

B.Tech III Year I Semester (R13) Supplementary Examinations June 2017

**ANTENNAS & WAVE PROPAGATION**

(Electronics and Communication and Engineering)

Time: 3 hours

Max. Marks: 70

**PART – A**  
(Compulsory Question)

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- 1 Answer the following: (10 X 02 = 20 Marks)
- Why do you need of radiation resistance of an antenna? Explain with an example.
  - Estimate the value of effective aperture of isotropic antenna using its directivity.
  - Deduce the relation of radiation between small loop and short dipole antennas.
  - Draw the E – plane view and H – plane view of a pyramidal horn antenna.
  - Explore the advantage of lens antenna over a reflector antenna? Explain.
  - Justify preference of rectangular patches to circular? Justify.
  - Comment on reliability of a point source in practice.
  - Where near and far fields of a.c. current element coincide? Justify.
  - Explore the boundary limits of different means propagation above the sky.
  - Are horizontal polarization antennas are suitable for ground waves? Justify.

**PART – B**  
(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

- 2 (a) With suitable assumptions, using electric and magnetic fields, explain how much power is radiated by a vertical radiator if it carries 1A a.c.  
(b) Explain importance of discontinuity for radiation.

OR

- 3 Compute the radiation resistance of a half wave dipole. Hence give the value of a quarter wavelength monopole.

**UNIT – II**

- 4 With neat diagrams, describe the principle of working of 3 element Yagi antenna, listing out its design requirements.

OR

- 5 Determine the length L, H-plane aperture and flare angles  $\theta_E$  and  $\theta_H$  of a pyramidal horn for which E-plane aperture  $a_E = 10\lambda$ . The horn is fed by a rectangular wave guide with  $TE_{10}$  mode. Let  $\delta = 0.2\lambda$  in the E-plane and  $0.375\lambda$  in the H-Plane. Also calculate the beam width and directivity.

**UNIT – III**

- 6 Give advantages and limitations of microstrip patch antennas.

OR

- 7 With reference to parabolic antenna, explain: (i) f/d ratio. (ii) Spill over and aperture efficiency. (iii) Front to back ratio. (iv) Types of feeds.

**UNIT – IV**

- 8 Distinguish between broad side array and end fire array.

OR

- 9 Describe how gain of an antenna under test is measured using absolute gain method.

**UNIT – V**

- 10 What are the different paths used for propagating radio waves from 300 kHz and 300 MHz?

OR

- 11 A radio link has to be established between two earth stations placed at a distance of 25000 km between them. If the height of the ionosphere is 200 km and its critical frequency is 5 MHz, calculate the MUF for the given path. Also calculate the electron density in the ionospheric layer.