

**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)

- What is the importance of radiation resistance of an antenna? Explain with example.
- Calculate the value of effective aperture of isotropic antenna using its directivity.
- What is the relation of radiation between small loop and short dipole antennas?
- How the length of a 3 element parasitic elements are related? Explain.
- What is the advantage of lens antenna over a reflector antenna? Explain.
- Why rectangular patches are in general preferred to circular? Justify.
- Can point source is realizable in practice? Explain.
- At what distance near and far fields of a.c current element coincide? Justify.
- What are the boundary limits of different means propagation above the sky?
- Why horizontal polarization antennas are not suitable for ground waves? Explain.

**PART – B**

(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

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

**OR**

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

**UNIT – II**

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

**OR**

- 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-Planes. Also calculate the beam width and directivity.

**UNIT – III**

- Give advantages and limitations of microstrip patch antennas.

**OR**

- With reference to paraboloids, explain:

- f/d ratio.
- Spill over and aperture efficiency.
- Front to back ratio.
- Type of feeds.

**UNIT – IV**

- Distinguish between broad side array and end fire array.

**OR**

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

**UNIT – V**

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

**OR**

- 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.

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