APR - 18/TE/Insem. - 22

T.E. (E & TC)

ANTENNA & WAVE PROPAGATION

(2012 Pattern) (Semester - II)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.

2) Neat diagrams must be drawn wherever necessary.

3) Figures to the right side indicate full marks.

4) Assume suitable data, if necessary.

Q1) a) Derive an expression of wave equation in terms of an electric field & magnetic field for perfect conductor using Maxwell equation in phasor form. **[6]**

b) A 10 GHz plane wave travelling in free space has an amplitude 15 V/m find. **[4]**

   i) Velocity of propagation

   ii) Wavelength

   iii) Amplitude of H

   iv) Phase constant (β)

OR

Q2) a) Derive an expression for transmission & reflection coefficient for normal incidence between free space and perfect dielectric. **[5]**

b) State poynting theorem and derive expression for the poynting theorem. **[5]**

P.T.O.

Q3) a) Explain in detail the multi hops communication with proper diagram and what is the limit for hop distance. **[4]**

b) Explain the following term **[6]**

   i) Virtual height

   ii) Skip distance

   iii) MUF

OR

Q4) a) Explain the Ground wave propagation in detail. **[5]**

b) At what frequency a wave must propagate for the D region to have index of refraction 0.5, when 400 electrons/cc for D region. **[5]**

Q5) a) Explain the following antenna parameters. **[6]**

   i) Radiation Intensity

   ii) Antenna efficiency

   iii) Effective Length

b) A free space H= 0.2 cos(wt - βz) a_z A/m. Find total power passing through a circular disc of radius 5cm on a plane x = 1. **[4]**

OR

Q6) a) Draw radiation pattern and half power beam width of a antenna a given by, U(θ) = $sin^2θ$, for $0 \leq θ \leq π$. **[4]**

b) Explain following term related to antenna with mathematical expression. **[6]**

   i) Maximum Directivity

   ii) Aperture efficiency

   iii) Absolute Gain of Antenna

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