C 22580 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2017

Electronic and Communication Engineering

EC 14 601—RADIATION AND PROPAGATION

Time : Three Hours Maximum : 100 Marks

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. (a) Explain the directive gain and directivity of an antenna. Give the expression for directivity of half dipole antenna.

   (b) State reciprocity theorem and give its significance in antenna applications.

   (c) Write short notes on binomial arrays.

   (d) Explain the principle of pattern multiplication.

   (e) Illustrate the structure and radiation pattern of Broad Side array.

   (f) Design a six element Yagi-Uda antenna for a frequency of f = 300 MHz.

   (g) Discuss the efficiency of medium and high frequency antennas.

   (h) Explain the working principle of slot antenna.

   (i) Explain the phenomena of extended wave propagation through duct propagation.

   (j) Deduce the fundamental equation of space wave propagation.

   (8 × 5 = 40 marks)

2. (a) (i) What is meant by retarded potential ? Starting from the expression of vector potential, derive the fields produced by an oscillating electric dipole in near and far field zones. Also find an expression for the power radiated.

   (10 marks)

   (ii) Explain different types of antenna polarization. (5 marks)

   Or

   (b) (i) Explain the terms : antenna beam width, antenna bandwidth, antenna beam efficiency and antenna beam area.

   (8 marks)

   (ii) Illustrate the radiation generated by a monopole antenna. (7 marks)

Turn over

3. (a) (i) Derive the expression for the field pattern of an array of two isotropic point sources excited with (I) Equal amplitude and phase ; (II) Equal amplitude and opposite phase. (8 marks)

(ii) Write short notes on Dolph-Tchebysceff arrays. (7 marks)

Or

(b) Explain the array of n-sources of equal amplitude and spacing - End fire case.

(I) Direction of pattern maxima.

(II) Direction of pattern minima.

(III) Beam width of major lobe.

4. (a) (i) Explain the structure of the helical antenna under axial mode of operation. (10 marks)

(ii) Discuss the effect of ground on performance of antenna. (5 marks)

Or

(b) (i) Explain the structure, design and principle of working of log periodic antenna. (7 marks)

(ii) With neat sketches, explain the working of rhombic antenna. (8 marks)

5. (a) (i) Explain the structure of ionosphere with suitable sketches. (8 marks)

(ii) Discuss the phenomenon of reflection of radio waves by the surface of the earth. (7 marks)

Or

(b) (i) Explain the maximum usable frequency and show how to calculate MUF. (10 marks)

(ii) Outline the concept of fading. (5 marks)

[4 × 15 = 60 marks]