Reg. No.:.....
Name: .....

M.TECH DEGREE EXAMINATION
Model Question Paper
Specialization: Communication Engineering
First Semester
MECCE 105-2 ANTENNA THEORY AND DESIGN
(Regular-2013 Admissions)

Time: Three Hours **Maximum: 100 marks**

Each question carries 25 marks.

Module I

1. a) Explain how a λ/2 dipole is acting as an ideal radiator which is energized by an alternating supply. Why a dc cannot be radiated? (10)
   b) State Reciprocity theorem. Show how it is used in antenna measurement. (10)
   c) State the Duality Power Theorem and explain. (5)

OR

2. a) What is the significance of radiation pattern? (5)
   b) Draw the radiation pattern of a horn antenna. (2)
   c) Explain the shape of the above said pattern and also explain how it is formed with the help of required diagram and equation. (10)
   d) Give the radiation equation and explain (8)

3. a) What is continuous line-source distribution? How the radiation characteristics of continuous line-sources are analyzed? (5)
   b) Explain the Schelkunoff method of synthesis of antenna array. (10)
   c) Design a linear array of isotropic elements placed along the z-axis such that the zeros of the array factor occurs at $\theta=0^0$, 60^0, 120^0. Assume that the elements are spaced λ/4 apart and that the progressive phase shift between them is0^0.
      Find the required number of elements. (2)
      Determine their excitation coefficients (3)
      Write the array factor. (3)

OR

4. a) Explain the Taylor design procedure for continuous distribution with required mathematical support. (10)

   b) Explain the space factor of Circular aperture. (5)

   c) Explain the Woodward – Lawson synthesis for discrete linear array. (10)

5. a) Explain the basic characteristics of Micro strip patch. (5)

   b) What is transmission line model of rectangular patch and explain the fringing effect, effective length and fringe factor. (10)

   c) Design a rectangular patch antenna using a substrate with dielectric constant=2.2 and height=0.1588 cm, so as to resonate at 10GHz. (10)

OR

6. a) Extract the mathematical expression for modes in a rectangular patch. (10)

   b) Find the fields radiated from micro strip for the principal E-plane and H-plane. (7)

   c) A micro strip transmission line of beryllium oxide of dielectric const 6.8 has a width-to-height ratio of 1.5. Assuming that the thickness-to-height ratio is 0, determine

      Effective dielectric constant , (4)

      Characteristic impedance of the line. (4)

7. a) Explain the terms cell splitting and sectorized systems. (5)

   b) Explain how the DOA algorithm determines the directions of incoming signals. (10)

   c) Design the DOA of a two-element array. Show that the angle of arrival/incidence can be determined on the basis of time delays and geometry of the system. (10)

OR

8. a) Explain the Least Mean Square algorithm in adopting weights. (10)

   b) What is Rayleigh Fading? (5)

   c) What is MANET? Explain the MAC protocol of IEEE 802.11. (10)

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