

Code: 9A02404

B.Tech II Year II Semester (R09) Supplementary Examinations May/June 2016

ELECTROMAGNETIC FIELDS
(Electrical & Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain Gauss's law with example.
(b) Using Gauss law, find E at any point due to long infinite charge wire.
- 2 (a) Write short notes on conducting bodies in electric field.
(b) Give the significance of Poisson's and Laplace's equations.
- 3 A parallel plate capacitor has a plate area of 1.5 Sq.m. and a plate separation of 5 mm. There are two dielectrics in between the plates. The first dielectric has a thickness of 3 mm with a relative permittivity of 6 and the second has a thickness of 2 mm with relative permittivity 4. Find the capacitance.
- 4 Find the magnetic field intensity at a point (r, ϕ, z) due to an infinitely long straight filament carrying a current I in the +z direction.
- 5 (a) Find the magnetic field intensity due to a hollow conductor of radius R_1 and outer radius R_2 .
(b) Derive the boundary conditions at the magnetic interfaces and show that $\tan \theta_1/\theta_2 = \mu r_1/\mu r_2$.
- 6 (a) Derive the expression for force on a current element in a magnetic field.
(b) A current element 4 cm long is along y-axis with a current of 10mA flowing in y-direction. Determine the force on the current element due to the magnetic field if the magnetic field $\mathbf{H} = 5\mathbf{a}_x \mu\text{A/m}$.
- 7 (a) Define mutual inductance and derive Neumann's formulae.
(b) A solenoid has 400 turns with a length of 2 m. It has a circular cross section of 0.1 m². Find the inductance and derive the formula used.
- 8 (a) Show that in a capacitor the conduction current and displacement current are equal.
(b) A capacitor has a capacitance of 1.5pF. Find the displacement current at $t = 0$, if a voltage $5 \sin 100(\pi t)$ is applied to it.
