Total No. of Questions :6] **SEAT No. :**

P88 **[Total No. of Pages :2**

APR. -16/TE/Insem. - 20
T.E.(E&TC)
ANTENNA&WAVE PROPAGATION
(2012 Pattern) (Semester - II)

Time : 1Hour] ***[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 indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Derive an expression of wave equation in terms of an electric field& magnetic field. **[5]**

b) A wave of frequency 1MHZ travels in a large block of copper ($\sigma=5.7*10^7, \varepsilon_r=1$ and $\mu r=1$).Determine the values of η, α, β, the phase shift between the electric and magnetic field and the distance that the wave must travel to be attenuated by the factor 37%. **[5]**

OR

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

b) An uniform plane wave in free space is propagating in the $\mathbf{a}_y$ direction at frequency of 10 MHz if, E=400 *cos* ωt az V/m. at y=0. Write the expression for E(x,y,z,t),H(x,y,z,t) and Es(x,y,z). **[5]**

Q3) a) Explain in brief factors affecting the performance of mobile communication channel. **[4]**

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

i) Virtual height

ii) Skip distance

iii) MUF

OR

P.T.O.

Q4) a) What are the Ionospheric abnormalities and how they affect wave propagation? **[5]**

b) Calculate the critical frequency and maximum usable frequency(MUF) of F2 layer if its density $3\times10^5/cm^3$ if the angle of incidence is 30 degree. **[5]**

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

i) Radiation Intensity

ii) Antenna efficiency

iii) Effective Length

b) Determine the electrical field intensity at a distance of 10KM from an antenna having directive gain of 5 dB& radiating a total power of 20 KW. **[4]**

OR

Q6) a) Draw radiation pattern and half power beam width of a antenna a given by, $U(\theta)=\cos\theta$, for $0 \le \theta \le \pi/2$ and $0 \le \Phi \le 2\pi$. **[4]**

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

i) Directivity.

ii) Aperture area.

iii) Gain of Antenna.