RA

Code No: 155SE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, July/August - 2023

ELECTROMAGNETIC FIELDS AND WAVES

(Electronics and Communication 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)	Define the electrostatic field and mention any two sources.	[2]
b)	Name a few applications of Gauss law in electrostatics.	[3]
c)	Mention the limitations of scalar magnetic potential.	[2]
d)	Write the relation between magnetic flux density and field intensity.	[3]
e)	State Lenz's law.	[2]
f)	What is the significance of displacement current density?	[3]
g)	Define Polarization.	[2]
h)	What is a lossy dielectric medium?	[3]
i)	What is meant by dominant mode?	[2]
j)	What are the characteristics of TEM waves?	[3]

PART – B

(50 Marks)

2. Derive an expression for the capacitance of a parallel plate capacitor having two dielectric media. [10]

OR

3. Explain the importance of Poisson's and Laplace's equations in electromagnetics with necessary equations. [10]

4. Derive the expression for magnetic field intensity due to an infinitely long coaxial transmission line. Use ampere circuital law. [10]

OR

5.a) Write Maxwell's third equation in point and integral form.
b) Derive the expression for the force between two current-carrying wires. [2+8]

6. With the necessary explanation, derive Maxwell's equation in differential and integral forms. [10]

OR

7. Explain faradays law of electromagnetic induction and derive the expression for induced EMF. [10]

8. Derive the one dimensional general wave equation and find the solution for the wave equation. [10]

OR

9. Derive suitable relations for integral and point forms of poynting theorem. [10]

10. Describe the field components of TE waves in a rectangular waveguide with necessary expression and also plot the field configurations for the TE10 mode. [10]

OR

11. Derive the expression of wave impedance for TE and TM waves guided along rectangular waveguide. [10]

---ooOoo---