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(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID : 131323 | Roll No. | | | | | | | | | |

B.Tech.

(SEM. III) THEORY EXAMINATION, 2015-16

ELECTROMAGNETIC FIELD THEORY

[Time:3 hours] **[Total Marks:100]**

Section-A

1. Attempt **all** parts. All parts carry equal marks. Write answer of each part in short. (10x2=20)

   (a) State the conditions for a field to be solenoidal and irrotational.

   (b) Transform the point P (-2, 6, 3) in spherical coordinate system.

   (c) What are the various types of charge distribution? Give an example for each.

   (d) State the applicatiion of Gauss's law.

   (e) Give any one dissimilarity between electric and magnetic circuits.

(f) Distinguish between solenoid and toroid.

(g) Define Poynting vector and State Poynting Theorem.

(h) What is skin effect?

(i) How to avoid the frequency distortiion that occurs in the line?

(j) What is Impedance matching?

Section-B

Attempt **any five** questions from this section. (5x10=50)

2. State and explain Maxwell's equations. Discuss its physical significance.

3. Enlist the properties of conductors, dielectrics and semiconductor and obtain an expression for continuity current relation.

4. State the divergence theorem. Determine the flux of $D = \rho^2 \cos^2 \phi \hat{a}_\rho + Z \sin \phi \hat{a}_\phi$ over the closed surface of Cylinder $0 \le z \le 1, \rho = 4$. Verify the divergence theorem for this case.

5. Write the Laplacian equation in all three coordinate system. Find the potential function and electric field intensity for the region between two concentric right circular cylinder where V=Vo at r=a and V=0 at r=b (b>a)?

6. Derive the expression for inductance per unit length of co-axial conductor. A current filament of 2.5 A is placed along z axis and current in the directiion of a_z. then calculate the magnetic flux crossing the portion of plane defined by $\phi = \frac{\pi}{4}, 0.01 \le r \le 0.05$ and $0 \le z \le 2m$.

7. Derive the expression of reflection and transmission coefficients. Derive the relation between two.

8. A distortion less line has $Z_0 = 60\Omega, \alpha = 20mNp/m$, u=0.6c, where c is the speed of light in vacuum. Find R, L, G, C and λ at 100 MHz.

9. A 30m long transmission line with Z_0= 50ohms operating at 2 MHz is terminated with a load Z_L=60+j40ohms. If the velocity of the wave v=0.6c on the line, find the reflection coefficient I⁻ standing wave ratio and input impedance.

Section-C

Attempt **any two** questions from this section. (2x15=30)

10. Discuss the solution of plane wave equation in conducting media (Lossy Dielectric). Derive the above up to propagation constant, attenuation constant and phase constant.

11. Define displacement and conduction current densities. Derive the boundary conditions between dielectric (ϵ_{r1}) – dielectric (ϵ_{r2}) interfaces.

12. Define transmission loss, reflection loss and return loss. The 600 ohms lossless transmission line is feeded by 50 ohms generator. If the line is 200m long and terminated by load 500 ohms. Determine in dB (i) reflection loss, (ii) transmission loss, and (iii) return loss.

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