

[Time: Three Hours]

[ Marks:80]

N.B: 1. Question number one is compulsory  
2. Attempt any three out of remaining

- Q.1 Attempt any FOUR: (20)**
- a. Derive wave equation for electric fields.
  - b. Define the terms near field and far field for antenna
  - c. Derive continuity equation for electric fields
  - d. Explain ground wave propagation
  - e. Why Maxwells equations need to be modified for time varying fields
- Q.2**
- a. Define loop antenna. Mention the disadvantages of loop antenna (10)
  - b. Design rectangular micro strip antenna for 2.4 GHZ frequency using FR-4 Substrate of dielectric value 4.4 & thickness 1.6mm. (10)
- Q.3**
- a. Compare broadside and end fire array. (10)
  - b. Derive FRIIS Transmission Equation & Explain its Significance (10)
- Q.4**
- a. With neat sketch explain parabolic Reflector antenna. List feed mechanism used (10)
  - b. Derive wave equations for magnetic fields and explain what is TEM wave (10)
- Q.5**
- a. Explain H-plane sectoral horn a antenna and describe various configuration of horn (10)
  - b. antenna (10)
- What are the advantages of array antenna? Describe principle of pattern multiplication and sketch radiation pattern of a 3-element array separated at  $\lambda/2$
- Q.6** Write short notes on (any four questions, each carry five marks) (20)
- a) Sky wave propagation
  - b) Power in EM wave
  - c) Retarded potential
  - d) Equivalent noise temperature of antenna
  - e) Radiation pattern

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