

Total No. of Questions :6]

SEAT No. :

**P88**

**APR. -16/TE/Insem. - 20**

[Total No. of Pages :2

**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 ( $\sigma=5.7 \times 10^7$ ,  $\epsilon_r=1$  and  $\mu_r=1$ ). Determine the values of  $\eta$ ,  $\alpha$ ,  $\beta$ , 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,  $E=400 \cos \omega t \mathbf{a}_z$  V/m. at  $y=0$ . Write the expression for  $E(x,y,z,t)$ ,  $H(x,y,z,t)$  and  $E_s(x,y,z)$ . **[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  $3 \times 10^5/\text{cm}^3$  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  $0 \leq \theta \leq \pi/2$  and  $0 \leq \Phi \leq 2\pi$ . [4]

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

i) Directivity.

ii) Aperture area.

iii) Gain of Antenna.

