

(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)
- List out which parameters to consider for Receiving antenna design.
  - Relate radian and steradian.
  - What is the radiation resistance of a current element whose overall length is  $\lambda/50$
  - State the principle of pattern multiplications.
  - A linear broadside array consists of four equal isotropic inphase point sources with  $\lambda/3$  spacing. Find the beamwidth.
  - 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  $E_{norm} = 1/\lambda \frac{\sin \lambda \varphi/2}{\sin \varphi/2}$
- 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  $E = \cos\left(\frac{dr}{2} \cos\theta\right)$ . 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 =  $1.5 \Omega$ , find Rr 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)

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