

S.E. EXTC (IV) (CBGS)

10/12/15

Wave Theory and Propagation

Q.P. Code : 5455

(3 Hours)

[Total Marks : 80]

- N.B. : (1) Question No.1 is compulsory.
(2) Answer any **three** questions from the remaining **five** questions.
(3) Assume any suitable data wherever required.
(4) Figures to the right indicate **full** marks.

1. Answer any four of the following. 20
- (a) With regard to ionosphere discuss the following-
- i) E layer
 - ii) Sporadic E layer
- (b) Give significance of boundary conditions for electric field.
- (c) Write integral form of Ampere's law and interpret the same.
- (d) What do you mean by depth of penetration?
- (e) Derive the boundary conditions for electric and magnetic field.
2. (a) Explain earth reflection on horizontally and vertically polarized wave. 10
- (b) Derive Maxwell's equation in point and integral form. 10
3. (a) Compare scalar and vector potential. 5
- (b) Derive wave equation for good dielectric medium. 5
- (c) A media has the following properties $\mu_r = 8$, $\epsilon_r = 2$, $\sigma = 10^{-4}$ mho/m at 2GHz. Determine- 10
- (i) Attenuation Constant
 - (ii) Attenuation Constant in dB
 - (iii) Phase Constant
 - (iv) Propagation Constant
 - (v) Wavelength
 - (vi) Phase Velocity
 - (vii) Intrinsic Impedance
 - (viii) Refractive Index
 - (ix) Loss Tangent
 - (x) Is the medium behaving like conductor or dielectric
4. (a) Derive an expression for magnetic field intensity due to finite long straight element. 10
- (b) State the Poynting Theorem and explain meaning of each term. 5
- (c) Derive wave equation in free space. 5

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5. (a) Obtain the reflection and transmission coefficient of a parallel polarized wave incident between a dielectric-dielectric boundary with an oblique incidence. 10
(b) Explain Super refraction and Tropospheric fading. 10
6. (a) What is virtual height of a layer? Why is it called so? Is it more than or less than the actual height of the layer? 5
(b) What is ionosphere? Which layers are present during day and night? Define critical frequency. 5
(c) Prove that static electric field is irrotational and static magnetic field is solenoidal. 10

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