Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 91416

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Sixth Semester

Electronics and Communication Engineering

EC 2353/EC 63/10144 EC 604 — ANTENNAS AND WAVE PROPAGATION

(Regulation 2008/2010)

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

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Distinguish between power gain and directive gain.

2. Define an isotropic radiator.

3. Draw the radiation pattern of a vertical dipole.

4. What is Binomial array?

5. What is meant by resonant and non-resonant antennas?

6. What is the basic concept of reflector antenna?

7. Define pitch angle of a helical antenna.

8. Differentiate 'V' antenna from rhombic antenna.

9. What are the factors that affect radio wave propagation?

10. Define skip distance.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Derive the wave equations using Maxwell's equations and get the solution of wave equations. (8)

    (ii) Explain how electric field lines are formed and get detached from short dipole antenna. (8)

Or

(b) The power radiated by a lossless antenna is 10 watts. The directional characteristics of the antenna are represented by the radiation intensity of

$$U = B_o \cos^3 \theta \frac{\omega}{S_r} \text{ for } 0 < \theta \leq \frac{\pi}{2} \text{ and } 0 < \phi \leq 2\pi$$

Find the maximum power density at a distance of 1000 m, assuming far field distance. Specify the angle where this occurs and find the directivity and half power beamwidth of the antenna. (16)

12. (a) Obtain the expressions for power radiated and the radiation resistance of a Half wave dipole. (16)

Or

(b) (i) Describe the method of pattern multiplication. (8)

(ii) A linear broadside array consists of 4 equal isotropic inphase point sources with $\lambda/3$ spacing. Find the Directivity and beamwidth. (8)

13. (a) (i) Explain the effect of earth on radiation patterns above earth. (8)

(ii) Discuss in detail the methods of feeding slot antenna. (8)

Or

(b) Describe the radiation patterns and fields on the axis of an E-plane and H-plane sectoral horns. (16)

14. (a) (i) Explain the construction and characteristics features of frequency independent antennas. (8)

(ii) Illustrate the reciprocity in antenna measurements. (8)

Or

(b) Describe construction and radiation characteristics of normal and axial mode helical antenna. (16)

15. (a) (i) Explain in detail the mechanism of space wave propagation over ideal flat earth with a neat sketch. (8)

(ii) Discuss the factors that give rise to fading in ionospheric radio wave propagation. (8)

Or

(b) (i) Describe the significant features of ground wave propagation. (8)

(ii) Obtain an expression for the refractive index of an ionospheric layer. (8)

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