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Total Pages : 3

**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)

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- (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  $300 \Omega$ . 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  $30^\circ$  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)