

2125
B.E. (Electronics and Communication Engineering)
Fifth Semester
EC-503: Antennas and Wave Propagation

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Answer the following:-

- a) Define the term "Radiation Resistance ."
- b) Illustrate the concept of reciprocity in antennas with an examples to support your answer.
- c) What is the need of Impedance matching?
- d) List various modes of propagation with frequency range of each mode?
- e) What is the significance of Skip distance?
- f) What is a uniform linear array?
- g) What is a rectangular antenna array?
- h) Describe the Half Power Beam Width (HPBW).
- i) What is binomial array?
- j) Give the effect of earth on radiation patterns? (10x1)

UNIT - I

- II. a) Starting from the fundamentals, derive an expression for radiated electric field for half wave dipole and sketch the field strength pattern.
b) If an antenna has a directivity of 5 dBi, what is its radiation intensity if it radiates a total power of 100 W? Use the formula. $U = P/4\pi \times D$,Where U is radiation intensity and D is directivity. (2x5)
- III. a) Given an antenna with a radiation efficiency of 70% and a gain of 10 dBi, calculate its effective isotropic radiated power (EIRP) if the input power is 50 W.
b) Define antenna temperature. Differentiate among antenna temperature of isotropic and perfectly directional antenna. (6,4)
- IV. a) Discuss various impedance matching and feeding techniques of an antenna.
b) Explain about Folded dipoles and write its characteristics. (5+5)

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(2)

UNIT - II

- V. a) Explain construction and working of frequency independent antenna?
b) Calculate the skip distance for flat earth with MUF of 10 MHz if the wave is reflected from a height of 300 km where the maximum value of n is 0.9. (5+5)
- VI. a) Explain how environmental factors affect wave propagation in urban areas compared to rural areas.
b) Compare critical and maximum usable frequency. Derive an expression for MUF considering earth curvature. (5+5)
- VII. What are the key design parameters for a Rhombic Antenna? Explain how vertical wave angle, side lengths, tilt angle, and height above ground affect its performance. (10)

x-x-x