Total No. of Questions :6]

SEAT No :

P184

[Total No. of Pages :2

APR -17/ TE/Insem. - 20
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 O.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 $\varepsilon_r = 4$, $\mu_r = 9$ 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]**