QP Code : 29136

Duration: 3 hrs   Total Marks: 100

NOTE:

1. Question No 1 is compulsory
2. Solve any four out of remaining six questions
3. Figures on right hand indicate full marks
4. Assume suitable data if necessary

Q1) Solve any Four   [20]

    a. Prove that the curl of gradient of a scalar function is zero.

    b. State and explain amperes circuital law.

    c. Show that the electrostatic energy stored in parallel plate capacitor is given by $\frac{1}{2}CV^2$.

    d. State and explain Divergence theorem.

    e. Prove that static electric field is irrigational and the static magnetic field is solenoid

Q2)   [20]

    a. Derive an expression for an Electric Field Intensity due to an infinite sheet charge.

    b. A uniform line charge, $\rho_L = 25$ nc/m lies on the line X = -3, Z = 4 in free space. Find E at the point P(2, 15, 3)

Q3)   [20]

    a. If $\bar{E} = -8xy\,\bar{a}_x + 4x^2\bar{a}_y + \bar{a}_z$ v/m. Find the work done in carrying a 6 coulombs charge from A(1, 8, 5) to B(2, 18, 6) along the path y= 3x+2, z=x+4

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b. Given that $D = [(10x^3) / (3)]$. a_x c/m^2 evaluate both sides of the divergence theorem for volume of cube, 2m on an edge, centered at the origin and with edges parallel to the axes.

Q4) [20]

a. Find the capacitance of a co-axial conductor of length L, where inner and outer radii are r_1 and r_2 respectively.

b. V = 0 volts, for r = 0.1m and v = 100 volts for r = 2.0m in spherical co-ordinates, Assuming free space between the concentric spherical shells, find E & D using Laplace's equation.

Q5) [20]

a. Using Biot Savart Law, find the magnetic field intensity due to finite long straight filament placed along z-axis.

b. A square filamentary loop 2 meters in side is placed with Z = 0 plane with its center at origin. If current of 10A is passing through loop, find H at origin.

Q6) [20]

a. The circular loop conductor lies in the z = 0 plane, has a radius of 0.1m and resistance of 5.0Ω. Given $\overline{B} = 0.20 \sin 10^3 t$ $\overline{a_z}$ (T), determine the current in the loop.

b. State and explain Maxwell equation for time varying fields

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Q7) [20]

a. Define Poynting vector. Obtain the integral form of the Poynting theorem and explain each of the terms

b. A lossy electric has $\mu r = 1$, $\varepsilon r = 50$ and $6 = 20$mho/s at 15.9 MHz, electromagnetic wave propagating through this medium. Find attenuation constant α, phase constant β, velocity of propagation and intrinsic impedance of the medium.   .