

B.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2023.

Fourth Semester

Physics – Core

## ELECTROMAGNETISM

(For those who joined in July 2017 – 2020)

Time : Three hours

Maximum : 75 marks

## PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The unit Henry can also be written as

- (a)  $V_S A^{-1}$  (b)  $Wb A^{-1}$   
(c)  $\Omega S$  (d) all

6. Velocity of electromagnetic wave in medium is

- (a)  $C = \sqrt{\mu_0 / \epsilon_0}$  (b)  $C = \sqrt{\mu \epsilon}$   
(c)  $C = \frac{1}{\sqrt{\mu \epsilon}}$  (d)  $\sqrt{\epsilon / \mu}$

7. Brewster's law is \_\_\_\_\_

- (a)  $\mu = \sin i_p$  (b)  $\mu = \cos i_p$   
(c)  $\mu = \tan i_p$  (d)  $\mu = \frac{1}{\tan i_p}$

8. Refractive index of a medium is

- (a)  $\frac{\sqrt{\mu r}}{\epsilon r}$  (b)  $\frac{\sqrt{\epsilon r}}{\mu r}$   
(c)  $\frac{1}{\sqrt{\mu_r \epsilon_r}}$  (d)  $\sqrt{\mu_r \epsilon_r}$

9. Magnetic induction \_\_\_\_\_

- (a)  $B = \phi \cdot A$  (b)  $B = \frac{\phi}{A}$   
(c)  $B = \phi \cdot I$  (d) None

2. Lenz's law is in accordance with the law of

- (a) Conservation of changes  
(b) Conservation flux  
(c) Conservation of momentum  
(d) Conservation of energy

3. The relation connecting magnetic induction ( $B$ ) and magnetic field intensity ( $H$ ) is \_\_\_\_\_

- (a)  $\mu = B/H$  (b)  $\mu = BH$   
(c)  $\mu = H/B$  (d) none

4. Magnetic induction due to an infinitely long straight conductor placed in a medium of permeability  $\mu$  is

- (a)  $\frac{\mu_0 I}{4\pi a}$  (b)  $\frac{\mu_0 I}{2\pi a}$   
(c)  $\frac{\mu I}{4\pi a}$  (d)  $\frac{\mu I}{2\pi a}$

5. Electro magnetic waves are

- (a) transverse  
(b) longitudinal  
(c) may be longitudinal or transverse  
(d) neither longitudinal nor transverse

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10. Induction coil is \_\_\_\_\_

- (a) an a.c transformer  
(b) a d.c transformer  
(c) an inverter  
(d) a dynamo

## PART B — (5 × 5 = 25 marks)

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

Each answer should not exceed 250 words.

11. (a) Define self inductance of the coil. Give it unit.

Or

(b) What are eddy currents? Give the application.

12. (a) Explain the Lorentz force on a moving charge.

Or

(b) State and explain Ampere's circuital law.

13. (a) Explain the Boundary conditions for Magnetic induction ( $B$ ).

Or

(b) Describe Hertz experiment to produce electromagnetic waves.

14. (a) Derive the wave equation for magnetic field in a non-conducting medium.

Or

(b) Explain the polarization of electro magnetic waves by reflection.

15. (a) Write a short note on earth inductor.

Or

(b) What are the applications of induction coil?

PART C — (5 × 8 = 40 marks)

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

Each answer should not exceed 600 words.

16. (a) Determine the self inductance of a coil by Owen's bridge method.

Or

(b) Obtain the expression for the self inductance of a toroidal solenoid.

17. (a) Write short note on Damping correction in Ballistic Galvanometer.

Or

(b) Obtain an expression for the magnetic induction at a point due to a long straight conductor carrying current.

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18. (a) Derive the Maxwell's equation for material media.

Or

(b) Derive an expression for poynting vector.

19. (a) Discuss the reflection and transmission of electromagnetic wave at a dielectric boundary for normal incidence.

Or

(b) Obtain an expression for impedance of a dielectric to electric magnetic wave.

20. (a) Describe how the earth's inductor can be used to determine earth's vertical field induction at a place.

Or

(b) Describe an induction coil and explain its working.

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