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Reg. No. :

**Question Paper Code : 21372**

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

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. What is an elementary dipole and how does it differ from the infinitesimal dipole.
2. What is the effective area of a half wave dipole operating at 1 GHz?
3. A uniform linear array contains 50 isotropic radiation with an inter element spacing of  $\lambda/2$ . Find the directivity of broadside forms of arrays.
4. What is pattern multiplication and draw the pattern of 2 point sources separated by  $\lambda/2$ .
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  $12 \times 6$  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. Find the maximum distance that can be covered by a space wave, when the antenna heights are 60m and 120m.
10. What is Fading? and how it is compensated.

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) What is binomial array? (2)
- (ii) Draw the pattern of 10 element binomial array with spacing between the elements of  $3\lambda/4$  and  $\lambda/2$ . (14)

Or

- (b) Derive the expressions for field pattern of broad side array of n point sources.
13. (a) (i) Compare flat reflector and corner reflector antennas. (2)
- (ii) Explain how a paraboloidal antenna gives a highly directional pattern. (6)
- (iii) Explain in detail about the feeding structure of parabolic reflector antenna. (8)

Or

- (b) Write short notes on
- (i) Slot antenna (8)
- (ii) Lens antenna (8)
14. (a) With neat diagram explain helical antenna and briefly describe its operation in the axial mode. How does it differ from other antennas?

Or

- (b) With neat block diagram explain how Radiation pattern and Gain of an antenna can be measured.

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.
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