REG.N

VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act 1956)

SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST - I
WINTER SEMESTER 2024-2025

SLOT: F1+TF1

Programme Name & Branch	:	**B. Tech (SCHEME & SCE)**
Course Code and Course Name	:	**BPHY101L and Engineering Physics**
Faculty Name(s)	:	**Dr. JOSEPH NATHANAEL A /Dr. MALATHI M / Dr. RAMASUBRAMANIAN V**
Class Number(s)	:	**5313/5311/5315**
Date of Examination	:	**01.02.2025**
Exam Duration	:	**90 minutes** **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes:
  CO1: Comprehend the phenomenon of waves and electromagnetic waves.
  CO2: Explain the properties of electromagnetic waves using the Maxwell's equations

Q. No	Question	M	CO	BL
1.	Derive the velocity of transverse wave propagation on string with relevant diagram and verify using dimensional units.	10	CO1	BL2
2.	a) Write down the necessary conditions for the formation of standing waves on a string with both ends fixed.	5	CO1	BL2
	b) What is characteristic impedance (Z) of a string? Discuss the scenario if the wave encounters different boundaries where (i) Z = 0 & (ii) Z = ∞.	5		
3.	a) A transverse wave on a string has a wavelength of 0.4 m and a speed of 20 m/s. What is the frequency of the wave? If the amplitude of the wave is 0.01 m, write the equation of the wave, assuming it travels in the positive x-direction and has a phase constant of zero.	5	CO1	BL3
	b) A standing wave is formed on a string of length 2 m fixed at both ends. The string vibrates in three segments. Find the wavelength of the wave.	5		
4.	Starting with the Maxwell equation in free space, derive the electromagnetic wave equation and obtain the speed of light in free space.	10	CO2	BL2
5.	a) Explain the physical significance of the gradient, divergence, and curl of an electric field. Express these concepts mathematically using Cartesian coordinates.	5	CO2	BL2
	b) What is displacement current? Explain how Maxwell modifies the Ampere's law using the concept of displacement current?	5		

****