305501

December, 2019

B.Tech. (ECE)-V SEMESTER

Electromagnetic Waves (ECC-02)

Time : 3 Hours]　　　　　　　　　　　　　[Max. Marks : 75

Instructions :

　1.　It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.

　2.　Answer any four questions from Part-B in detail.

　3.　Different sub-parts of a question are to be attempted adjacent to each other.

PART - A

1.　(a)　What is Poincare's Sphere.　　　　　　　(1.5)

　　(b)　Discuss attenuation in waveguides.　　　(1.5)

　　(c)　Differentiate between lowloss and lossless transmission lines.　　　　　　　　　　　　　　　　　(1.5)

　　(d)　How does Smith Chart help in calculating the admittance of a transmission line.　　　　(1.5)

(e) Prove that the curl of gradient of a scalar is zero. (1.5)

(f) A lossless transmission line having $Z_0 = 600\ \Omega$ is terminated by a resistance of 300 Ω. Calculate VSWR. (1.5)

(g) What is Field Visualization in waveguides. (1.5)

(h) Calculate angle of transmission if a wave is incident at an angle of 30° from air into polystyrene. Polystyrene has relative permittivity = 2.7. (1.5)

(i) Differentiate between monopole and dipole antennas. (1.5)

(j) Discuss the concept of total internal reflection. (1.5)

PART - B

2. (a) Derive the expressions for instantaneous, average and complex Poynting Vector. (10)

(b) What are gradient, divergence and curl. Give their physical interpretation. (5)

3. (a) What are the basic laws of electromagnetics? How are the four Maxwell's Equations derived from them? (8)

(b) Derive the boundary conditions for electric and magnetic fields. (7)

4. Derive the expressions for characteristic impedance, attenuation constant, velocity of propagation and wavelength of a uniform transmission line in terms of primary constants. (15)

5. (a) Derive the expression for power radiated by Hertz Dipole. (5)

(b) What is polarization? Discuss the three types of polarization. (10)

6. (a) Write Maxwell's Equations in differential and integral form and give their physical interpretation. (8)

(b) What are degenerate modes in rectangular waveguides? Why are rectangular waveguides preferred over circular waveguides? (7)

7. For a plane electromagnetic wave incident normally on the surface of a perfect dielectric, derive expressions for refraction coefficient and transmission coefficient. (15)