VIT
Vellore Institute of Technology

Continuous Assessment Test I – March 2023

Programme	:	B.Tech.	Semester	:	Win22-23
Course	:	Engineering Physics	Code	:	BPHY101L
Faculty	:	Atanu Dutta, Caroline Ponraj, M. Gopinath, N. Manikandan, V Rajasekarakumar	Slot/ Class Numbers	:	F1/CH2022232300038,CH202223230002 9, CH2022232300030,CH2022232300023,C H2022232300036
Time	:	1½ Hours	Max. Marks	:	50

Answer any FIVE Questions (5 × 10 = 50)

1.		Derive the equation for a wave in a string fixed at one end.	10
2.	(i)	Prove that $y = \ln[d(x-vt)]$ is a solution of standard wave equation, where 'd' is a constant.	10
	(ii)	Consider that strings of 2 alloys which vary slightly in their linear mass densities are connected at a point and are maintained at a constant tension T. If a wave is generated at one end of the string, discuss what will happen to its propagation at the point where the strings are connected. What will happen if the connection point becomes the end point for the string?	
3.	(i)	A string of 5 m length is fixed at both the ends. State only what will happen if it is disturbed? Calculate the fundamental and the second harmonic of the wave if its velocity is 100 m/s.	10
	(ii)	For the function defined by $H = 2x^2 - 3y^3 + z$, calculate the curl of its gradient.	
4.	(i)	Let a wave represented by $y = 0.06 \sin(5x + 3t)$ be propagating in a string of linear density 1.6×10^{-4} kg/m, then calculate the speed of the wave and the tension in the string. Units of displacement and time are in meters and seconds, respectively.	10
	(ii)	Find the curl and divergence of the following function: $y_2 = xy^2\vec{i} + 2yz^2\vec{j}$	
5.		Write down the Maxwell's equations explaining the terms therein. Considering the propagation of waves in vacuum, prove that light is an EM wave.	10
6.	(i)	Explain the significanceof Gauss law of magnetostatics.	10
	(ii)	Discuss the Hertz experiment that proved the existence of electromagnetic waves.	