

Code No: 125DQ

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, November/December - 2017

ANTENNAS AND WAVE PROPAGATION

(Common to ECE, ETM)

Time: 3 hours

Max. Marks: 75

**Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**PART - A**

(25 Marks)

- |      |   |     |
|------|---|-----|
| 1.a) | What is quarter wave monopole?                                  | [2] |
| b)   | Write the relation between effective aperture and Directivity.  | [3] |
| c)   | Draw the structure of helical antenna with a coaxial line feed. | [2] |
| d)   | What is the spacing between elements of Yagi - Uda antenna      | [3] |
| e)   | What are the disadvantages of lens antennas?                    | [2] |
| f)   | Write short notes on horn antenna.                              | [3] |
| g)   | What is the main disadvantage of binomial array?                | [2] |
| h)   | Draw uniform linear array.                                      | [3] |
| i)   | Derive the expression for refractive index of ionosphere.       | [2] |
| j)   | Explain the concept of super refraction.                        | [3] |

**PART - B**

(50 Marks)

- |           |   |       |
|-----------|---|-------|
| 2.a)      | Derive an expression for the radiation resistance of a Half wave dipole antenna.  |       |
| b)        | What is meant by the effective area of an antenna? How is it related to the gain?   | [5+5] |
| <b>OR</b> |   |       |
| 3.        | Discuss about loop antenna. What are the disadvantages of loop antenna? What are applications loop antennas?                                    | [10]  |
| <b>OR</b> |   |       |
| 4.a)      | Write short notes on Yagi-Uda array Antenna and its applications, advantages and drawbacks.   |       |
| b)        | Discuss different types of horn antennas with neat sketches.  | [7+3] |
| <b>OR</b> |   |       |
| 5.        | With neat sketch, explain the operation of helical antenna.   | [10]  |
| 6.a)      | Explain the geometry of paraboloidal reflector with neat diagram.   |       |
| b)        | Calculate the 3dB beam width and power gain of a parabolic antenna at a frequency of 1.6GHz with 2.4 meter diameter and 48% antenna efficiency? | [6+4] |
| <b>OR</b> |   |       |
| 7.a)      | Compare UHF and VHF antennas.   |       |
| b)        | What are the various feeds used in reflectors?  | [7+3] |

- 8.a) Discuss broadside array and end fire array with neat diagrams.  
b) Derive expression for antenna array factor.

[7+3]

OR

- 9.a) An end fire array consisting of several half wave length long isotropic radiators having directive gain of 30. Find the length of array for broad side antenna?  
b) A broadside array of identical antennas consists 8 isotropic radiators separated by distance  $\lambda/2$ . Find radiation field in a plane containing the line of array showing directions of maxima and null.

[7+3]

10. Briefly describe the following terms connected with sky-wave propagation:

- a) Virtual height  
b) Critical frequency  
c) Maximum usable frequency  
d) Skip distance.

[10]

OR

- 11.a) Describe the troposphere and explain how ducts can be used for microwave Propagation.  
b) Write a short note on Multi-hop propagation.

[6+4]

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