Register Number: ………………………

M.E DEGREE EXAMINATIONS: JANUARY 2011

First Semester

COMMUNICATION SYSTEMS

COM501: Advanced Radiation Systems

Time: Three hours   **Maximum Marks: 100**

Answer ALL Questions:-

PART A (10 x 2 = 20 Marks)

1. Calculate the directivity of an isotropic source in dB.

2. What is Vector potential?

3 What are   the advantages of dolph chebyshev array over Binomial Array?

4. Discuss briefly the Fourier Transform method of antenna array synthesis

5. Differentiate between Fraunhofer and Fresnel diffraction

6. State Babinets theorem

7. Explain why a rectangular wave guide is flared to form pyramidal horn antenna

8. What is E plane sectorial horn antenna?

9. Describe how polarization is defined for antenna radiation?

10. What is a clockwise elliptically polarized wave?

PART B (5 x 16 = 80 Marks)

11. (a) (i) Derive the expression for the far field of a half wave dipole antenna. Hence obtain its
    radiation resistance.   (12)

    (ii) Draw the current distribution of a half wave dipole and explain.   (4)

(OR)

   (b) Deduce expression for the electric field components and magnetic field of an alternating
       current element at a distance from the element .How does the field radiated at the far
       zone differ from that the near zone?

12. (a) Design a four element   Broad side array of λ/2 spacing between elements. The pattern
        is to be optimum with a side lobe level 19.1 dB down the the main lobe maximum.

(OR)

   (b) Describe in detail the effect of number of elements and elemental spacing on radiation
       pattern, array factor of broadside array and end fire array with neat sketches.

13. (a) (i) State and explain with neat diagrams Huygens s Principle. (8)

(ii) Develop a relation for the impedance of a slot antenna (z_s) in terms of the impedance of the complementary dipole antenna (z_d) (8)

(OR)

(b) (i) Define the duality principle. (6)

(ii) For a uniform rectangular aperture, derive the expressions for the radiation fields.

14. (a) (i) Explain the feeding methodologies of rectangular patch antenna with neat sketches.(6)

(ii) Draw a neat cross sectional diagram of corrugated Pyramidal horn. Explain its types and applications. Bring out its design details. (10)

(OR)

(b) (i) Explain the working of a pyramidal horn antenna and derive expressions for the field strengths. (10)

(ii) Discuss about the different types of feed systems for parabolic reflectors (6)

15. (a) (i) Describe in detail the Poincare sphere representation of wave polarization. (12)

(ii) Explain random polarization of EM waves. (4)

(OR)

(b) (i) Differentiate between linear and elliptical polarization. (6)

(ii) What are spherical triangles (5)

(iii) Define and explain stokes parameters (5)

****