

III B. TECH II SEMESTER REGULAR EXAMINATIONS APRIL - 2023
ANTENNAS AND WAVE PROPAGATION
(ELECTRONICS AND COMMUNICATIONS ENGINEERING)

Time: 3 hours

Max. Marks: 70

Note: Answer **ONE** question from each unit (**5 × 14 = 70 Marks**)

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UNIT-I

1. a) Explain the following: (i) Antenna Efficiency (ii) Front to Back Ratio. [7M]
- b) With the help of neat circuit diagram explain the principle of radiation mechanism in antennas. [7M]

(OR)

2. a) Derive the relation between Directivity and effective aperture of an antenna. [7M]
- b) Explain about different polarizations with suitable expressions and sketches. [7M]

UNIT-II

3. a) Define retarded potentials? Explain Heuristic approach. [7M]
- b) Define the statement of reciprocity theorem and derive the condition for reciprocity theorem. [7M]

(OR)

4. a) Compute the radiation resistance of a half wave dipole. Hence give the value of a quarter wavelength monopole. [7M]
- b) A half-wave dipole is located on a perfectly conducting ground with sinusoidal current distribution. Deduce the expression for average power radiated by the dipole. [7M]

UNIT-III

5. a) Derive the expression for the far field pattern of an array of 2 – isotropic point sources with Equal amplitude and opposite phase. [7M]
- b) Explain the principle of Pattern multiplication. [7M]

(OR)

6. a) Explain about design concept of Binomial Array Antenna? [7M]
- b) Give the comparison between parabolic and corner reflectors. [7M]

UNIT-IV

7. a) Distinguish between sectoral, pyramidal and conical horns, with neat sketches. List out their utility and applications. [7M]
- b) Explain about usage of Radiator and Reflectors in antennas system? How improve the antenna gain and reduce the back lobes with antenna elements? [7M]

(OR)

8. a) With reference to paraboloids, explain: (a) f/d ratio. (b) Spill over and aperture efficiency. (c) Front to back ratio. (d) Type of feeds. [7M]
- b) Describe How gain of an antenna under test is measured using absolute gain method. [7M]

## UNIT-V

9. a) What are the different paths used for propagating radio waves from 300 kHz and 300 MHz? [7M]
- b) Describe the structure of the ionosphere and how its layers are aiding long distance communication at radio frequencies. [7M]

(OR)

10. a) Derive the expression for maximum usable frequency (MUF) considering flat and curved surfaces of the earth separately in terms of critical frequency and other parameters. [7M]
- b) A radio link has to be established between two earth stations placed at a distance of 25000 km between them. If the height of the ionosphere is 200 km and its critical frequency is 5 MHz, Calculate the MUF for the given path. Also calculate the electron density in the ionospheric layer. [7M]

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