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10TE63

Sixth Semester B.E. Degree Examination, June/July 2017
Antenna & Propagation

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. (i) Define Antenna. Explain basic principle of radiation using basic radiation equation.
(ii) State and prove Frii's transmission formula. **(10 Marks)**

b. Calculate the directivities from the half power beam widths of three unidirectional antennas having power patterns as follows:
$u(\theta,\phi) = U_m \sin\theta \sin^2\phi$, $u(\theta,\phi) = U_m \sin\theta \sin^3\phi$, $u(\theta,\phi) = U_m \sin^2\theta \sin^3\phi$
$u(\theta,\phi)$ has a value only for $0 \le \theta \le \pi$, $0 \le \phi \le \pi$ and zero elsewhere. **(10 Marks)**

2 a. Explain the following parameters that are related to array of point sources:
(i) Isotrophic source (ii) Power theorem
(iii) Radiation intensity (iv) Phase patterns
(v) Antenna arrays. **(10 Marks)**

b. Draw the polar diagram of a End fire array with number elements = 4 and spacing = $\frac{\lambda}{2}$ **(10 Marks)**

3 a. Derive Nearfield component of electric and magnetic fields of a short dipole. **(12 Marks)**

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

4 a. Write short notes on: (i) Horn antenna (ii) Loop antenna **(10 Marks)**

b. Explain with the help of neat diagrams, the principle of operation of a slot antenna and its feed arrangements. **(10 Marks)**

PART – B

5 a. With the help of neat diagrams, explain:
(i) Sleeve antenna (ii) Turnstile antenna **(10 Marks)**

b. Explain various types of rectangular horn antennas and derive any one type. **(10 Marks)**

6 a. Explain the features of an helical antenna. Explain the practical design consideration of the helical antenna. **(10 Marks)**

b. Explain : (i) Parabolic reflectors (ii) Yagi-uda antenna. **(10 Marks)**

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

b. Estimate the wave tilt in degrees of the surface wave over an earth of 5 milliohms conductivity and relative permittivity of 10 at 1 MHz. **(06 Marks)**

c. The critical frequency for F_1 layer ranges between 5-7 MHz, find its maximum electron density. **(04 Marks)**

8 a. Define signal fading. Explain various types of signal fading. **(07 Marks)**

b. In an Ionosphere wave propagation the angle of incidence made at a particular layer at a height of 200 km is 45°, with critical frequency 6 MHz. Calculate the skip distance. **(05 Marks)**

c. Derive an expression for conductivity, relative permittivity and refractive index as a function of electron density and angular frequency. **(08 Marks)**

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