

R15

Code No: 125DQ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, January/February - 2023

ANTENNAS AND WAVE PROPAGATION

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART - A

(25 Marks)

- 1.a) Determine the radiated power of antenna which has radiation resistance of 300 ohms and current of 5A. [2]
- b) What is antenna efficiency? How it is related with directivity. [3]
- c) Write the Fermat's Principle. [2]
- d) Mention the design Considerations of Pyramidal Horns. [3]
- e) What are the advantages and applications of microstrip antenna? [2]
- f) Write short notes on zoning. [3]
- g) Define point source. [2]
- h) List the precautions to be taken for error free antenna measurements. [3]
- i) Define skip distance. [2]
- j) Write the effect of Earth's Curvature on wave propagation. [3]

PART - B

(50 Marks)

- 2.a) An antenna has a radiation resistance of 72 ohms, a loss resistance of 8 ohms and a power gain of 12 dB. Determine the antenna efficiency and directivity.
 - b) Compare the far field components of small loop and short dipole. [5+5]
- OR**
3. Elaborate the radiation mechanism of Quarter Wave Monopole and Half Wave Dipole antenna with current distribution characteristics. [10]
 4. A pyramidal horn is having E-plane $a_E = 10\lambda$. The horn is fed by a rectangular waveguide with TE_{10} mode. Let $\delta = 0.2\lambda$ in the E-plane and 0.375λ in the H plane. Find (a) Length L, (b) E-Plane and H-plane flare angles, (c) H-plane aperture, (d) Half power beam width and directivity. [10]
- OR**
5. With neat diagram, elaborate the construction and working of Yagi-Uda antenna with its characteristics and what are the applications of it. [10]

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6. Explain in detail the design aspects of microstrip antenna and also discuss why rectangular type is mostly used. What are the limitations of rectangular patch in microstrip antenna? [10]

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7. With relevant diagram, explain the operations of Flar Sheet and Corner Reflectors with different corner angles. [10]

8.a) With a neat example, elaborate the principle of pattern multiplication. [5+5]
b) How to design binomial array antennas? [5+5]

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9. Explain the atleast two antenna gain measurement methods with suitable block diagram. [10]

10.a) Elaborate on Sky wave propagation. [5+5]
b) What are the different effects of earth's curvature? [5+5]

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11.a) Write short notes in duct propagation. [5+5]
b) Explain the concepts of Multi-hop Propagation. [5+5]

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