Con. 5417–09. T.E. (EXTC) Sem VI **SP–8117**

Antenna & Wave Propagation

(3 Hours) **[Total Marks : 100**

Lib

15/12/09

2-30 to 5.30

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from the remaining **six** questions.
(3) Assume **suitable** data if **needed**.
(4) Support your answers with **neat sketches**.

1. Explain the following :– **20**
   (a) FRIIS transmission formula
   (b) Maxwell's equation's for harmonic variations
   (c) Polarization and polarization matching factor
   (d) Ground interference effects.

2. (a) Derive an expression for the near field and far field equation for a short electric dipole. **10**
   (b) State and give the applications of Reciprocity Theorem. Show that the transmitting and receiving radiation patterns of antennas are equal. **10**

3. (a) State and explain the principle of pattern multiplication use the principle to find the radiation pattern of 4 isotropic elements fed in phase and $\lambda/2$ apart. **10**
   (b) Derive the equation for the total far field pattern of linear array of n isotropic point sources of equal amplitude and spacing. Define array factor. **5**
   (c) Define broadside and end fire arrays. What are the conditions for a linear array of N isotropic elements to radiate in end fire and broadside modes. **5**

4. (a) Explain important features of loop antenna. Explain how a loop antenna may be used for direction finding. **10**
   (b) Explain with diagrams the working of a log-periodic antenna. Give its applications. **10**

5. (a) Give the current distribution and radiation pattern of a folded dipole antenna. Explain how its radiation pattern will be modified with addition of reflectors and directors. **10**
   (b) Explain the structure of microstrip antennas. State its limitations and applications. **10**

6. (a) Explain the following terms :– **12**
      (i) Critical frequency
      (ii) Virtual height
      (iii) Maximum usable frequency.
   (b) What is line of sight propagation ? Obtain the expression for range of line-of-sight for spacewave propagation in terms of antenna's transmitting and receving heights. **8**

7. Write short notes on any **two** of the following :– **20**
   (a) Horn antenna – working, antenna feed and applications.
   (b) Construction, working and modes of operation of helical antenna.
   (c) Structure of Ionosphere.