USN | 1 | MV | 10 | EC | 107 | 10EC64

Sixth Semester B.E. Degree Examination, June/July 2013

Antennas and Propagation

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define the following terms with respect to antenna:
i) Directivity ii) Beam solid angle iii) Radiation resistance **(09 Marks)**

b. State and prove Frii's transmission formula. **(05 Marks)**

c. Show that maximum effective aperture of short dipole is $0.119\ \lambda^2$. **(06 Marks)**

2 a. State and prove power theorem and its application. **(05 Marks)**

b. Show that the directivity for unidirectional operation is $2(n + 1)$ for an intensity variation of $U = U_m \cos^n \theta$. **(05 Marks)**

c. Derive an expression and draw the field pattern for isotropic point sources of the same amplitude and same phase. **(10 Marks)**

3 a. Starting from electric and magnetic potentials, obtain the far field components for a short dipole. **(12 Marks)**

b. Derive an expression for radiation resistance of a short electric dipole. **(08 Marks)**

4 a. Derive an expression for far field components of a loop antenna. **(10 Marks)**

b. The radius of a circular loop antenna is 0.02λ. How many turns of the antenna will give a radiation resistance of 35 Ω. **(05 Marks)**

c. Write a note on slot antenna. **(05 Marks)**

PART – B

5 a. Explain the features of an helical antenna and the practical design considerations of the helical antenna. **(10 Marks)**

b. Write note on: i) Ultra wide band antenna, ii) Lens antenna. **(10 Marks)**

6 a. Explain: i) Yagi-Uda antenna, ii) Parabolic reflectors. **(10 Marks)**

b. Write short notes on:
i) Turnstile antenna ii) Antennas for ground penetrating radar. **(10 Marks)**

7 a. Discuss the propagation characteristics of radio waves for different frequencies. **(10 Marks)**

b. Explain the principle of surface wave propagation. Obtain an equation for tilt angle α of the wave. **(10 Marks)**

8 a. Draw and explain different ionized layers an ionospheric propagation. **(10 Marks)**

b. A distance of 1500 km one is to be covered along earth surface using a communication link of the reflection region of ionosphere has f_c 6 MHz and f_{MUF} 7.5 MHz, calculate the height of the region. **(05 Marks)**

c. Write a note on skip distance. **(05 Marks)**

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