

T. E. - sem V (CBUS)

18/11/14

ETRX -

Electromagnetic Engg

QP Code : 14818

(3 Hours)

Total Marks : 80

- N. B. : (1) Question No.1 is compulsory.
(2) Solve any **Three** questions from remaining **five** questions.
(3) Draw a **neat** and **clean** diagram whenever **necessary**.
(4) Assume **suitable** data if **required**.

1. Answer the following (**any four**) 20
 - (a) What do you understand by conservative field.
 - (b) Derive wave equations for time harmonic fields.
 - (c) The radiation resistance of antenna is 72Ω and the loss resistance is 8Ω . Calculate its directivity in dB if the power gain is 16.
 - (d) Explain the important advantages and drawback of FDM.
 - (e) Define critical frequency, MUF and OMF.
2. (a) State and Explain Maxwell's equations in differential and integral form for static field. 8
 - (b) A 10 GHz plane wave travelling in free space has an amplitude of $E_x = 10\text{V/m}$ 8
Find - (i) The phase constant
(ii) Intrinsic impedance and
(iii) The amplitude and the direction of \mathbf{H}
 - (c) Explain the operating modes of helical antennas. 4
3. (a) Explain the mechanism of ionospheric propagation. A high frequency radio link has to be established between two points at a distance of 2000 km. on the earth's surface. Considering the height of 200km and critical frequency of 5MHz. Calculate MUF for given path. 8
 - (b) Derive an expression for radiation resistance of an infinitesimal dipole antenna and explain its significance. 8
 - (c) Derive Laplace's and Poisson's equations. 4
4. (a) Find the transmission and reflection coefficients at the boundary for normal incidence. Given that for region 1: $\mu_{r1} = 1$, $\epsilon_{r1} = 9$ and for region 2 is a free space. Consider the perpendicular polarization. 8
 - (b) Derive an expression for vector magnetic potential wave equation. 8
 - (c) Explain the physical significance of the terms α , β and γ related to wave propagation in lossy dielectrics. 4
5. (a) Give the comparison of FDM, FEM and MOM. 8
 - (b) Determine the Poynting vector theorem and explain the power flow terms due to the time varying fields. 8
 - (c) The height of monopole antenna is $\lambda/100$ what is the radiation resistance. 4
6. Write short notes on- 20
 - (a) Boundary conditions for static \mathbf{E} and \mathbf{M} fields.
 - (b) Polarization of waves.
 - (c) Antenna parameters.
 - (d) Space wave propagation