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Question Paper Code : 23461

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Sixth Semester

Electronics and Communication Engineering

EC 2353 — ANTENNAS AND WAVE PROPAGATION

(Regulations 2008)

(Common to PTEC 2353 – Antennas and Wave Propagation for B.E. (Part-Time) Fifth Semester – Electronics and Communication Engineering – Regulations 2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are θ and Φ patterns in antenna radiation pattern?

2. What are dB_i and dB_d? Write their significances.

3. Give the importance of radiation resistance of an antenna.

4. Define Pattern Multiplication.

5. State Babinet's principle and how it gives rise to the concept of complementary antenna.

6. The aperture dimensions of a pyramidal horn are 12 × 6 cm and operating at a frequency of 10 GHz. Find the beam width and directivity.

7. Mention the types of feeding structures used for microstrip patch antennas.

8. Design a 3 element Yagi – Uda antenna to operate at a frequency of 200 MHz

9. Define optimum working frequency.

10. What is meant Faraday rotation?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the principle of reciprocity as applied to an antenna. (6)

(ii) Derive the wave equation and obtain it's solution. (10)

Or

(b) (i) What is the effective, length of linear antenna? (4)

(ii) Derive the expression for the radiated fields of a center fed $\lambda/2$ dipole antenna. Sketch the radiation pattern. (12)

12. (a) (i) Explain the differences between half wave dipole and Quarter wave monopole antenna. (6)

(ii) Derive the directivity of Half wave dipole antenna. (10)

Or

(b) (i) Explain about loop antenna and discuss the radiation pattern. (8)

(ii) Derive Array factor of an Uniform linear array. Explain the significance of array factor. (8)

13. (a) Explain the radiation mechanism of horn antenna with diagram. Draw the different types of horn structures.

Or

(b) Explain the principle of Reflector antenna and discuss on different types of feed used with neat diagram.

14. (a) (i) With a suitable diagram depict the construction and operation of a Yagi antenna. (8)

(ii) With a neat sketch design a quad-helix earth station antenna. Calculate the directivity and the effective aperture. (8)

Or

(b) (i) Elaborate on Log-Periodic Antenna with a neat sketch. (10)

(ii) Design a Log-Periodic dipole array with 7 dB gain and a 4 to 1 bandwidth. Specify apex angle α, scale constant k and the number of elements. (6)

15. (a) (i) Describe the Troposcatter propagation. (8)

(ii) Explain the effect of Earth's magnetic field on ground wave propagation. (8)

Or

(b) Describe the theory of propagation of Electromagnetic wave through the ionosphere in the presence of external magnetic field and show that the medium acts as doubly refracting crystal.