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10EC64

Sixth Semester B.E. Degree Examination, July/August 2022
Antennas and Propagation

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART – A

- 1 a. Define Gain , Beam efficiency , HPBW and Aperture efficiency. (12 Marks)
b. Write the fundamental equation of Radiation. (04 Marks)
c. An Antenna field pattern is given by $E(\theta) = \cos^2 \theta$ for $0 \leq \theta \leq 90^\circ$. Find HPBW. (04 Marks)
- 2 a. Using Power theorem, obtain the directivity for the
i) Source with sine squared power pattern.
ii) Source with Uni – directional cosine cube power pattern. (08 Marks)
b. Derive a relationship between maximum effective aperture and effective height. (08 Marks)
c. What are Phase Patterns? (04 Marks)
- 3 a. Obtain the radiation resistance expression of a short dipole with uniform current. (07 Marks)
b. A $\lambda/10$ long antenna has a loss resistance of 2.1Ω . Find its radiation efficiency. (03 Marks)
c. Write the pattern factor for E – field component of a full wave (λ) antenna. (05 Marks)
d. Write a brief note on Low Side lobe arrays. (05 Marks)
- 4 a. Obtain the expression for instantaneous magnetic field at distance ‘r’ from a loop antenna of radius ‘a’. What are the applications of loop antenna? (10 Marks)
b. State and illustrate Babinet's principle. (07 Marks)
c. Write a brief note on : Patch antennas. (03 Marks)

PART – B

- 5 a. With the aid of neat diagram, discuss the basic working principle and design considerations of a log periodic antenna. (07 Marks)
b. Describe design considerations of a Horn antenna. What are the applications of horn antenna? (07 Marks)
c. Helix antennas are superior to other types when intended for the use in Satellite Communication - Justify. (06 Marks)
- 6 Write short note on :
a. Embedded Antenna. (07 Marks)
b. Lens Antenna. (06 Marks)
c. GPR Antenna. (07 Marks)
- 7 a. Define Path loss. Explain the significance of Log – distance path loss model. (07 Marks)
b. Discuss Knife edge and rounded surface diffraction models. (07 Marks)
c. Derive an expression for line of sight distance between transmitter and receiver antennas. (06 Marks)
- 8 a. Define Skip distance, Maximum usable frequency. (08 Marks)
b. Describe Ionisation characteristics during day and night hours. (06 Marks)
c. Discuss Faraday rotation in Ionospheric layer. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.