Total No. of Questions : 8] *[Total No. of Printed Pages : 2*

Roll No

EE-6001 (CBGS)

B.E. VI Semester

Examination, May 2018

Choice Based Grading System (CBGS)

Electronic Magnetic Field Theory

Time : Three Hours *Maximum Marks : 70*

Note: i) Attempt any five questions.
ii) All questions carry equal marks.

1. a) State and prove Gauss's law as applied to an electric field and determine the field due to an infinite line charge. 7
   b) A uniform line charge $\lambda_l = 25$ nC/m lies on the line $x = -3$ and $z = 4$ m free space. Find the electric field intensity at appoint (2, 5, 3). 7

2. a) Establish the electrostatic boundary conditions for the tangential components of electric field and electric displacement at the boundary of two non dielectrics. 7
   b) Derive an expression for capacitance of spherical capacitor. 7

3. a) State and explain Biot-Savart's law and derive the expression for the magnetic field at a point due to an infinitely long conductor carrying current. 7
   b) A parallel plate capacitor with plate area of 5 cm^2 and plate separation of 3 mm has a voltage $50\sin 10^3 t$ volts applied to its plates. Calculate the displacement current assuming $\epsilon = 2\epsilon_0$. 7

4. a) What are the limitations of Amperes current law? How this law can be modified to time varying field. 7
   b) Calculate the magnetic flux density due to a coil of 100 amperes and area 50 cm^2 on the axis of the coil at a distance 10cm from the center. 7

5. a) Explain the concept of vector and scalar magnetic potentials. 7
   b) Derive an expression for MFI due to a square current carrying wire at its center. 7

6. a) Explain in detail about modification of Maxwell's equations for time varying fields. 7
   b) A galvanometer has a rectangular coil suspended in a radial magnetic field which acts across the plane of the coil. The coil 0.01m by 0.01m has 1000 turns and the flux density is 3 Wb/m^2. Find the torque on the coil for a current of 10mA. 7

7. a) Determine the inductance of a toroid. 7
   b) A solenoid of 10cm in length consisting of 1000 turns having the cross-section radius of 1cm. Find the inductance of solenoid. What is value of current required to maintain a flux of 1mWb in the toroid? Take $\mu_r = 1500$. 7

8. a) Explain pointing vector theorem. 7
   b) Explain sinusoidal time varying uniform plane wave in free space. 7

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