

R15

Code No: 125DQ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, May - 2018

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 an antenna and mention the necessity of antenna. [2]
- b) How the radiation is accomplished in a two wire antenna? [3]
- c) Mention the advantages of folded dipole. [2]
- d) While measuring the gain of horn antenna the gain oscillator was set for 9 GHz frequency and attenuation inserted was found to be 9.8 dB. Calculate the gain of horn. The distance between the two horn was 35cm. [3]
- e) Estimate the diameter of a paraboloidal reflector required to produce a beam of 5° width at 1.2 GHz. [2]
- f) What are the merits and demerits of lens antenna? [3]
- g) Calculate the directivity of given linear end fire, uniform array of 10 elements with a separation of $\lambda/4$ between the elements. [2]
- h) Describe the principle of end-fire array. [3]
- i) Find the maximum range of tropospheric for which the transmitting antenna height is 100 ft and receiving antenna height is 50 ft. [2]
- j) Briefly explain about D-region. [3]

PART - B

(50 Marks)

2. Explain the following terms with proper expressions.

- a) Directivity
- b) Field pattern
- c) Half power beam width
- d) Beam efficiency.

[10]

OR

- 3.a) State and prove Friis's transmission formula.
- b) With the help of Maxwell's equation, explain how the radiation and reception of EM waves takes place.

[5+5]

4. Describe about the following:

- a) Folded – dipole antenna
- b) Yagi-uda antenna.

[5+5]

OR

- 5.a) Find length L , H plane aperture and flare angles θ_E and θ_H of a pyramidal horn for which E plane aperture is 10λ . Horn is fed by a rectangular waveguide with TE_{10} mode. Assume $\delta = 0.2 \lambda$ in E plane and 0.375λ in H plane. Also find E plane and H plane beam widths and directivity.

b) Write short notes on helical antenna.

[4+6]

- 6.a) Describe in detail about the cassegrain method of feeding a paraboloid reflector, with the help of the geometry of this feeding arrangement.

b) Explain briefly about features of microstrip antennas.

[6+4]

OR

- 7.a) Compare the performance of parabolic reflector and corner reflector.

b) Explain zoning in lens antenna.

[7+3]

8. What is broadside array? Draw the pattern. Obtain the expressions for directions of peaks, nulls, sidelobes and BWFN.

[10]

OR

- 9.a) Explain the method of measuring impedance of an antenna.

b) Calculate the directivity of an antenna, which has half power beam widths of 60° and 75° in vertical and horizontal planes respectively.

[7+3]

10. Explain in brief about the following terms with respect to wave propagation

a) Critical frequency

b) MUF

c) Skip distance

d) Virtual height.

[10]

OR

- 11.a) Discuss the salient features of ground wave propagation.

b) Calculate the wave tilt in degrees of the surface wave over an earth of 6 mm conductivity and relative permittivity of 12 at 2 MHz.

[5+5]

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