Printed Pages: 68 NEC-508

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

Paper ID : 131505 Roll No. | | | | | | | | | |

B.TECH.

(SEM. V) THEORY EXAMINATION, 2015-16

FUNDAMENTALS OF E.M. THEORY

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

Section-A

Note : All questions are ***compulsory.***

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

(a) State Stokes theorem.

(b) Give the application of cross product.

(c) Find gradient of $W = 2\rho^3 z \cos 2\phi$.

(d) What is Lorentz force?

(e) What is an equipotential surface?

(f) Define Scalar magnetic potential.

(g) State Poynting Theorem.

(h) Define Convection current.

(i) Write the Maxwell equation in differential and integral form for static magnetic fields.

(j) Give the relation between Magnetic field and Magnetic flux density?

Section-B

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

2. Given the potential $V = \frac{10}{r^2}\sin\theta\cos\phi$. Find the electric flux density D at $\left(2, \frac{\pi}{2}, 0\right)$.

3. State and explain Maxwell's equations for electrostatics and magnetostatics. Discuss its physical significance.

4. Prove the vector triple product identiy AXBXC = B(A.C)-C(A.B). Evaluate div (curlA) if $A = \frac{\sin\phi}{r^2}a_r - \frac{\cos\phi}{r^2}a_\phi$.

5. Explain the pehnomenon of polarization and explain its types.

6. State Coulomb's law. Derive an expression for elecric field intensity due to line charge density ρ_l.

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

8. Find the magnetic field intensity due to infinitely long charged wire as an application of Ampere circuital law.

9. Find the value of α (attenuation), β (Phase Constant) for good conductors. Find out the angle of characteristic impedence for good conductors.

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 propagation constant and characteristic impedace. Derive the boundary conditions for electric field between two dielectrics having different permittivity interfaces.

12. Find the expression for α, β, γ for lossless or perfect dielectric medium. A 10 GHz plane wave travelling in free space has an amplitude of E_x=10V/m. find V, β, λ, η and the amplitude of H.

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