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(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID : 131504 Roll No. | | | | | | | | | |

B.Tech.

(SEM. V) THEORY EXAMINATION, 2015-16

ANTENNA AND WAVE PROPAGATION

[Time:3 hours] **[Total Marks:100]**

Section-A

Q.1 **Attempt all parts. All parts carry equal marks. Write answer of each part in short.** (2×10=20)

(a) Classify various types of antenna arrays.

(b) Define effective height of an antenna.

(c) Relate MUF with skip distance for flat earth.

(d) At what frequency a wave must propagate for the D region to have an refractive index of 0.7? Given N = 400 electrons/ cm^3

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(e) A 12-turn axial helix antenna of circumference λ has turn spacing of $\lambda/4$. Determine HPBW, BWFN, directivity and also examine polarization characteristic of the antenna.

(f) A pyramidal horn antenna of mouth length 10 λ cm is fed by a rectangular waveguide in TE 10 mode. Determine the design parameters of the antenna at operating frequency 2.5 Hz.

(g) What do you mean by frequency independent antenna?

(h) Write down the expression for the electric field components of a short dipole.

(i) A 10MHz satillite communication is taking place through ionosphere layer with refractive index 0.975 and height 500Km. Calculate the ground range of this propagation assuming 10GHz as MUF and 2.24GHz as critical frequency.

(j) A thin dipole antenna is $\lambda/10$ long. If loss resistance is 1.5 Ω, Find radiation resistance and efficiency.

Section-B

Attempt any five questions from this section. (10×5=50)

2. (a) Write a short note on Antenna Temperature, Directivity and Antenna Impedance.

   (b) A TV transmitter is designed to establish communication at a distance of 50 Km from it. The height of TX antenna is 100m and transmits a power of 45 W at 90 MHz. Find the height of receiver and field intensity at the RX antenna.

3. Derive the relation between the Effective height and Effective aperture area. An antenna has a radiation resistance of 100ohm, a loss resistance of 15 ohm and a power gain of 10dB. Calculate Antenna efficiency and its directivity.

4. Explain operation of Log Periodic Antenna in detail.

5. Discuss applications of loop antenna as direction finder. What are disadvantage of loop direction finders. Also explain 180 degree ambiguity and how is it resolved.

6. Explain how ground-wave and space-wave propagates the signal via troposphere. Distinguish clearly between surface wave, space wave and sky wave.

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7. Explain Yagi Uda Antenna and Design a 5-dipolw Yagi-Uda array for operation at 500MHz.

8. Explain how carths magnetic field affects the propagation of radio waves in ionosphere.

9. Explain in detail Induction field (near field) and Radiation field (far field) (magnetic field only) applicable to alternating current element.

Section-C

Attempt any two questions from this section.

(15×2=30)

10. Why we use the term modified refractive index in propagation of radio waves? Explain Duct Propagation.

11. Explain Parabolic reflector and corner reflector antenna.

12. Derive the relation between MUF and skip distance. Also explain critical frequency, MUF, Virtual Height, skip distance

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