

**Code: 9A02404**

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

**ELECTROMAGNETIC FIELDS**

(Electrical &amp; Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions  
All questions carry equal marks

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- 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  $(r, \phi, z)$  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 m<sup>2</sup>. 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.

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