

Total No. of Questions : 8]

SEAT No. :

P1316

[4858] - 1050

[Total No. of Pages : 3

T.E. (E & TC)

ANTENNA & WAVE PROPAGATION

(2012 Pattern) (End Sem.)

[Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answers any one Questions out of Q1 & Q2, Q3 & Q4, Q5 & Q6, Q7 & Q8.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume Suitable data if necessary.*

- Q1)** a) What is poynting vector? What is its significance? Derive an expression for poynting vector? [6]
- b) Derive the fundamental equation for free space propagation and explain its parameter [6]
- c) A lossless resonant $\lambda / 2$ dipole antenna with input impedance of 73Ω is to be connected to a transmission line whose characteristics impedance is 50Ω . Assuming that the pattern of the antenna is given approximately by $U=B\sin^3\theta$. Find the overall maximum gain of this antenna. [8]

OR

- Q2)** a) State Maxwell's field equation with their significane and derive the wave equation foe lossless dielectric medium. [6]
- b) Derive vector potential A for an magnetic current source J. [6]
- c) Explain the following wireless channel characteristics [8]
- i) Coherence bandwidth
 - ii) Coherence time

P.T.O.

Q3) Find the following terms for half wave Dipole: **[18]**

- a) Specify the current
- b) Vector magnetic potential
- c) Far field components of Electric & Magnetic fields
- d) radiation density, radiation intensity
- e) radiated power, radiation resistance
- f) Directivity
- g) draws the radiation pattern

OR

- Q4)** a) Calculate the radiation resistance of a double turn and an eight turn small circular loop when radius of loop is $\lambda / 10$ and the medium is free space. Calculate its efficiency if loss resistance is 25Ω **[6]**
- b) Derive the expression for radiation resistance of Infinitesimal dipole. **[6]**
- c) Derive the expression for input impedance of small dipole. **[6]**

- Q5)** a) Write a short notes on **[8]**
- i) Pattern Multiplication
 - ii) Binomial Array
- b) An Endfire array with element spaced at $\lambda / 2$ and with axes of elements at right angles to the line of array is required to have directivity of 36. Determine - the array length and the width of major lobe. **[8]**

OR

- Q6)** a) Design a broad side Dolph - Tschebysheff array of five elements with half wavelength spacing between elements and with major to minor lobe ratio to be 19dB. Find the excitation coefficients & array factor. **[6]**
- b) Give the comparison of broadside and End fire antenna array. **[5]**
- c) Explain planar array. State its advantages and applications. **[5]**

- Q7)** a) What is Microstrip patch antenna? Give structure details, radiation pattern, specification and application of such antenna. [5]
- b) What is meant by Rhombic Antenna? How it is constructed? Explain how unidirectional pattern is obtained in properly terminated Rhombic Antenna. [5]
- c) Write a short notes on following antennas with respect to structural details, radiation pattern, features and applications [6]
- i) Hertz antenna
 - ii) Whip antenna

OR

- Q8)** a) Write a short notes on the following antennas [12]
- i) Lens Antenna
 - ii) Resonant Antenna
 - iii) Super - turnstile Antenna
- b) A paraboloidal reflector antenna with diameter 20m is designed to operate at frequency of 6 GHz and illumination efficiency of 0.54. Calculate the antenna gain in decibels. [4]

