

Total No. of Questions :8]

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 $-6a_z \text{ nC/m}$ and $9a_z \text{ nC/m}$ 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]

OR

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 $10(-0.8\vec{a}_x + 0.6\vec{a}_y)$ 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 $E = 20 \cos(\omega t - 50x) a_y$ determine [9]

- i) J_d ii) H iii) ω

OR

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- Q4)** a) State and derive Poynting theorem. [9]
- b) In non magnetic medium $E=4\sin(2\pi 107t-0.8x)az$ V/m. Find the following things.
- ϵ_r, η
 - The time-average power carried by the wave.
 - The total power crossing 100cm^2 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]

OR

- Q6)** a) Explain the reflected wave, Transmitted wave, incident wave. [6]
- b) In lossless dielectric for which $\mu=60\pi$, $\mu_r = 1$, 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 \mathbf{E} . [10]

- Q7)** a) Explain the different types of wave propagation in detail. [8]
- b) Define following terms: [8]
- Virtual height
 - Maximum Usable Frequency (MUF)
 - Skip distance
 - Critical Frequency

OR

- Q8)** a) Derive and explain the Friis Transmission equation. [8]
- b) Explain the characteristics of wireless channel in details. [8]

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