Code No: 115DQ

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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 5^0 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 Frii'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 10 λ. Horn is fed by a rectangular waveguide with TE_{10} mode. Assume $\delta = 0.2\ \lambda$ in E plane and $0.375\ \lambda$ 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 60^0 and 75^0 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 6mm conductivity and relative permittivity of 12 at 2 MHz. [5+5]

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