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BIEE-005

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

Term-End Examination

December, 2018

00023

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 Coulomb's law and discuss its importance. 7

(b) Point charges 1 mC and – 2 mC are located at (3, 2, –1) and (–1, –1, 4), respectively. Calculate the electric force on a 10 nC charge located at (0, 3, 1) and the electric field intensity at that point. 7

2. (a) State Gauss's law. Deduce Coulomb's law from Gauss's law thereby affirming that Gauss's law is an alternative statement of Coulomb's and that Coulomb's law is implicit in Maxwell's equation $\nabla \cdot D = \rho_v$. 7

(b) Two dipoles with dipole moments $-5a_z$ nC/m and $9a_z$ nC/m are located at points (0, 0, –2) and (0, 0, 3) respectively. Find the potential at the origin. 7

3. (a) Write short notes on : 7

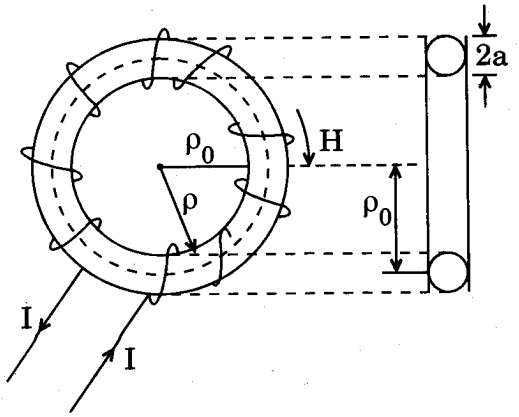
(i) Cylindrical coordinate system

(ii) Rectangular coordinate system

(b) Explain the general procedure for solving Laplace equation. 7

4. (a) State and explain Biot–Savart's law. Derive its formula as well. 7

(b) A toroid whose dimensions are shown in the figure below has N turns and carries current I. Determine H inside and outside the toroid. 7



5. (a) A plane wave in a non-magnetic medium has $E = 50 \sin (10^8 t + 2z) a_y$ V/m.

Find

(i) the direction of wave propagation

(ii) λ, f and ε_r

(iii) H. 7

(b) Show that in a good conductor, the skin depth δ is always much shorter than the wavelength. 7

6. (a) What do you mean by Smith Chart ? Explain how the Smith Chart is constructed and employed in calculation of transmission line characteristics such as T_L, S and Z_{in}. 7

(b) Discuss stub matching transients in lossless lines in detail. 7

7. Write short notes on any ***two*** of the following : *2×7=14*

(a) Law of Refraction and Snell's Law of Refraction

(b) Parallel Polarization

(c) Stokes' Theorem
