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BIEE-005

B.Tech. IN ELECTRICAL ENGINEERING (BTELVI)

01057

Term-End Examination

June, 2013

BIEE-005 : ELECTROMAGNETIC THEORY

Time : 3 hours *Maximum Marks : 70*

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

1. State and prove Gauss's theorem ? Give one application also. 10

2. Explain the concept of electric field and electric potential and derive expression for electric field intensity due to point charge. 10

3. (a) What are Poisson's and Laplace equations ? Write Laplace's equation in Cartesian, cylindrical and spherical coordinates. 5

   (b) Determine whether or not the following potential fields satisfy the Laplace's equation. 5

   (i) $V = x^2 - y^2 + z^2$

   (ii) $V = r\cos\phi + z$

4. Establish the boundary conditions for the tangential component of $\vec{H}$ at the boundary between two isotropic, homogeneous materials with permeabilities μ_1 and μ_2 show that from given Fig. 1 that : **10**

$$\frac{\tan\theta_1}{\tan\theta_2} = \frac{\mu_1}{\mu_2}$$

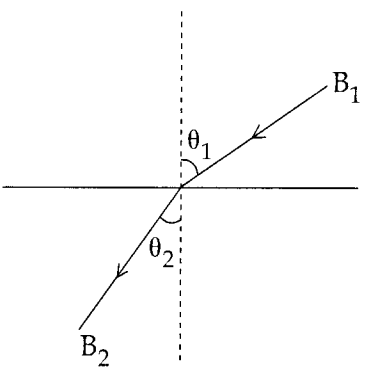

Fig. 1

5. Discuss the energy stored in electric and magnetic field. **10**

6. Write Maxwell's equations in integral and point form for static fields and explain physical significance of the equations ? Explain how they are modified for time - varying electric and magnetic fields. **10**

7. A lossy dielectric has $\mu_r = 1$, $\epsilon_r = 50$ and $\sigma = 60\,\mho/m$ at 15.9 MHz. Find α, β, v and η if the uniform plane wave is travelling through this medium. 10

8. Derive the relation for Poynting theorem and show that this relation can be used to explain the power transmitted. 10

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

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

(a) Wave polarization

(b) Smith chart

(c) Single and double stub matching