11. (a) State and explain Peltier and Thomson effect.

Or

(b) Explain Boy's radio micrometer.

12. (a) Explain the growth and decay of charge in C-R circuit.

Or

(b) Derive an expression for power for a circuit containing only resistance.

13. (a) Define magnetic permeability and susceptibility.

Or

(b) Describe Desauty's bridge with a diagram.

14. (a) Describe a method of measuring the self inductance of a long solenoid.

Or

- (b) Describe with necessary theory the use of an earth inductor to find the angle of dip.

15. (a) Explain the significance of displacement current.

Or

- (b) Describe the phenomenon of polarization by reflection.

PART C — ($5 \times 8 = 40$ marks)

Answer ALL questions by choosing (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain Coulomb's law in vector form.

Or

- (b) Illustrate the importance of a thermo electric diagram.

17. (a) Describe the conversion of galvanometer into voltmeter and ammeter.

Or

- (b) Explain j-operator method in Alternating current.

18. (a) State Biot savart law. Describe magnetic field inside a long solenoid.

Or

- (b) Give the theory of moving coil Ballistic galvanometer.

19. (a) State and explain Faraday's law of electromagnetic induction.

Or

- (b) Explain eddy currents.

20. (a) Write down Maxwell's equation for a material medium.

Or

- (b) Explain Hertz experiment for production and detection of EM waves.
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