

Roll No.

Total Pages : 3

321201

May 2023

**B.Sc. (H) Physics - II SEMESTER
ELECTRICITY AND MAGNETISM
(BPH-201A)**

Time: 3 Hours]

[Max. Marks. : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. (a) Give the statement of maximum power transfer theorem. (1.5)
- (b) Define and write the expression for impedance (Z) of a series LCR circuit. (1.5)
- (c) What do you mean by the sharpness of a resonant circuit? (1.5)
- (d) What is electric potential and how is it related to the electric field? (1.5)
- (e) Show that an electrostatic field is curl free. (1.5)

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- (f) What do you mean by the Curie Temperature of a ferromagnetic material? (1.5)
- (g) Define the term magnetic permeability and its unit. (1.5)
- (h) Define Faraday's Law of electromagnetic induction. (1.5)
- (i) Define the term electrical susceptibility and its unit. (1.5)
- (j) What do you understand by the Displacement current? (1.5)

PART-B

2. Analyse a series LCR circuit to define its resonant frequency, power dissipation and quality factor. (15)
3. (a) State and verify Norton's theorem by taking suitable example. (10)
- (b) Discuss the conversion of a constant voltage source into a constant current source. (5)
4. State and prove Gauss's law in electrostatics. Using this law, derive the expression for the electric field intensity at a point near an infinite plane sheet of charge. (15)
5. (a) What is magnetic hysteresis? Show that hysteresis loss per unit volume per cycle of magnetization in a ferromagnetic material is equal to the area under the B-H curve. (10)

- (b) Give general properties of diamagnetic materials. (5)
6. (a) Write down the differential and integral form of Maxwell's equations and discuss their physical significance. (10)
- (b) Discuss Poynting vector and Poynting theorem. (5)
7. (a) Define electric field (E), electric polarization (P) and displacement vector (D) and establish a relation between E, P and D. (10)
- (b) Determine the capacitance of a parallel plate capacitor with dielectric slab inserted between the plates of the capacitor. (5)