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BIEE-005

B.Tech. – VIEP – ELECTRICAL ENGINEERING (BTELVI)

00655

Term-End Examination

June, 2019

BIEE-005 : ELECTROMAGNETIC THEORY

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any* ***five*** *questions. All questions carry equal marks. Use of scientific calculator is allowed.*

1. (a) State and explain the Gauss divergence theorem. Write down its limitations and utilities. 7

(b) Point charges 5 nC and – 2 nC are located at (2, 0, 4) and (– 3, 0, 5) respectively. Determine : 7

(i) The force on 1 nC point charge located at (1, – 3, 7).

(ii) The electric field E at (1, – 3, 7).

2. (a) What do you mean by boundary conditions ?
Explain dielectric (Er_1) – dielectric (Er_2) boundary condition. 7

(b) State Continuity equation and Relaxation time. Derive them respectively. 7

3. (a) What are the methods of Image ? Also mention its limitation. 7

(b) Discuss cylindrical and rectangular coordinate system. 7

4. (a) Derive Biot-Savart's law and Ampere's law. 7

(b) Given the magnetic vector potential $A = -\rho^2/4\ \mathbf{a}_z$ Wb/m, calculate the total magnetic flux crossing the surface 7

$\phi = \pi/2,\ 1 \leq \rho \leq 2$ m, $0 \leq z \leq 5$ m.

5. (a) Explain Poynting vector and its applications. 7

(b) Explain the wave propagation in dielectric and conducting medium in a lossless non-conductor. 7

6. (a) In a non-magnetic medium

$$E = 4 \sin (2\pi \times 10^{-7}\ t - 0{\cdot}8x)a_z\ V/m$$

find 7

(i) ε_r, η

(ii) The total time-average power carried by the wave

(b) Discuss the transmission line equation for lossless line and distortionless line. 7

7. Write short notes on any ***two*** of the following :

2×7=14

(a) Parallel polarization

(b) Stokes' theorem, its limitations and utilities

(c) Gauss's theorem and its applications