

Roll No.

Exam Code : M-19

Subject Code—8683

B.Sc. EXAMINATION

(Batch 2018 Onwards)

(Second Semester)

PHYSICS

CPL-203

Electricity, Magnetism EMI-II

Time : 3 Hours

Maximum Marks : 80

Note : The question paper consists of nine questions. Q. No. 1 is compulsory. *Four* more questions are to be attempted, selecting *one* question out of two questions set from each Unit. Use of Scientific (non-programmable) calculator is allowed.

1. (a) Draw the electric field lines for a isolated positive charge.

- (b) Define electric potential.
- (c) What is Plane Wave ?
- (d) What are Electromagnetic Waves ?
- (e) What is Electric flux ? Give its units.
- (f) What is displacement current ?
- (g) Explain Lenz's Law ?
- (h) State Ampere's Law. **2 each**

Unit I

2. (a) Define Q factor of a resonant circuit.
How is the Q factor related to the amplitude of the oscillations ? **4**
- (b) Derive an expression for Q factor of an LCR series resonant circuit. **8**
- (c) A $1000\ \Omega$ resistor, a $500\ \text{pF}$ capacitor, and a $2\ \text{mH}$ inductor are connected in series. What is the impedance of this combination at a frequency of 10 kilocycles per second ? **4**

3. (a) Work out an equation that applies to series LCR resonant circuit without any emf source. 8
- (b) What are Faraday's law of electromagnetic induction ? Derive expressions for self and mutual induction. 8

Unit II

4. (a) What are Maxwell's equations ? Derive Maxwell's equations in vacuum. 10
- (b) Explain, how Maxwell fixed the Ampere's law ? 6
5. (a) State and prove Poynting theorem. 10
- (b) Derive the continuity equation. 6

Unit III

6. (a) How can a wave be represented mathematically ? What are sinusoidal waves ? Explain its quantitatively. 8
- (b) Derive an expression for equation an electromagnetic wave propagating in vacuum. 8

7. (a) Derive formula for Energy and Momentum in Electromagnetic Waves. 8
- (b) Derive an expression for equation an electromagnetic wave propagating in isotropic dielectric medium. 8

~~Unit IV~~

8. (a) Describe the scalar and vector potentials for electromagnetic fields. 8
- (b) Explain Coulomb and Lorentz gauges. 8
9. Discuss the electric and magnetic dipole radiation qualitatively. 16