Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(Electronics & Electrical) (2011 Onwards) (Sem.–7,8)
B.Tech.(Electrical & Electronics) (2013 & Onwards)

ANTENNA & WAVE PROPAGATION

Subject Code : BTEEE-801
M.Code : 71962

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

a. Define polarization and polarization loss factor.

b. Define radiation pattern. What is the directivity (dB) for monopole antenna?

c. What is the function of parasitic elements in a Yagi Uda array?

d. Derive the relationship between effective height and effective aperture.

e. Define antenna field zones.

f. Differentiate between lens antenna and reflector antenna.

g. Explain the radiation mechanism in dipole antenna.

h. What is space wave or tropospheric wave propagation?

i. What do you mean by pattern multiplication?

j. What is radio horizon? How it is different from optical horizon?

SECTION-B

2. An antenna radiates isotropically in all direction. If **E = 100 mV/m (rms)** at a distance of **1 km**, find

   a. Power radiated

   b. Power received by an antenna, has an effective aperture of 200 cm^2 located at 200 m away from the transmitting antenna,

3. Calculate the exact directivity. of a unidirectional antenna if the normalized power pattern is given by a) $\mathbf{P_n = \cos^3 \theta}$ b) $\mathbf{P_n = \cos^2 \theta}$. in all cases these patterns are unidirectional (in + Z direction) with having Pn having a value only for Zenith angle $0 \leq \theta \leq 90$ and with $P_n = 0$ for $90 \leq \theta \leq 180$. The patterns are independent of the azimuth angle ϕ.

4. Find the array factor for an array of two isotropic elements in which the elements are separated by a distance of 15 cm and the elements are excited with uniform current and in same phase at 1 GHz. Also plot the array factor.

5. Calculate the beam width, directivity and gain of a 15 cm × 10 cm pyramidal horn antenna which is operating at 10 GHz. Assume aperture efficiency is 50 %.

6. The sky wave reflects from an ionospheric layer which has an altitude of 400 km and refractive index as 0.9 at 9 MHz. Find out the skip distance for which MUF is 9MHz. Neglect earth's curvature.

SECTION-C

7. Derive the expressions for the directivity of Hansen-Woodyard array.

8. Drive the fields radiated from a half wave dipole with sinusoidal in phase current distribution over its length.

9. Write short notes on following :

   a. Layer structure of Ionosphere

   b. Duct propagation

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.