Total number of printed pages – 4

B. Tech

PEEC 5401

Seventh Semester Examination – 2007

ANTENNA ENGINEERING

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

1. Explain the following questions : 2×10

   (a) Why is a Hertzian dipole referred to as an electric dipole ?

   (b) What is an omni directional antenna ?

   (c) What are the traits of a uniform linear array ?

P.T.O.

(d) What is the significance of pattern multiplication ?

(e) What is meant by the effective area of an antenna ?

(f) What is an optimum horn ?

(g) How the desire phase angle difference is achieved for a log-periodic antenna ?

(h) How the reactive components of the antenna impedance indicate the nature of resonance existing in the antenna ?

(i) What are the functions of the non-resonant elements of a Yagi-Uda array ?

(j) What is axial ratio pattern ?

2. Determine the directivity of an antenna whose normalized intensity is given by

(a) $U(\theta, \varphi) = \sin\theta \sin^2\varphi$ where, $0 \leq \theta \leq \pi$, $0 \leq \varphi \leq \pi$

(b) $U(\theta, \varphi) = \sin^2\theta \sin\varphi$ where, $0 \leq \theta \leq \pi$, $0 \leq \varphi \leq \pi$ 5+5

3. A horizontal infinitesimal electric dipole of current I_0 is placed symmetrically about the origin and directed along the y-axis. Derive the
(a) far-zone fields radiated by the dipole and
(b) directivity of the antenna. 10

4. What is a folded dipole ? Explain the characteristics of the folded dipole and show that the input impedance of a two element folded dipole of $1 = \lambda/2$ is four times greater than that of an isolated element of the same length. 10

5. Explain the complementary behavior between a slot and dipole antennas. 10

6. Explain the principle of working of paraboloid type antennas. Show that maximum gain of a paraboloid antenna using uniformly illuminated reflector is $6.5 (D/\lambda)^2$, where the symbols have their usual meanings. Give the frequency range of its use. 10

7. Explain the basic characteristics of a rectangular patch antenna. Write the feed arrangements used for micro strip antenna. 10

8. Write short notes on any *two* : 5×2

(a) Pyramidal horn

(b) Broadside and End-fire array patterns

(c) Electronic scanning antenna.
