VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)
CHENNAI

Reg. Number:	

Continuous Assessment Test (CAT) – I AUGUST 2024

Programme	:	MIS	Semester	:	Fall Semester 2024-25
Course Code & Course Title	:	IPHY101L & Engineering Physics	Slot	:	B1+TB1
Faculty	:	Dr. Parasuraman E Dr. M.G. Shalini	Class Number	:	CH2024250103111 CH2024250103094
Duration	:	1½ Hours	Max. Mark		50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
- Only non-programmable calculator without storage is permitted

Section-A (Answer any TWO Questions (2× 10 = 20))

Q. No	Sub Sec.	Description	Marks
1		A standing wave is moving at 140 m/s on a 3.5 m long string. [each 2 marks] a). What is the fundamental frequency of this wave? b). What is the frequency of the third harmonic? c). How many nodes and antinodes are present in the wave of the 3rd harmonic? d). What is the frequency of the 5th overtone? e). What is the wavelength of the 3rd overtone?	10
2		Explain the aim, principle, experimental setup and working of an experiment that dealt with proof of existence of electromagnetic waves in detail with suitable figure.	10
3	a	i) Calculate the reflection and transmission coefficient if the impedance of the second string is zero. ii) Find the Gradient of the function $f(x,y) = 3x^2 + 13y^2 + 24z$ at a point (-1,-2,1)	4
	b	Compute div and Curl of $\vec{F} = x^3 y\,\hat{\imath} - (z^2 - 4x)\hat{\jmath} + 4y^2\hat{k}$	6

Section-B (Answer any TWO Questions (2×15 = 30))

3		With necessary assumptions and a diagram, derive a 1-D wave equation for a progressive wave produced by a stretched string.	15
4	a	Write Maxwell's equation in differential form with their implications.	5
	b	From the given wave function y= 3 Sin(3πt-2x), find i) frequency, ii) wavelength, iii) velocity, iv) tension and v) maximum velocity of the particle in the string, if the mass per unit length of the string is 0.25 kg/m.	10
5		Using Maxwell's equation for free space, derive the equation for plane electromagnetic waves for free space in terms of electric and magnetic field vector. Also show how these equations navigate to arrive at the velocity of the EM wave.	15

**********All the best **********