

R18

Code No: 153AR

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year I Semester Examinations, February -2024

**ELECTROMAGNETIC FIELDS
(Electrical and Electronics Engineering)**

Time: 3 Hours

Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

- 1.a) What is the difference between potential and potential difference? [2]
- b) Name few applications of Gauss law in electrostatics. [3]
- c) Write the expression for capacitance between two parallel plates. [2]
- d) List the properties of conductor and dielectric materials. [3]
- e) What is scalar magnetic potential? [2]
- f) Define self and mutual inductance. [3]
- g) What is motional electromotive force? [2]
- h) Write Maxwell's equations in point form. [3]
- i) What is meant by wavelength of electromagnetic waves? [2]
- j) Give the expressions for propagation constant, intrinsic impedance, if a wave propagates in a lossy dielectric. [3]

PART - B

(50 Marks)

- 2.a) Drive an expression for energy density in electrostatic field.
- b) A circular disc of 10 cm radius is charged uniformly with a total charge $10^{-10}c$. Find the electric field at a point 30 cm away from the disc along the axis. [5+5]

OR

- 3.a) Define the electric dipole. Derive an expression for potential of electric dipole at a point P in between them.
- b) State and prove Gauss law. [5+5]

- 4.a) Derive the point form of Ohm's law.
- b) Discuss about the boundary conditions of dielectric- dielectric materials in electrostatic fields. [5+5]

OR

5. Obtain the poissons and laplace's equations. [10]
- 6.a) Define Vector magnetic potential. Explain in detail.
- b) State and explain biot –savart law. [5+5]

OR

- 7.a) Derive the expressions for boundary conditions in magnetic fields.
- b) Derive the expression of force on a differential current elements. [5+5]

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8.a) Write and explain the integral forms of Maxwell's equations.

b) Explain (i) Conduction Current. (ii) Displacement current.

[5+5]

OR

9. State and explain the Faraday's law for Electromagnetic induction.

[10]

10.a) Discuss the plane waves in lossy dielectrics.

b) State and explain Poynting theorem.

[5+5]

OR

11. Derive the electromagnetic wave equation in phasor form with necessary equations. [10]

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