Total No. of Questions : 4]

SEAT No. :

PE48

[Total No. of Pages : 1

[6579]-350

T.E. (Electronics and Telecommunication) (Insem)

ELECTROMAGNETIC FIELD THEORY

(2019 Pattern) (Semester - I) (304182)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic packet calculator and smith chart is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) State and Prove Gauss's Law. **[6]**

b) The electric potential near the origin of a system of co-ordinates is $V = 5x^2 + 8y^2 + 10z^2$. Find the electric field at a point A (1,2,3). **[6]**

c) Define Electric Field intensity and derive its expression for point charge. **[3]**

OR

Q2) a) Two point charges –4 μ C and 5 μ C are located at (2,–1,3)and (0,4,–2) respectively. Find the potential at (1,0,1) assuming zero potential at infinity. **[6]**

b) Derive an expression for the potential gradient $E = -\nabla V$. **[5]**

c) Explain the physical significance of gradient and divergence. **[4]**

Q3) a) State Ampere's circuital law. Find magnetic field intensity H due to an infinitely long straight current carrying conductor using Ampere's law. **[7]**

b) The point Q=18 nC is has velocity of 5×10^6 m/s in the direction $a_v = 0.60 a_x + 0.75 a_y + 0.30 a_z$ calculate the magnitude of force exerted on the charge by the field, **[6]**

i) Electric field intensity $E = -3 a_x + 4 a_y + 6 a_z$ kV/m

ii) Magnetic flux density $B = -3 a_x + 4 a_y + 6 a_z$ mT

c) Define and explain Biot-Savart's law. **[2]**

OR

Q4) a) Find the vector current density in rectangular coordinate system at A (2,3,4) if Magnetic field intensity $H = x^2 z\, a_x - y^2 x\, a_z$ A/m. **[6]**

b) Find magnetic field intensity H due to a circular current carrying loop on the axis of a loop using Ampere's law. **[7]**

c) State and explain Lorenz force equation. **[2]**

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