B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2014

ELECTRONICS AND COMMUNICATION ENGINEERING

Sixth Semester

EC9354 ANTENNAS AND WAVE PROPAGATION

(Regulation 2008)

Time: 3 Hours   Answer ALL Questions   Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. "Antenna is a transitional structure". Justify
2. An antenna has a field pattern given by $E(\theta)=\cos^2\theta$ for $0°\le \theta \le 90°$ .Find HPBW.
3. The impedance of a infinitesimally thin half wave dipole antenna is 73 + j 42.5 ohms. Find the impedance of an infinitesimally thin half wave slot antenna.
4. What is a Aperture antenna?
5. Given a linear, end-fire, uniform array of 10 elements with a separation of $\lambda/4$ between the elements, find the directivity of the array factor.
6. In the Schelkunoff polynomial method, find the Visible Region and Invisible Region boundaries for complex variable z when $\beta=0$ and $d=\lambda/2$.
7. What is Log periodic antenna?
8. Define pitch angle of a helical antenna
9. Compute the roughness factor for the earth at 10 MHz if $\sigma =5$ for θ equal to 30°
10. Define Maximum Usable Frequency.

Part – B (5 x 16 = 80 marks)

11 (i) Derive the radiating fields of an oscillating dipole.   (12)

   (ii) A resonant half wavelength dipole is made out of copper ($\sigma =5.7 \times 10^7$ S/m) wire. Determine the radiation efficiency of the dipole antenna at f=75 MHz if the radius of the wire b is $2 \times 10^{-4}\lambda$, and the radiation resistance of the $\lambda/2$ dipole is 73 ohms. (4)

12 a Write notes on (i) Slot antennas (ii) Microstrip antennas   (16)

(OR)

12 b (i)"A horn antenna may be regarded as a flared out or opened out waveguide". Substantiate and elaborate. Derive the expression for L of a horn antenna.   (8)

   (ii)Elaborate on reflector antennas.   (8)

13. a) (i)Explain in detail the Binomial array.Sketch the Pascal's triangle upto m=7. (10)

(ii)Discuss in detail the design of a broadside array. (6)

(OR)

b) (i)Arrive at the array factor of a two-element array.For this array, find the nulls of the total field when d = λ/4 and the cases of β=0, β =90° and β= -90°. (12)

(ii)Define(i)Uniform array (ii) Grating lobes. (4)

14. a) (i)Elaborate on the principle of frequency independent antennas (6)

(ii)Discuss in detail about dielectric antennas. (6)

(iii)Distinguish between a reconfigurable antenna and active antenna. (4)

(OR)

b) (i)How is VSWR measured? Explain. (6)

(ii)Discuss in detail how a spiral antenna behaves as a frequency independent antenna. (10)

15. a) (i)Discuss in detail about the structure of atmosphere and the different modes of propagation. (12)

(ii)Define(i)Virtual height (ii)Critical frequency (4)

(OR)

b) (i)Write short notes on (i) Sky wave propagation and (ii) Flat earth and Curved earth concept.