B.Tech. SEM -V Electronics Engg.) 2014 Course (CBCS) : SUMMER - 2019

SUBJECT : ELECTROMAGNETIC ENGINEERING

Day : Wednesday
Date : 15/05/2019

S-2019-2676

Time : 10.00 AM TO 01.00 PM
Max. Marks : 60

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable **CALCULATOR** is allowed.

Q.1 **a)** Define Gradient, divergence and curl. **[05]**

b) Express $A = 2y\,\hat{a}_x - 2\hat{a}_y + x\,\hat{a}_z$ in spherical coordinates. **[05]**

OR

a) Give cylindrical coordinates of point P(1, 2, 3). **[05]**

b) Define force between point charges and coulomb's law. **[05]**

Q.2 **a)** Derive application of Gauss's law to differential volume element (Divergence theorem). **[06]**

b) Find E at points P(3, 8, -3) and Q(8, 2, 6) due to sheet charge 24 nC/m^2 located at y = 4 plane. **[04]**

OR

a) Discuss in detail boundary conditions of electrostatic fields at boundary between conductor-dielectric. **[06]**

b) Find electric flux density at (6, 4, -5) due to line charge $\rho_L = 40\mu C/m$ on z-axis. **[04]**

Q.3 **a)** A conductor 4m long lies along the y-axis with a current of 10A in a_y direction. Find the force on conductor if the field in region is B = $0.05a_x$ T. **[04]**

b) Define Ampere's circuital law. **[03]**

c) Define vector magnetic potential. **[03]**

OR

a) Derive magnetic force on a current element. **[04]**

b) Derive for magnetic field intensity caused by a finite current carrying element on z-axis. **[04]**

c) Define magnetic torque. **[02]**

Q.4 **a)** Write down Maxwell's equation in point and integral form for time-varying fields. **[05]**

b) In a lossless medium for which $\eta = 40\pi$, $\mu_r = 1$, find ε_r and ω. **[05]**

OR

a) Discuss wave propagation through lossless dielectric (perfect). **[05]**

b) Define wave polarization. **[05]**

Q.5 **a)** For a transmission line the per unit length parameters are 0.1 Ω/m, 0.2μH/m, 10PF/m and 0.02 S/m. Find complex propagation constant at **i)** 1MHz **ii)** 1GHz. **[05]**

b) Discuss loss-less and loss-loss transmission lines. **[05]**

OR

Derive the expressions for input impedance, phase velocity and group velocity of transmission line. **[10]**

Q.6 Write short note on: **[10]**

i) Hertzian dipole **ii)** Magnetic dipole

OR

Derive the field expressions for TE wave in a rectangular waveguide. **[10]**

* * * *