

**R18**

**Code No: 156AF**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

**B. Tech III Year II Semester Examinations, July - 2023**

**ANTENNAS AND PROPAGATION**  
**(Electronics and Communication Engineering)**

**Time: 3 Hours**

**Max. Marks: 75**

**Note:** i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

**PART – A**

**(25 Marks)**

- 1.a) Define Beam width. [2]
- b) Compare the far fields of small loop and short dipole. [3]
- c) Write a short note on Binomial array. [2]
- d) What is meant by antenna ranges? What are the different types of the same? [3]
- e) Write applications of folded dipole antenna. [2]
- f) What is parasitic element? Describe usage of elements. [3]
- g) List the advantages and disadvantages of Microstrip antenna. [2]
- h) What is the basic concept of reflector antenna? Mention its types. [3]
- i) Define the terms: i) Absorption ii) Critical frequency. [2]
- j) Write about Multi – hop propagation. [3]

**PART – B**

**(50 Marks)**

2. Derive expressions for the Far Field components and Radiation resistance of a short dipole antenna. [10]

**OR**

- 3.a) Derive the EMF equation for a small loop antenna.
- b) What is effective length of an antenna? Determine effective length of a half wave dipole antenna. [6+4]

- 4.a) How a unidirectional pattern is obtained in an End fire array and explain in detail?
- b) Derive an array factor of a uniform linear array of 'N' identical elements. [5+5]

**OR**

5. Define the term directivity and list out different formulas for its evaluation. Explain various methods of measuring directivity. [10]

6. What is a Yagi – Uda antenna? Explain its construction and properties with special reference to directivity, bandwidth and input impedance. [10]

**OR**

- 7.a) What is the electromagnetic horn antenna? Sketch and explain its characteristics with its dimensional relations.
- b) Discuss the design characteristics of pyramidal and sectorial horns. [5+5]

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8. Explain the geometry, requirements and properties of parabolic reflectors. Hence establish the Fermat's principle with a neat sketch. [10]

**OR**

9.a) Explain the design procedure of rectangular patch antenna. [7+3]  
b) Write a short notes on plane reflectors.

10.a) Derive the expression for Free space propagation.  
b) Explain phenomenon of Duct propagation. [5+5]

**OR**

11.a) What information is conveyed by it regarding the ionosphere? Describe a method to measure critical frequency.  
b) Explain about LOS propagation. [5+5]

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