



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

PAPER ID : 131504

Roll No.

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B. Tech.

(SEM. V) (ODD SEM.) THEORY
EXAMINATION, 2014-15

ANTENNA AND WAVE PROPAGATION

Time : 2 Hours]

[Total Marks : 50

Note : Attempt ALL questions.

1 Answer any four of the following : **2.5×4=10**

- (a) Calculate the directivity for a unidirectional source whose pattern is $\phi = \phi_m \sin \theta \sin^3 \phi$, where ϕ_m is maximum radiation intensity.
- (b) Evaluate the radiation resistance of a $\lambda/2$ antenna element operating at a frequency of 10MHz
- (c) Derive Friis's transmission formula.
- (d) Derive relationship between effective aperture and beam area of an antenna.
- (e) A source has a cosine radiation intensity given by $U=U_m \cos \theta$. The radiation intensity has a value only in upper hemisphere. Find the total power radiated and its directivity.
- (f) Derive the radiation resistance of a short electric dipole.

- 2 Answer any two of the following : $5 \times 2 = 10$
- (a) Explain principle angular regions of a flat sheet reflector.
 - (b) Derive and hence plot the radiation pattern for two isotropic point sources of same amplitude but opposite phase.
 - (c) Derive the expression for power radiated by an alternating current element.
- 3 Answer any two of the following : $5 \times 2 = 10$
- (a) Discuss about the applications of loop antenna and what is 180° ambiguity? How it arises and how is it removed?
 - (b) Explain with suitable diagram the working of axial mode of operation of a helical antenna.
 - (c) Design log periodic antenna. What are the advantages of microstrip antennas?
- 4 Answer any two of the following : $5 \times 2 = 10$
- (a) Make a detailed comparison between corner reflector and parabolic reflector.
 - (b) What are the various feeding methods used for reflector antenna?
 - (c) What are antenna measurement ranges? Explain any two gain measurement techniques.
- 5 Answer any two of the following : $5 \times 2 = 10$
- (a) Explain MUF, critical frequency and virtual height as applied to sky wave propagation.
 - (b) Derive the skip distance for region between transmitter and receiver using sky wave propagation, when curvature of earth is taken into consideration.
 - (c) Explain the mechanism of reflection and refraction of sky waves by ionosphere and derive the relevant relationship for same.
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