

(6 pages)

Reg. No. :

Code No. : 20350 E Sub. Code : EMPH 51

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

Fifth Semester

Physics — Core

ELECTRICITY, MAGNETISM AND
ELECTROMAGNETISM

(For those who joined in July 2023 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The capacitance of a parallel plate capacitor is directly proportional to _____.
(a) distance between plates
(b) area of plates
(c) thickness of dielectric
(d) potential difference

2. Which of the following is not a thermoelectric effect?
(a) Seebeck effect
(b) Joule effect
(c) Thomson effect
(d) Peltier effect
3. Which law explains the magnetic field around a current carrying conductor?
(a) Gauss's law
(b) Faraday's law
(c) Biot-Savart's law
(d) Ampere's law
4. The SI Unit of magnetic flux is _____.
(a) Weber (b) Maxwell
(c) Henry (d) Tesla
5. Magnetic permeability (μ) is defined as _____.
(a) B/H (b) H/B
(c) M/H (d) B²/H

6. A coil of 16 H is coupled with a coil of 4 H in such a way that coefficient of coupling is unity. Find the mutual inductance.

- (a) 10 H (b) 8 H
(c) 12 H (d) 16 H

7. Which circuit element causes a phase difference between voltage and current in an AC circuit?

- (a) resistance (b) inductance
(c) switch (d) battery

8. The resonance condition in an LCR circuit occurs when _____.

- (a) $X_L = 0$ (b) $X_C = 0$
(c) $X_L = X_C$ (d) $R = 0$

9. The term added by Maxwell to Ampere's law is called _____.

- (a) Induced current
(b) Conduction current
(c) Displacement current
(d) Eddy current

10. Which characteristics of an electromagnetic wave is affected by the medium through which it travels?

- (a) time period (b) velocity
(c) wavelength (d) frequency

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain the effect of dielectric in a capacitor.

Or

(b) Write short note on Peltier effects.

12. (a) State Ampere's circuital law and explain the divergence of magnetic field.

Or

(b) Explain torque on a current loop in a magnetic field.

13. (a) Write a short note on hysteresis loss.

Or

(b) Explain mutual inductance between two coaxial solenoids.

14. (a) Derive the expression for voltage across a capacitor in an RC charging circuit.

Or

- (b) Write a short note on equality factor.

15. (a) Define displacement current and explain its significance.

Or

- (b) Write a note on velocity of electromagnetic waves in free space.

PART C — ($5 \times 8 = 40$ marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the construction and working of Carey Foster Bridge.

Or

- (b) Discuss the thermoelectric diagrams and their applications.

Page 5 Code No. : 20350 E

17. (a) Derive an expression for force on a current carrying conductor placed in a magnetic field and the magnetic force between two infinitely long conductors.

Or

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

18. (a) Describe an experiment to draw B-H curve.

Or

- (b) Derive an expression for self-inductance of a solenoid.

19. (a) Derive an expression for charge and current in an LCR circuit.

Or

- (b) Explain resonance in parallel LCR circuits and derive condition for maximum current.

20. (a) Derive Maxwell's equations in differential form in free space.

Or

- (b) Explain electromagnetic wave propagation in linear homogenous media.

Page 6 Code No. : 20350 E