

Total No. of Questions : 8]

SEAT No. :

P 3284

[Total No. of Pages : 2

[5353] - 157

T.E. (E&TC)

ANTENNA AND WAVE PROPAGATION

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.

- Q1) a) Calculate the skip distance for flat earth with MUF of 10MHz. If wave is reflected from a height of 300km where maximum value of refractive index (n) is 0.9. [8]
- b) Explain the following characteristics of wireless channel [6]
- i) coherence band width
 - ii) coherence time and
 - iii) fading.
- c) Derive vector potential A for an magnetic current source J. [6]

OR

- Q2) a) What is pointing vector? What is its significance? Derive an expression for pointing vector? [6]
- b) Write a short note on structure of atmosphere. [6]
- c) A lossless half wave dipole antenna of $(73 + j42.5)\Omega$ having directional gain of 1.15 dB is driven from 10 V, 50Ω generator. Determine electric field intensity at a distance 10km in a plane perpendicular to the antenna. [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

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Q4) a) Find the radiation efficiency of a single turn and eight—turn small circular loop at $f = 100\text{MHz}$. The radius of the loop is $\lambda/25$, the radius of the wire is $10^{-4} \lambda$ and the turns are spaced $4 \times 10^{-4} \lambda$ apart. Assume the wire is copper with a conductivity of $5.7 \times 10^7 \text{ (S/m)}$ and antenna is radiating into free space. [10]

b) Give the comparison of far fields of small loop and short dipole. [6]

Q5) a) A broadside array of identical antennas consists of 8 isotropic radiators separated by distance $\lambda/2$. Find radiation field in a plane containing the line of array showing direction of maxima and null. [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) Draw and explain the radiation pattern of an endfire array. [8]

b) Design a broadside Dolph - Tchebyshev array of 10 elements with half wave spacing (d) between the elements and with a major to minor lobe ratio of 26 dB. Calculate the excitation coefficient. [8]

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

a) Micro strip antenna

b) Lens antenna

c) Whip antenna

OR

Q8) a) Explain the working of Super turnstile antenna in detail. [8]

b) With the help of suitable diagram explain the operating principle of [10]

i) Rhombic antenna

ii) Slot antenna.

