

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

Paper ID : 2289459

Roll No.

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B.TECH

Regular Theory Examination, (Odd Sem- V) 2016 - 17
ANTENNA AND WAVE PROPAGATION.

Time : 3 Hours

Max. Marks : 100

SECTION - A

1. Attempt all parts. All parts carry equal marks. Write answer of each part in short questions. (10×2=20)
 - a) List out which parameters to consider for Receiving antenna design.
 - b) Relate radian and steradian.
 - c) What is the radiation resistance of a current element whose overall length is $\lambda/50$
 - d) State the principle of pattern multiplications.
 - e) A linear broadside array consists of four equal isotropic inphase point sources with $\lambda/3$ spacing. Find the beamwidth.
 - f) Draw the unidirectional & bidirectional pattern for $U = U_m \cos\theta$ & $U_m \sin\theta$.

- g) Mention the applications of loop antenna.
- h) What are frequency independent antennas? Give example.
- i) Define magneto ionic splitting.
- j) What is maximum usable frequency?

SECTION - B

Note: Attempt any five Parts. from this section (5×10=50)

2. a) Derive Friis transmission formula.
- b) Show that linear array of N-isotropic point source equal amplitude & spacing $E_{norm} = 1/\lambda \frac{\sin \lambda \phi/2}{\sin \phi/2}$
- c) A transmitting antenna having effective height of 61.4m takes a current of 50A, at a wavelength of 625m. Find radiation resistance, power radiated by an antenna and antenna efficiency for RA=50
- d) Deduce the relation between effective aperture and gain of an antenna.
- e) Derive the impedance of a folded dipole antenna.
- f) Describe in brief about microstrip antennas types & different feeding techniques.

- g) Narrate in details about Cassegrain feed of a parabolic reflector & explain different Reflector types.
- h) With a neat sketch explain about skip distance.

SECTION - C

Note: Attempt any two Questions from this section.

(2×15=30)

3. a) Calculate the directivity of an end fire array of two identical isotropic point source in phase opposition, spaced $\lambda/2$ apart along the polar axis, the relative field pattern being given by $E = \cos\left(\frac{d}{2} \cos \theta\right)$. Show that the directivity for an ordinary end fire array of two identical isotropic source spaced a distance d is given by

$$D = \frac{2}{1 + \frac{\lambda}{2\pi d} \sin\left(\frac{2\pi d}{\lambda}\right)} \quad (12)$$

- b) A thin dipole antenna is $\lambda/15$ long. if its RL = 1.5Ω, find R_r and its efficiency. (3)
4. a) With a neat sketch explain the construction and working of Yagi-Uda antenna. (7)
- b) Illustrate with neat diagram and design equations the working of Log periodic antenna. (8)

5. a) Discuss in detail about the mechanism of refraction in sky wave propagation. (3)
- b) Obtain the expression for refractive index and critical frequency. (12)

RTNCH

Regulation Theory & Applications (Unit 5) 2016-17

ANTENNA AND WAVE PROPAGATION

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

- a) List out which parameters are considered for designing antenna design.
- b) Explain the antenna factor.
- c) When is the antenna factor independent of distance between antenna and receiver?
- d) State the principle of the antenna factor.
- e) A linear antenna has a length of 100 cm. It is fed by a voltage source with a peak voltage of 100 V. Find the beamwidth.
- f) Draw the unidirectional radiation pattern of a horn antenna.