VIT

Vellore Institute of Technology

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

Continuous Assessment Test (CAT - I), March 2023

Programme	:	B.Tech	Semester	:	Winter 2022-2023
Course Title	:	Engineering Physics	Course Code	:	BPHY101L
School	:	School of Advanced Sciences	Slot	:	E1+TE1
Duration	:	90 mins	Max. Marks	:	50
Class No	:	4944, 4946, 4942, 4936, 4938, 4940, 4948, 4934			

Part – A (5 x 10 = 50)

Answer ALL Questions

Sl. No	Questions	Max Marks
1	Derive the expression for the wave equation of a 1D mechanical wave propagating on a string (6 Marks) and deduce wave velocity (1 Mark). With a suitable diagram, write the assumptions used for the derivation. (1+2 Marks)	10
2	Derive the expression for allowed frequencies due to the net displacement of counter-propagating two harmonic waves on a string, with both ends fixed, forming a standing wave.	10
3	a) Show that a transverse wave on a string suffers a phase change of 180 degrees after reflection from an extremely rigid wall. b) A string of length 4 m is fixed at both ends. If the tension in the string is 80 N and its mass is 0.01 kg, find the speed of a transverse wave in the string.	5 5
4	List the Maxwell equations both in differential and integral forms. Explain Maxwell's contribution to Ampere's law.	10
5	a) Sketch the set-up used in Hertz experiment (2 Marks) and discuss it's mechanism for generating and detecting an electromagnetic wave. (3 Marks) b) Given a vector field, $\vec{F} = xy\,\hat{j}$, where x and y are the cartesian coordinates, check if the given vector field is conservative or solenoidal.	5 5