

Total No. of Questions : 8]

SEAT No. :

P3507

[5560]-157

[Total No. of Pages : 2

T.E. (E&TC)

ANTENNA AND WAVE PROPAGATION

(2012 Pattern) (Semester - II) (End Semester)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer any one questions out Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if necessary.

Q1) a) Assume the medium is lossless with relative permeability $\mu_r = 1$ and relative permittivity $\epsilon_r = 3.5$, wave of 700MHz is propagating through a material, which has maximum electric field intensity of 30V/m. Determine velocity of propagation, wavelength, and intrinsic impedance propagation constant. **[8]**

b) Explain the following terms with respect to the wireless channel propagation. **[6]**

- i) Multipath
- ii) Delay Spread
- iii) Fading

c) Derive vector potential A for an magnetic current source J . **[6]**

OR

Q2) a) What is polarization of wave? Explain linear and circular polarization of wave. **[6]**

b) Write a short note on i) Critical frequency ii) Skip Distance. **[6]**

c) An antenna has a radiation resistance of 72Ω , a loss resistance of 12Ω and power gain of 15db; calculate the antenna efficiency and its directivity. **[8]**

Q3) a) Derive the equation for input impedance and directivity of half wave dipole. **[8]**

b) Show the current distribution on small dipole and derive the equation for its input impedance. **[8]**

OR

P.T.O.

- Q4)** a) Hertzian dipole of length $L = 2\text{m}$ operates at 2MHz , find radiation resistance if copper conductor has $\sigma = 57 \times 10^6 \text{mho/m}$, $\mu_r = 1$ and radius of 1mm . [6]
- b) Give the comparison of far fields of small loop and short dipole. [6]
- c) Write a short note on: monopole antenna. [4]

- Q5)** a) Calculate the null to null beam width and half power beam width in degrees if an array contains 100 isotropic radiators with an inter element spacing of 0.3λ . It is required to produce broadside beam. [8]
- b) Derive antenna array factor for N-element linear array taking the centre element as reference for N is odd and even. [8]

OR

- Q6)** a) Determine the null to null beam width of endfire array when the array length is 15λ and number of elements are 25. [8]
- b) Explain in brief Dolph - Tchebyscheff distribution. What is the need for Tchebyscheff distribution? [8]

- Q7)** Explain the following antennas with its structural details dimensions, radiation pattern, diagram, specifications, features and applications. [18]

- a) Rhombic antenna
- b) Lens antenna
- c) Super turnstile antenna

OR

- Q8)** a) Explain the working of Micro strip antenna in detail. [8]
- b) With the help of suitable diagram explain the operating principle of [10]
- i) Antenna with parabolic reflector
 - ii) Slot antenna

