(6 pages)

Reg. No. : .....

Code No. : 20391 E **Sub. Code : CMPH 31**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Third Semester

Physics — Core

ELECTRICITY AND ELECTROMAGNETISM

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Operation of thermocouple is governed by ———
   (a) Peltier effect (b) Seeback effect
   (c) Thomson effect (d) All of the mentioned

2. Coulomb is the unit of
   (a) Field strength (b) Charge
   (c) Capacitor (d) Force

3. The terminal potential difference will be greater than its emf when it is
   (a) in open circuit
   (b) being charged
   (c) discharged
   (d) being charged or discharged

4. In a series resonance circuit, series resonance occurs when
   (a) $X_L = 1$ (b) $X_C = 1$
   (c) $X_L = X_C$ (d) $X_L = -X_C$

5. Which of the following is a vector quantity?
   (a) Relative permeability
   (b) Magnetic field intensity
   (c) Flux density
   (d) Magnetic potential

6. Biot Savart law in magnetic field is analogous to
   (a) Gauss law (b) Faraday law
   (c) Coulomb's law (d) Ampere law

7. The self inductance associated with a coil is independent of?
   (a) induced voltage (b) current
   (c) time (d) coil resistance

8. What is measured by the eddy current induced in energy meters?
   (a) Electric potential
   (b) Electric induction
   (c) Electric power
   (d) Electric energy

9. In electromagnetic waves the phase difference between electric and magnetic field vectors are
   (a) zero (b) $\pi/4$
   (c) $\pi/2$ (d) π

10. The EM waves when travel into different media gets
    (a) refracted (b) transmitted
    (c) reflected (d) emitted

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Define electric potential. Write relation connecting electric field and potential.

    Or

    (b) State and explain Faraday's law of electrolysis.

12. (a) State ohms law : Kirchoff's law.

    Or

    (b) Derive an expression for LCR series resonance circuit.

13. (a) Write the relation between M, B and H.

    Or

    (b) Obtain an expression for Lorentz force on a moving charge.

14. (a) Describe coefficient of coupling in mutual inductance.

    Or

    (b) Write a note on induction oil.

15. (a) Write short note on poynting vector. Discuss significance of poynting vector.

    Or

    (b) Describe the reflection and transmission at normal incidence in EM waves.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Define see back effect. Explain the measurement of thermo emf using potentiometer.

Or

(b) Explain Kohlrausch's bridge method for determining the specific conductivity of a electrolyte.

17. (a) Describe growth and decay of charge in LCR circuit.

Or

(b) Define term power factor. Describe how you would determine the power factor load in an AC circuit.

18. (a) Obtain relation between magnetic flux and magnetic induction.

Or

(b) Explain B - H curve.

19. (a) Define self inductance. Explain determination of L by Owen's bridge.

Or

(b) Write short note :

(i) Rotating magnetic field

(ii) Eddy current.

20. (a) Explain displacement current equation.

Or

(b) Derive wave equations for electric field and magnetic field.

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