

T.Y.B.SC. SEM – VI (2014 COURSE) : WINTER- 2017
SUBJECT : PHYSICS: ELECTRODYNAMICS

Day : Monday
Date : 23/10/2017

Time : 12.00 NOON TO 02.00 PM
Max. Marks : 40.

W-2017-0670

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the **RIGHT** indicate full marks.
- 3) Use of electronic calculator/ log table is allowed.

Q.1 Attempt any **TWO** of the following: **(10)**

- a) State Faradays laws of electromagnetic induction and prove that $\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$.
- b) Explain electric polarization of matter.
- c) Define method of electrical image. Write the procedural steps for solving a particular electrostatic problem.

Q.2 Attempt any **TWO** of the following: **(10)**

- a) Write Maxwell's equation in differential and integral form. What is the physical significance of Maxwell's equation?
- b) State Gauss theorem. Write the integral form and differential form of it.
- c) Find the vector potential of an infinite solenoid having 'n' turns per unit length, radius R and carrier a current I through its winding.

Q.3 Attempt any **TWO** of the following: **(10)**

- a) Show that the last two of Maxwell's equation are contained in first two equations.
- b) Prove that volume charge density ρ_p is equal to negative divergence of polarisation.
- c) A plastic disc of radius 'a' has a charge uniformly distributed over its surface. If the disc is rotated at an angular frequency ' ω ' about its axis, show that the magnitude field at the centre of the disc is $B = \frac{\mu_0 \omega q}{2\pi a}$.

Q.4 Attempt any **FIVE** of the following: **(10)**

- a) Show that another point form of Faraday's law is $\vec{E} = -\frac{\partial \vec{A}}{\partial t}$, where \vec{A} is magnetic vector potential.
- b) State Poisson's and Laplace's equation.
- c) State the relation between \vec{D} , \vec{E} & \vec{P} .
- d) Explain the terms (i) Surface charge density (ii) Linear charge density
- e) Two long parallel wires separated by 1 cm in air carry current of 50 amp each. Find the force on one meter length of wire.
- f) Define (i) Magnetic permeability (ii) Magnetic susceptibility.
- g) Give the physical significance of equation of continuity.

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