

**Registration No.**

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**M.E./M.Tech. Degree Examinations, January 2017**

**First Semester**

**COMMUNICATION SYSTEMS**

**CU16101 – ADVANCED RADIATION SYSTEMS**

**(Regulation 2016)**

**QP Code:252914**

**Time: Three hours**

**Maximum : 100 marks**

Answer **ALL** questions

**PART A - (10 X 2 = 20 Marks)**

1. State the significance of the reciprocity theorem.
2. Enumerate the limitations of matching techniques applied to antenna.
3. Mention the physical and maximum effective areas of an uniform distribution aperture.
4. Give any four applications of horn antenna.
5. What are phased arrays and retro arrays?
6. Give the array factor of two point array elements with half wavelength spacing is excited equal in magnitude and equal in phase relation.
7. List the any four features of microstrip antennas.
8. Give any two structures of microstrip array feed system.
9. What is the need of biconical antennas in terms of antenna measurements?
10. If a relative gain of a test antenna with standard antenna is 30, directivity is 42, then calculate the percentage of radiation efficiency of a given system.

**PART B - (5 X16 = 80 Marks)**

11. (a) Explain the following antenna parameters: **(16)**
    - (i) Radiation pattern and its components
    - (ii) Directivity and directive gain
    - (iii) Radiation resistance
    - (iv) Antenna Beamwidth and Bandwidth
- (OR)**
- (b) Illustrate the working principle of mobile phone base station antennas and its arrangement with necessary sketches. **(16)**

12. (a) Derive the necessary radiation equation for a given rectangular aperture of constant field distribution with  $a = 5\lambda$  and  $b = 3\lambda$  is mounted on an infinite ground plane to compute the following parameters (i) FNBW in the E plane, (ii) HPBW in the E plane, (iii) FSLBW in the E plane and (iv) Directivity. (16)

(OR)

- (b) Derive and describe the radiation characteristics of pyramidal horn antenna with neat sketches. (16)
13. (a) Show that the HPBW of an end fire array is twice than that of the broad side array. (16)

(OR)

- (b) Illustrate the structural arrangement and working principle of frequency scanning grid array of uniformly spaced elements. Compare the same with frequency scanning chain array. (16)
14. (a) Describe the various excitation techniques of microstrip antennas with its equivalent circuit models along with its merits and demerits. (16)

(OR)

- (b) Analyze the transmission line model of rectangular patch antenna with suitable example. (16)
15. (a) Explain the construction and working of Log periodic dipole antenna with a neat diagram. (16)

(OR)

- (b) Explain any one method to measure gain of an antenna along with its block level functional details and its significance. (16)