

Exam.Code:0928

Sub. Code: 6587 ✓

2023

B.E. (Electronics and Communication Engineering)

Fourth Semester

✓ EC-408: Electromagnetic Theory

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

- a) Gauss's Law is applicable only in the case of the electric field. (True / False)
- b) If there are no charges enclosed by a surface, then the net electric flux will be (1, -1, 0, or Infinite).
- c) For those surfaces where surface charge density is ____ (Infinity, Unity, or Zero) normal component of electric flux density is continuous.
- d) If a coil carrying current is placed in a uniform magnetic field, then ____ (emf, torque, (or force) is produced.
- e) Ground wave propagation is used when frequency is in the ____ (LF, HF, or UHF) range.
- f) Radio waves sometimes bend around the corners due to ____ (Reflection, Refraction, or Diffraction).
- g) The direction of Poynting vector is perpendicular to the direction of propagation of wave. (True/False)
- h) The networks in which the R, L, C parameters are individually concentrated or lumped at discrete points in the circuit are called ____ (Lumped, Distributed, or Parallel) networks.
- i) Skin effect of a conductor will increase when ____ (Diameter, Resistivity, or Frequency) decreases.
- j) TEM wave can propagate in rectangular waveguides. (True / False) (10x1)

UNIT - I

- II. a) State Gauss's Law. Prove that the electric flux over the sphere is equal to the amount of charge enclosed by the sphere.
- b) State and explain Faraday's Law. (6,4)

P.T.O.

(2)

- III. a) State the Maxwell's equations for harmonically varying Fields.
b) Explain the wave equations in perfect dielectric medium. (2x5)
- IV. a) For a uniform plane wave in fresh lake water, $\sigma = 10^{-3}$ mhos/m, $\epsilon_r = 40$, $\mu = \mu_0$.
Calculate α, β, γ and η for frequency 100MHz.
b) Define Poynting Theorem. Also state its application. (8,2)

UNIT - II

- V. Derive an expression for Voltage and Current equations for transmission line. (10)
- VI. What do you mean by TM and TEM waves? Explain. Also state their characteristics. (10)
- VII. a) Derive an expression for the guide wavelength of TM wave mode propagating in rectangular waveguide.
b) Calculate the cut-off wavelength, the guide wavelength and the wave impedance of a circular waveguide whose internal radius is 4.0 cm and operates on 10 GHz signal propagating in it is the TE_{11} mode. (5,5)

x-x-x