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Code No: 154AV

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year II Semester Examinations, August/September - 2021

ELECTROMAGNETIC FIELDS AND WAVES

(Electronics and Communication Engineering)

Time: 3 Hours

Max. Marks: 75

**Answer any five questions
All questions carry equal marks**

- 1.a) Define electric field intensity at a point. Derive the expression for E of a line charge.
b) Find E due to infinite surface charge distribution by using Gauss's law. [10+5]
- 2.a) Establish Poisson's and Laplace's equations from Gauss's law.
b) State and explain Biot-Savart's law. Derive the magnetic field produce at a point due to an infinite line current distribution. [10+5]
- 3.a) State and explain Faraday's laws.
b) Explain "Inconsistency of Ampere's law"? [8+7]
- 4.a) A plane wave propagating through a medium with $\epsilon_r = 10$, $\mu_r = 2$ has $E = 0.5 e^{-z/3} \sin(10^6 t - \beta z) a_x$ V/m. Determine:
i) Phase constant ii) The loss tangent iii) Intrinsic impedance
iv) Wave velocity v) H field.
- b) Define the reflection coefficient and derive the expression for input impedance in terms of reflection coefficient? [10+5]
- 5.a) Define and explain magnetic scalar and vector potentials.
b) State and explain Ampere's Circuital Law. [10+5]
- 6.a) Explain the solution of wave equation in a rectangular waveguide.
b) Discuss the properties and characteristics of waveguide. [8+7]
7. Obtain Maxwell's equations in different forums for time-varying fields. [15]
8. Derive the continuity equation. [15]

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