R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, November - 2015
ANTENNAS AND WAVE PROPAGATION
(Electronics and Communication Engineering)

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) Distinguish between near field and far fields. [2]
 b) Explain the concept of Retarded vector potential. [3]
 c) Write down the characteristics of folded dipole. [2]
 d) Explain the construction of Yagi-Uda antenna. [3]
 e) List any five applications of patch antennas. [2]
 f) Discuss the features of Micro-strip antennas. [3]
 g) What is a uniform linear array? [2]
 h) A linear broad-side array consists of 4 equal isotropic sources with $\lambda/3$ spacing
   (overall length of array = λ). Calculate the beam width. [3]
 i) Define Wave tilt of Ground Wave. [2]
 j) Write a short note on Super Refraction. [3]

PART - B (50 Marks)

2.a) Derive the relation between Directivity and effective aperture of an antenna.
 b) Find the radiation resistance of a loop antenna of diameter 0.5 m operating at a
   frequency of 1 MHz. [5+5]

OR

3.a) Calculate the power gain of a Half wave dipole whose ohmic losses and directive gain
   are 7 ohms and 1.64 respectively.
 b) Derive expressions for the components of the radiated field of an alternating current
   element. [5+5]

4.a) Discuss in detail about the pyramidal Horn antenna and write down its merits and de-
   merits.
 b) What are the design considerations of pyramidal Horns? Explain. [5+5]

OR

5.a) Explain about the operating principle of Helical antenna in Normal and Axial modes.
 b) Design Yagi-Uda antenna of 6 elements to provide gain of 12 dB if the operating
   frequency is 200 MHz. [5+5]

6.a) Explain in detail Flar sheet and corner reflector antennas in detail.
  b) Explain different feed methods used for parabolic reflector antennas. [5+5]

OR

7. With necessary diagrams explain the principle of operation of Lens antennas and also discuss its advantages and disadvantages. [10]

8.a) Derive an Expression of array factor for an n-element uniform array.
  b) Explain in detail about the measurement of radiation pattern with neat diagram. [5+5]

OR

9.a) Explain in detail about the Binomial array and differentiate it with a linear array.
  b) Derive an expression for the radiation pattern of a Broadside uniform linear array of 4-elements with $\lambda/2$ spacing and obtain its radiation pattern. [5+5]

10.a) Find the maximum range of Tropospheric transmission for which the height of transmitting antenna is 100ft and that of receiving antenna is 50 ft.
  b) Derive the relation between Maximum usable frequency (MUF) and skip distance. [5+5]

OR

11. Write short notes on:
  a) Virtual height
  b) Line of sight propagation
  c) Effect of earth's curvature. [3+4+3]

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