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BIEE-005

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B.Tech. IN ELECTRICAL ENGINEERING (BTELVI)

Term-End Examination

December, 2012

BIEE-005 : ELECTROMAGNETIC THEORY

Time : 3 hours *Maximum Marks : 70*

*Note : Answer **any seven** questions. All the questions are to be answered in English Language only. All questions carry **equal** marks.*

1. (a) State and explain Coulomb's law and hence show that electric field is inversely proportional to the square of the distance between two points. **5**

   (b) Three point charges $q_1 = +10^{-6}C$, $q_2 = -10^{-6}C$ and $q_3 = 0.5 \times 10^{-6}C$ are placed in air at the vertices of an equilateral triangle of 50 cm side. Determine the magnitude and direction of the force on q_3. **5**

2. For an electromagnetic wave explain the laws of reflection and Snell's law of refraction. **10**

3. What is understood by boundary conditions in static Electric field ? Derive the boundary conditions for a conductor free - space interface. **10**

4. (a) Discuss the solution of Poisson's and Laplace's equation in one dimension. 5

(b) Let $V = 2xy^2z^3$ and $\epsilon = \epsilon_0$. Given points is P(1,3,−1). Find V at point P. Also find out if V satisfies Laplace's equation. 5

5. State Biot - Savart's law and deduce from it an expression for magnetic field intensity $\vec{H}$ at a point located at a distance of r metres from an infinitely long straight conductor carrying a current I Amperes. 10

6. (a) Two wires carrying current in the same direction of 3A and 6A are placed with their axes 5cm apart, free space permeability $= 4\pi \times 10^{-7}$H/m. Calculate the force between them in kg/m length. 5

(b) Explain the concept of scalar and vector magnetic potentials. 5

7. Discuss the energy stored in magnetic fields. 10

8. Explain reflection of uniform plane waves with normal incidence at a plane dielectric boundary. 10

9. Derive transmission line voltage and current equations. Discuss the concept of Distortionless and lossless line. 10

10. Write short notes on ***any two*** of the following : 5+5=10

(a) Standing Wave Ratio (SWR)

(b) Smith Chart

(c) Gauss Theorem
