

Code No: 115DQ**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B. Tech III Year I Semester Examinations, March - 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) Define the terms antenna efficiency and radiation efficiency. [2]
- b) If the power density due to a point source in a free space at a distance of 25 Km is 100 micro watt/m² then what is the power density if the distance is (i) doubled (ii) halved. [3]
- c) What is optimum horn? Explain its important features. [2]
- d) Explain how unidirectional pattern is formed in Yag Uda antenna from the bi directional pattern of folded dipole. [3]
- e) Why is zoning done in lens antenna? [2]
- f) Discuss various methods available for analysis of microstrip antenna. [3]
- g) Explain how beam steering is achieved in uniform linear array? [2]
- h) Calculate directivity of a given linear uniform BSA of 10 element with separation of $\lambda/4$ between the elements. [3]
- i) What is skip distance? [2]
- j) What is wave tilt? List all the factors that affect wave tilt. [3]

PART - B**(50 Marks)**

- 2.a) Derive the expression for radiation fields of a centre fed half wavelength dipole antenna. Sketch the radiation pattern.
- b) Prove the reciprocity theorem as applicable to antennas and hence show the equality of directional pattern for transmission and reception by same antenna. [5+5]

OR

- 3.a) Compare far fields of small loop antenna and short dipole antenna.
- b) What is the radiation resistance of antenna? Derive the expression for radiation resistance of half wave length dipole antenna. [5+5]
- 4.a) Derive the construction and basic principles of operation of a helical antenna under (i) normal mode of operation (ii) axial mode of operation
- b) Explain the working of folded dipole antenna. [5+5]

OR

- 5.a) Draw the sketch of Yagi Uda array antenna. Prove how the longer antenna behind the main antenna behaves as a reflector and the shorter antenna in front of main antenna acts as a director. www.ManaResults.co.in
- b) What is electromagnetic horn antenna? What are the various types of horn? What are their practical applications? [5+5]

- 6.a) Discuss the principle of operation and the consideration which have to be gone into the design and construction of parabolic reflector antenna.
- b) Explain the various feeding mechanisms used in parabolic reflector antennas. [5+5]
- OR**
- 7.a) Show that the contour of a nonmetallic dielectric lens antenna is a hyperbola.
- b) Explain the principle of working of lens antenna. [5+5]
- 8.a) What is binomial array antenna. What its basic principle of working? Mention the advantages and disadvantages.
- b) What is the principle of pattern multiplication explain with an example. [5+5]
- OR**
- 9.a) What is near field and far field region? Why is the condition $2D^2/\lambda$ chosen for far field region.
- b) With a neat sketch explain the procedure of radiation pattern measurement. [5+5]
- 10.a) Derive the relation for dielectric constant of ionosphere layer in terms of plasma frequency.
- b) Explain the phenomenon of ducting? What are the conditions required for manifestation of this phenomenon. [5+5]
- OR**
- 11.a) Briefly explain the tropospheric propagation and multi-hop propagation.
- b) Explain the following terms with diagram (i) Duct propagation (ii) Skip zone [5+5]

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