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### M.Tech. (ECE) (Sem. – 2)

## ANTENNAS AND RADIATING SYSTEMS

### Subject Code: MTEC-103-18

# M Code: 76259

### Date of Examination: 13-12-2022

Time: 3 Hrs.

### Max. Marks: 60

### INSTRUCTIONS TO CANDIDATES:

- 1. Attempt any FIVE questions out of EIGHT questions.
- 2. Each question carries TWELVE marks.
- 1. Describe radiation pattern, radiation power density, radiation intensity, HPBW, FNBW, efficiency of an antenna.
- 2. Explain bandwidth, polarization, types of polarization, input impedance, antenna vector effective length in detail.
- 3. a) Explain the types of antenna and their possible application areas.
  - b) Derive Friis transmission equation.
- 4. Derive the expression of electric field intensity, magnetic field intensity, power radiated by an infinitesimal dipole antenna. Also, determine the radiation resistance of this antenna.
- 5. Normalized array factor of N-element array is given as -

$$AF_{n} = \frac{1}{N} \left[ \frac{\sin\left(\frac{N\psi}{2}\right)}{\sin\left(\frac{\psi}{2}\right)} \right]; \quad \psi = kd\cos\theta + \beta$$

Each element of the array is excited by identical amplitude but  $\beta$  progressive phase shift. The elements are spaced d distance from their neighboring elements. Derive the expression for directions of the nulls of the array ( $\theta_n$ ), directions of maximum of the array ( $\theta_m$ ), directions of half-power of the array ( $\theta_h$ ), HPBW and FNBW.

- 6. a) Explain the working of circular loop antenna with non-uniform current distribution.
  - b) Explain the working of conical horn antenna.
- 7. a) Explain feeding mechanism and method of analysis used in microstrip antenna.
  - b) Explain circular patch microstrip antenna in detail.
- 8. Explain the working of plane reflector and Cassegrain reflector antenna with the help of suitable diagram.

### NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.