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December 2023

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) How loss less lines are different from low loss lines. Give examples for both the cases. (1.5)
   (b) Why do we require Smith charts? (1.5)
   (c) What is the utility of Maxwell's equations in integral and Differential forms? (1.5)
   (d) What ids the significance of surface current. (1.5)

(e) How concept of reflection from a conducting body is different from a reflection from simple surface or body? (1.5)

(f) Why do we use waveguides when other mediums of wave propagation are there? (1.5)

(g) What are standing waves? Are these useful or not required? (1.5)

(h) What are the properties of Omnidirectional antenna? (1.5)

(i) What are the different reasons of attenuation of wave in waveguide? (1.5)

(j) Give *two* examples of concept of Total internal reflection. (1.5)

PART–B

2. (a) Derive an expression for Input Impedance of Open and Short Circuited lossless Transmission Line. (10)

(b) Derive and expression for relation between SWR and Reflection coefficient. (5)

3. (a) What are merits and demerits of Stub Matching? (5)

(b) Calculate the VSWR for loss-less line of Characteristic impedance 50 ohms when it is terminated in 00 ohms resistive and 30 - j 50 ohms. (10)

4. What is displacement current? Derive all the Maxwell equation in Integral and Differential forms in free space and Harmonically varying fields. Also explain their physical interpretation. (15)

5. (a) Explain how wave propagates in rectangular waveguide? (5)

(b) Derive propagation constant, Cut off frequency and wavelength for TE and TM waves. (10)

6. (a) Derive an expression for Poynting vector. Why this important when we are studying the concept of power flow? Explain its one application that will clear the concept. (10)

(b) Explain the impact of surface currents on the walls of waveguide. (5)

7. Write short notes on the following :

(a) Radiation for Hertz Dipole.

(b) Compare Monopole and Dipole antenna.

(c) Radiation parameters of an antenna. (15)