T.E. Sem 6 (Rev.) Antenna & wave propagation 28/5/08

Con. 2665-08. EXTC

CO-2956

(REVISED COURSE)

(3 Hours) [Total Marks : 100

N.B. (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of remainign **six** questions.
(3) Assume any **suitable** data whenever **required**.
(4) **Figures** to the **right** indicate **full** marks.

1. Explain the following :—
   (a) Directivity, gain, radiation resistance and beam width. 4
   (b) Compare Travelling wave and Standing wave antennas. 4
   (c) Compare Rhombic and Loop antennas. 4
   (d) FRIIS transmission formula. 4
   (e) Maxwell's equation in time varying integral and differential form. 4

2. (a) Derive the formula for instantaneous power density using Poynting theorm. 10
   (b) Electric fluid intensity of an electromagentic wave in free space is given by :— 10

$$E_x = 0,\ E_Z = 0,\ E_y = E_0 \cos w \left(t - \frac{z}{v} \right).$$

Determine the expression for components for magnetic fluid intensity using, Maxwell's equation in free space.

3. (a) Show that radiation resistance of a wire dipole is given by :— 10

$$R_{rad} = 80\ \pi^2 \left(\frac{dl}{\lambda} \right)^2$$ where dl is the small length of wire dipole.

   (b) A Transmitting antenna has an effective height $\frac{2}{\pi}$ times of its physical length. This carries 10 a current of 1600 Amp at the base and operates at frequency 20 KHz. If the physical length of antenna is 200 m. and antenna efficiency is 10% .
   Calculate :
   (i) Electric fluid intensity at 350 km
   (ii) Radiation resistance
   (iii) Power radiated
   (iv) Power input in antenna
   (v) Voltage induced in receiving antenna of 100 m effective heights at the distance 350 km.

4. (a) Why antenna array is required ? Explain broadside and end fire array in detail. 10
   (b) Obtain the radiation pattern for 8 isotroic antennas of equal magnitude and spaced by $\lambda/2$ for end fire array. 10

5. (a) Explain the construction and properties of Yagi-Uda antenna. Also sketch its radiation pattern. 10
   (b) Explain different types of horn antenna. Find its directivity and beam width. 10

6. (a) A 64 meter diameter paraboloid reflector is fed by a non-directional antenna at 1430 MHz. Calculate beam width between half power points and nulls. Also calculate power gain with respect to half wave dipole. 10
   (b) Explain transmission line model of rectangular patch microstrip antenna. Also give its applications. 10

7. Explain the following :— 20
   (a) Sky wave propagation
   (b) Pattern multiplication
   (c) Sleve dipole
   (d) Ground interference effect.