Total No. of Questions : 8]

SEAT No. :

P2386

[Total No. of Pages : 3

[4758]-545

T.E. (E & TC)

ANTENNA & WAVE PROPAGATION

(2012 Course) (Semester - II) (End - Sem.)

Time : 3 Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer any one Questions out of Q.No.1 or 2, Q.No.3 or 4, Q.No.5 or 6, Q.No.7 or 8.***
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 polarization of wave? Explain the polarization of three types of wave with the help of relevant diagram? **[8]**

b) Write a short note on **[6]**

i) Ionospheric abnormalities

ii) Multihope propagation

c) A lossless resonant $\lambda/2$ dipole antenna with input impedance of 73 Ω is to be connected to a transmission line whose characteristics impedance is 50Ω. Assuming that the pattern the antenna is given approximately by $U = B_o \sin^3\theta$. Find the overall maximum gain of this antenna. **[6]**

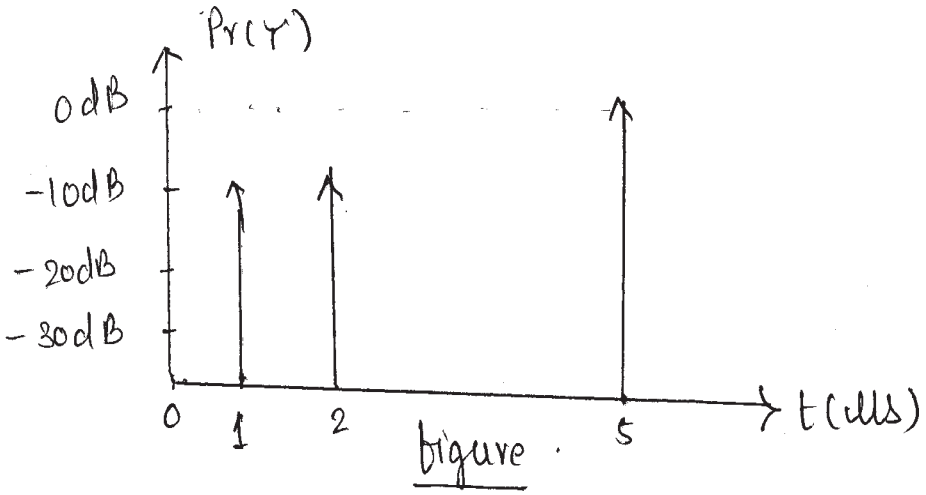
OR

Q2) a) What is poynting vector? What is its significance? Derive an expression for poynting vector? **[6]**

b) Explain antenna radiation mechanism in detail. **[6]**

c) Calculate the mean excess delay, rms delay spread, and the maximum excess delay (10dB) for the multipath profile given in the figure below. Estimate the 50% coherence bandwidth of the channel. **[8]**

P.T.O.



figure

Q3) a) Derive the expression for radiation resistance of Infinitesimal Dipole. **[9]**

b) Derive the expression for radiation resistance of small dipole antenna. **[9]**

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. **[8]**

b) Derive mathematical expression for power density and radiation intensity of half wave dipole antenna and draw radiation pattern of half wave dipole antenna in E and H plane. **[10]**

Q5) a) Write a short notes on **[8]**

i) Pattern Multiplication.

ii) Binomial Array.

b) Design a broad side Dolph-Tschebhysheff 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. **[8]**

OR

Q6) a) Explain planar array. State its advantages and applications. **[6]**

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. **[5]**

c) Give the comparison of broadside and End fire antenna array. **[5]**

Q7) a) Give structure details, radiation pattern, specification and application of Super-turnstile Antenna. **[5]**

b) What is meant by Rhombic Antenna? Explain its construction and operating principle. **[5]**

c) Write a short notes on following antennas with respect to structural details, radiation pattern features and applications. **[6]**

i) Hertz antenna

ii) Lens Antenna

OR

Q8) a) Write short notes on the following antennas. **[12]**

i) Whip antenna

ii) Slot Antenna

iii) Microstrip patch 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]**

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