USN | | | | | | | | | | |

06EC64

Sixth Semester B.E. Degree Examination, June 2012
Antenna and Propagation

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. State and explain: Aperature efficiency, effective height and bandwidth of an antenna. **(09 Marks)**

b. Show that the directivity of an antenna is the ratio of the area of a sphere to the beam area. **(05 Marks)**

c. Derive Friis transmission formula. **(06 Marks)**

2 a. The radial component of the radiated power density of an infinitesimal linear dipole of length $l << \lambda$ is given by $\frac{a_r A_m \sin^2\theta}{r^2}$ where A_m = peak value of the power density, a_r = radial unit vector. Find the directivity of the antenna. **(06 Marks)**

b. Prove that directivity for a source with unidirectional pattern of Um $\cos^n\theta$ (where n is any number) can be expressed as D = 2(n + 1). **(06 Marks)**

c. Obtain the field pattern for two point sources situated symmetrically with respect to the origin. Two sources are feed with equal amplitude and equal phase signals. Assume: Distance between two sources = $\lambda/2$. **(08 Marks)**

3 a. Derive an expression for electric field component of a linear antenna of length $\lambda/2$ long. **(12 Marks)**

b. Derive the expression for radiation resistance of a short dipole with uniform current. **(08 Marks)**

4 Write notes on:

a. Pattern multiplication. **(07 Marks)**

b. Power distribution in broad side array. **(06 Marks)**

c. Radiation pattern. **(07 Marks)**

PART – B

5 a. Derive the expression for E field component of a small circular loop antenna of radius 'a', carrying current I. **(12 Marks)**

b. State and illustrate Babinets principle. **(08 Marks)**

6 Write short notes on:

a. Lens antenna. **(07 Marks)**

b. Log-periodic antenna. **(07 Marks)**

c. Antennas for ground penetrating radar. **(06 Marks)**

7 a. What is meant by diffraction of radio waves? Define knife edge diffraction gain. **(07 Marks)**

b. Describe ground wave propagation. **(07 Marks)**

c. Obtain the expression for line of sight distance between the transmit and receiver antennas. **(06 Marks)**

8 a. Discuss the reflection mechanism where by electromagnetic waves are bent back by a layer of the ionosphere. Include in your discussing a description of the virtual height of a layer. **(12 Marks)**

b. Describe briefly the strata of the ionosphere and their effects on sky wave propagation. **(08 Marks)**

* * * * *