BIEE-009

B.Tech. – VIEP – ELECTRICAL ENGINEERING (BTELVI)
Term-End Examination
December, 2014

000255

BIEE-009 : APPLIED ELECTROMAGNETICS

Time : 3 hours   *Maximum Marks : 70*

Note : *Attempt any **seven** questions.*

1. Discuss the different types of charge distributions. Derive the expression for E due to infinite sheet charge.   *10*

2. (a) What is Gauss Law ? Prove its mathematical expression.   *5*

    (b) Explain special Gaussian Surfaces. What are the conditions for a surface to be special Gaussian surface ?   *5*

3. (a) Use Laplace's equation to find the capacitance per unit length of a coaxial cable of inner radius 'a' meters and outer radius 'b' meters.   *5*

    (b) Derive the relation between J, ρ_v and velocity v.   *5*

4. With reference to parallel plate capacitor obtain expression for capacitance, energy stored and energy density. *10*

5. (a) What is Biot-Savart Law ? Explain. *5*

(b) The conducting triangular loop in Figure 1 carries a current of 10 A. Find H at (0, 0, 5) due to side 1 of the loop. *5*
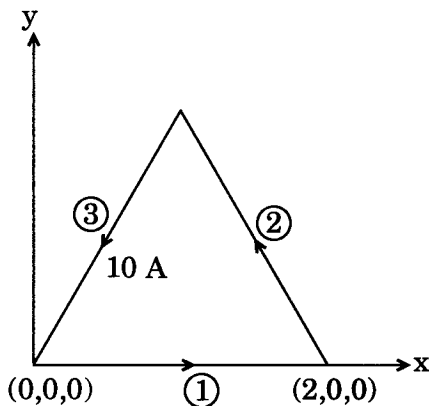

Figure 1

6. What is magnetic dipole ? Derive expression for field due to magnetic dipole. *10*

7. (a) A square filamentary loop 2 meters in side is placed in z = 0 plane with its centre at origin. If current 1 A is passing through loop, find H at origin. *5*

(b) Starting from Maxwell's equation prove that   5

$$\oint (\overline{E} \times \overline{H}) \cdot d\overline{S} = \int_V \overline{J} \cdot \overline{E} \, dV + \frac{\partial}{\partial t} \int \left(\frac{\varepsilon E^2}{2} + \frac{\mu H^2}{2} \right) dV$$

8. What do you understand by polarization of waves ? How many types of polarizations occur in waves ? Explain circular polarization in detail.   10

9. (a) A plane wave travelling in air is normally incident on a block of paraffin with $\varepsilon_r = 2 \cdot 2$. Find reflection and transmission coefficient.   5

(b) What is Poynting Vector ? Explain its physical significance.   5

10. Write short notes on any *two* of the following :   2×5=10

(a) Laplace and Poisson's equation

(b) Concept of Displacement current

(c) SWR