



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

PAPER ID : 3089

Roll No.

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B.Tech

(SEM V) ODD SEMESTER THEORY EXAMINATION 2009-10
ANTENNA & WAVE PROPAGATION

Time : 3 Hours

[Total Marks : 100

Note : Attempt all questions.

1 Answer any two questions of the following : $10 \times 2 = 20$

- (a) Define beam width of an antenna and show that its directivity is given by :

$$D = \frac{41257}{Q_E^\circ \cdot Q_H^\circ}$$

where Q_E and Q_H are half power beam-width in E and H plane respectively.

- (b) A transmitting antenna having an effective height of 70 meters, takes a current of 50 amp (rms) at a wavelength of 600 meters. Find :
- Radiation resistance of the antenna
 - Power radiated
 - Antenna efficiency for a total antenna resistance of 50Ω .

- (c) What is meant by directivity and power gain of an antenna? Show how the directivity can be increased by using a number of antenna in a suitable array.

2 Attempt any two questions of the following : $10 \times 2 = 20$

- (a) Prove that the directivity for a broadside array of two identical isotropic in-phase point sources spaced distances d apart is given by

$$D(\theta, \varphi) = \frac{2}{1 + \frac{\delta m \beta d}{\beta d}}$$

- (b) A uniform linear array consists of 16 isotropic point sources with a spacing of $\lambda/4$. If the phase difference $\delta = -90^\circ$, calculate

- HPBW
 - Beam solid angle
 - Beam efficiency
 - Directivity and
 - Effective aperture.
- (c) What is meant by Dolph-chebyshev distribution for a linear array? Show that such a distribution gives a minimum side lobe level for a given beam-width of major-lobes.

3 Attempt any two parts of the following : $10 \times 2 = 20$

- Discuss the theory of formation ionospheric regions. Describe the properties of different ionospheric regions with special reference to seasonal variations.
- Explain how long, medium and short waves, are propagated over short and long distances and comment on their applications in the field of practical radio communication.
- Explain MUF, critical frequency, virtual height, and skip distance as applied to sky wave propagation.

4 Attempt any two parts of the following : $10 \times 2 = 20$

- Find out the length L , width W , and half flare angles θ_E and θ_H of a pyramidal horn antenna for which the mouth height $h = 10\lambda$. The horn is fed by a rectangular waveguide with TE_{10} mode.
- What is a folded dipole antenna? Describe an Yagi antenna and explain its operation.



(c) Explain with suitable diagrams the working of the helical antenna under :

(i) Normal mode of operations and

(ii) Axial mode of operations.

What are its applications ?

5 Attempt any two parts of the following : $10 \times 2 = 20$

(a) Measurement of antenna efficiency

(b) Radiation pattern measurement

(c) Log periodic antenna.