SEAT No. :

P2866

[4958]-1055

[Total No. of Pages :2

T.E. (Electronics Engg.)
ELECTROMAGNETIC AND WAVE PROPAGATION
(2012 Pattern) (End Semester) (Semester - I) (304204)

Time : 2½ Hours]   *[Max. Marks :70*

Instructions to the candidates:

   1)   Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8.
   2)   Neat diagram must be drawn wherever necessary.
   3)   Figures to the right side indicate full marks.
   4)   Assume suitable data if necessary.
   5)   Use of calculator is allowed.

Q1) a)   State and prove Gauss's law.   **[6]**

   b)   Two dipoles with momentum $-6a_z$ nC/m and $9a_z$ nC/ m are located at point (0,0,2) & (0,0,3) respectively. Find the potential at the origin.   **[8]**

   c)   State and derive Biot-Savart's law.   **[6]**

<p align="center">OR</p>

Q2) a)   Define and derive Electric potential and potential difference.   **[6]**

   b)   An infinite long current filament is placed along Z-axis. The magnetic field intensity at point $P(3,4,0)$ *is* $10(-0.8\overrightarrow{a_x}+0.6\overrightarrow{a_y})$ A/m. find the current through the filament.   **[8]**

   c)   State and explain the scalar and vector magnetic potential.   **[6]**

Q3) a)   Write Maxwell's equations in point form and integral form.   **[9]**

   b)   In free space E = 20 cos(ωt – 50x) a_y determine   **[9]**

       i) J_d ii)   H   iii) ω

<p align="center">OR</p>

Q4) a) State and derive Poynting theorem. **[9]**

   b) In non magnetic medium E=4sin $(2\pi107t-0.8x)$az V/m. Find the following things.

   i) $\varepsilon r, \eta$

   ii) The time-average power carried by the wave.

   iii) The total power crossing 100cm² of plane 2x+y=5. **[9]**

Q5) a) Define polarization and explain all types of polarization with expression. **[8]**

   b) Explain and derive the plane wave equation in lossless dielectrics. **[8]**

<div align="center">OR</div>

Q6) a) Explain the reflected wave, Transmitted wave, incident wave. **[6]**

   b) In lossless dielectric for which $\mu=60\pi$, μ_r =1, and

   $H = -0.1 \cos(\omega t - z)a_{x+} 0.5\sin(\omega t - z)a_y$ A/m, calculate ε_r, ω, and **E. [10]**

Q7) a) Explain the different types of wave propagation in detail. **[8]**

   b) Define following terms: **[8]**

   i) Virtual height

   ii) Maximum Usable Frequency (MUF)

   iii) Skip distance

   iv) Critical Frequency

<div align="center">OR</div>

Q8) a) Derive and explain the Friis Transmission equation. **[8]**

   b) Explain the characteristics of wireless channel in details. **[8]**

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