

Total No. of Questions :6]

SEAT No :

P184

APR -17/ TE/Insem. - 20

[Total No. of Pages :2

T. E. (E & TC)

ANTENNA AND WAVE PROPAGATION

(Semester - II) (2012 Pattern)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) *Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.*
- 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) A plane wave of 200MHz travelling in free space impinges normally on a large block of material having $\epsilon_r = 4$, $\mu_r = 9$ and $\sigma = 0$, determine $\eta_1, \eta_2, \beta_1, \beta_2, \Gamma_T$ and Γ_R . **[6]**

b) Derive the expressions for field after normal incidence with conductor. **[4]**

OR

Q2) a) Write the Maxwell equation in phasor form. Derive the wave equation, solve the wave equation for transverse electromagnetic (TEM) and clearly mention the assumptions to be made. **[6]**

b) What is poynting vector? What is its significance? Derive an expression for poynting vector? **[4]**

Q3) a) Explain the effect of earth's magnetic field on ionospheric propagation. **[3]**

b) The observed critical frequencies of E and F layers at Bhubaneswar at a particular time are 2.5MHz and 8.4MHz respectively. Calculate the maximum electron concentrations of the layers. **[4]**

c) Distinguish between the sky wave and space wave propagation. **[3]**

OR

P.T.O.

- Q4)** a) Write a short note on “Space link geometry” [4]
- b) Write a short note on [6]
- i) Skip distance
 - ii) Maximum Usable frequency
 - iii) Coherence bandwidth

- Q5)** a) Derive vector potential A for an magnetic current source J. [6]
- b) With the help of illustrative diagrams explain the following radiation pattern of antenna. [4]
- i) Directional
 - ii) Omnidirectional.

OR

- Q6)** a) Explain in detail the radiation mechanism of antenna. [6]
- b) A lossless antenna has input impedance of 75Ω , maximum effective aperture of 2.14m^2 at a operating frequency of 100MHz . The antenna is connected to a 50Ω transmission line. Find the directivity of the antenna by neglecting the polarization loss. [4]

