

Total No. of Questions : 6]  
P493

SEAT No. :

[Total No. of Pages : 2

**TE/Insem/APR - 20**  
**T.E. (E & TC)**  
**Antenna & Wave Propagation**  
**(2012 Pattern)**

*Time : 1 Hour]*

*[Max. Marks : 30*

*Instructions to the candidates :*

- 1) Answer any one Question out of Q.1 & Q.2, Q.3 & Q.4 and Q.5 & Q.6.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to the right indicate full marks.*
- 4) Use of calculator is allowed.*
- 5) Assume suitable data if necessary.*

- Q1)* a) What is polarization? Explain polarized wave. **[4]**
- b) A uniform plane wave of 200 MHz travelling in free space impinges normally on a large block of material having permittivity 4, permeability 9 & conductivity is zero. Find reflection coefficient & transmission coefficient at the interface for Electric field. **[6]**

OR

- Q2)* a) What is loss tangent, how media is classified as lossless dielectric, lossy dielectric and good conductor based on loss tangent. Why it important. **[4]**
- b) A plane electromagnetic wave having frequency of 10 MHz has an average pointing vector of  $1 \text{ W/m}^2$ . The medium is lossless with relative permeability 2 and relative permittivity 3. Find **[6]**
- i) Velocity of propagation
  - ii) Wave length
  - iii) Impedance of the medium
  - iv) RMS electric field E.

**P.T.O.**

- Q3)** a) What do you mean by Fading? List the major causes? How it can be minimized? [4]
- b) Two planes 15 km apart are in radio communication. The transmitting plane delivers 500 W. Its antenna gain being 10 in the direction of other plane power observed is 2 microwatts by the receiving antenna of the second plane. Find the effective area. [6]

OR

- Q4)** a) What is MUF & Critical Frequency? Why this frequency varies with respective layers. [4]
- b) A communication link is to be established between two station using half wavelength antenna for maximum directive gain. Transmitter power is 1 kW, distance between transmitter & receiver is 100 km. What is the maximum power received by receiver in dBW. Frequency of operation is 100 MHz. [6]

- Q5)** a) Explain the term Gain, Directivity & Radiation intensity. What is the relation between effective aperture of any antenna & directivity? [4]
- b) Derive vector potential F for an magnetic current source M. [6]

OR

- Q6)** a) What is field region? Define far field region. Why antenna fundamentals are measured in far field. [4]
- b) What is isotropic radiator? A hypothetical isotropic antenna is radiating in free space. At a distance of 100 m from the antenna, the total electric field ( $E_\theta$ ) is measured to be 5 V/m. Find the [6]
- i) Power density ( $W_{\text{rad}}$ )
- ii) Power radiated ( $P_{\text{rad}}$ )

