Total No. of Questions : 6]

SEAT No. :

P20

[Total No. of Pages : 2

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, $U(\theta) = \sin^2\theta$, for $0 \leq \theta \leq \pi$. **[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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