

(6 pages)

Reg. No. :

Code No. : 30560 E Sub. Code : SMPH 41

B.Sc.(CBCS) DEGREE EXAMINATION,
NOVEMBER 2020.

Fourth Semester

Physics — Core

ELECTROMAGNETISM

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 1 = 10$ marks)

Answer ALL questions.

Choose the correct answer :

1. The direction of induced emf in a circuit is given by
 - (a) Faraday's law
 - (b) Fleming's law
 - (c) Lenz's law
 - (d) None of these
2. A device for storing energy in magnetic field is
 - (a) resistor
 - (b) capacitor
 - (c) inductor
 - (d) none

3. The unit of magnetic flux is
 - (a) Oerstead
 - (b) Weber
 - (c) Maxwell
 - (d) Gauss
4. The force experienced by a current carrying conductor parallel to magnetic induction is
 - (a) Zero
 - (b) BIl
 - (c) $BIl \sin \theta$
 - (d) HIl
5. The unit of magnetic susceptibility is
 - (a) A/m
 - (b) A/m^2
 - (c) Am^2
 - (d) no unit
6. The displacement current through a circuit is given by
 - (a) $\epsilon_0 \frac{\partial E}{\partial r}$
 - (b) $\mu_0 \epsilon_0 \frac{\partial E}{\partial r}$
 - (c) $\epsilon_0 \frac{\partial \phi}{\partial r}$
 - (d) $\mu_0 \epsilon_0 \frac{\partial \phi}{\partial r}$
7. Brewster angle is the angle of
 - (a) incidence
 - (b) reflection
 - (c) refraction
 - (d) transmission

8. The refractive index of a medium is
- (a) $\sqrt{\mu r / \epsilon r}$ (b) $\sqrt{\frac{\epsilon r}{\mu r}}$
- (c) $\frac{1}{\sqrt{\epsilon r \mu r}}$ (d) $\sqrt{\epsilon r \mu r}$
9. Calibrating B.G. means
- (a) finding its charge sensitiveness
- (b) finding its throw
- (c) finding its damping
- (d) all the above
10. Induction coil is
- (a) an a.c. transformer
- (b) an d.c. transformer
- (c) an inverter
- (d) a dynamo

PART B — ($5 \times 5 = 25$ marks)

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

Each answer should not exceed 250 words.

11. (a) Define coefficient of self inductance of a coil.
Deduce an expression for the self inductance of a solenoid.
- Or
- (b) Define coefficient of coupling and derive an expression for it.

12. (a) State and prove Ampere's circuital law.

Or

- (b) Explain Lorentz force on a moving charge.

13. (a) Define three magnetic vectors M , B and H .
Obtain the relation connecting them.

Or

- (b) Derive an expression for loss of energy in one cycle of magnetization.

14. (a) Derive electromagnetic equation for the varying electric field.

Or

- (b) Show that when a beam of unpolarised light is incident at Brewster angle the refracted beam is at right angles to the reflected beam.

15. (a) Explain how the ballistic constant of a B.G. Can be determined using solenoid inductor.

Or

- (b) What are the applications of induction coil?

PART C — ($5 \times 8 = 40$ marks)

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

Each answer should not exceed 600 words.

16. (a) Describe Anderson's bridge method of determining the self inductance of a coil.

Or

- (b) Describe a method of determining mutual inductance between two coils.

17. (a) A circular coil has a radius 0.1 m and a number of turns of 50. Calculate the magnetic induction at a point (i) on the axis of the coil and distance 0.2 m from the center (ii) at the center of the coil, when a current of 0.1 A flows in it.

Or

- (b) Describe an experiment of determine absolute capacity of a capacitor.

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

Or

- (b) Derive Maxwell's equations for electromagnetic wave.

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

Or

- (b) Explain polarization of electromagnetic wave by reflection. Also deduce Brewster's law of polarization.

20. (a) Describe an earth inductor and give its theory.

Or

- (b) Explain the method of measurement of intense magnetic field using search coil and B.G.
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