2007-PUNJAB UNIVERSITY

B.TECH DEGREE EXAMINATION

ANTENNA AND WAVE PROPAGATION

(ELECTRONICS AND COMMUNICATION ENGINEERING)

TIME-3HOUR
MARKS-100

PART A[10*2=20 MARKS]

(a) Draw the charge and current distribution on a linear antenna. Draw how this antenna radiates.

(b) Draw the tow dimensional top view and side view of omni directional and isotropic radiation pattern.

(c) What is radiation resistance of an antenna? Write expression for the radiation resistance of a dipole antenna.

(d) What is array factor and write the expression for a planar array factor?

(e) A rectangular aperture with a constant field distribution, with a = 3l and b = 2 l, is mounted on an infinite ground plane. Compute FNBW and HPBW in the E-Plane.

(f) What is the difference between the directivity of rectangular and circular aperture on ground plane?

(g) What is Babinet's principle?

(h)Define Troposphere scattering.

(i) What is critical frequency and write expression for the critical fr3quency in terms of ionization density?

(j) Differentiate between deviative and nondeviative absorption.

PART B[10*8=80 MARKS]

2. What is potential function and using Heuristic approach derive the expression for the retarded potential of a current carrying element?

3. The maximum radiation intensity of a 90% efficiency antenna is 200 mW/ unit solid angle. Find the directivity and gain (dimensionless and in dB) when the :

(a) input power is 125.66 Mw

(b) output power is 125.66 mW

4. Derive the expression for the total field for a linear array of n isotropic point sources of equal amplitude and spacing.

5. Draw the electron density profile of ionosphere and explain the phenomenon of reflection from different ionospheric layers.

6. If a small square loop is considered equivalent to 4 short dipoles, calculate the far field pattern. Show that the pattern in the plane of the loop is circle.

7. A half wave dipole radiator is elevated 100ft above the ground. A receiving dipole 3 miles distant is elevated 30 ft. Determine the space and surface wave field strengths at the receiving antenna when the transmitting antenna carries a current of 1 ampere at a frequency of 50 MHz. assuming an average earth having er=15 and s= 5 x 103.

(a) for vertical half wave dipole and

(b) for horizontal half wave dipole.

8. Describe the working of monopole and half wave dipole. Derive the field expressions for both of these antennas.