eeDch5073

VIT

Vellore Institute of Technology

Continuous Assessment Test I - March 2023

gramme	: B.Tech.	Semester	:	Win 22-23
urse	: Engineering Physics	Code	:	BPHY101L
culty	: B. Ajitha, Caroline Ponraj, **R.D. Eithiraj,** N. Manikandan, M.C. Ramkumar, M.G. Shalini	Slot/ Class Numbers	:	E1+TE1 CH2022232300026, CH2022232300028, **CH2022232300024,** CH2022232300022, CH2022232300040, CH2022232300042
Time	: 1½ Hours	Max. Marks	:	50

Answer any FIVE Questions (5 x 10 = 50)

1.	Derive the equation of a standing wave and find the Eigen frequencies in a string fixed at both the ends.	10
2.	(i) Assume that a thin copper wire held under a tension of 4 N/m is supporting the propagation of a wave at 32 m/s. If the velocity needs to be reduced to one-fourth of the initial, how should the tension in the string be changed? (ii) Show that $f(x, t) = x^2 + v^2t^2$ is a solution of standard wave equation.	10
3.	(i) If you are given a wave of the form $y = 10 \cos(3\pi x - 8\pi t)$, then calculate the wavelength, frequency and speed of the wave. (ii) Find the curl and divergence of the following function: $y_1 = y\vec{i} + xz^2\vec{j} + xy^3\vec{k}$	10
4.	(i) Find the curl of the gradient of a function $F = 2x^2 + y^3 + z^2$. (ii) A wave is allowed to propagate in a string made of aluminium of diameter 0.9 mm that is connected to another string of 1 mm diameter. What will happen to the wave as it moves from thinner to thicker string at the interface of different thickness strings? Write down the equations corresponding to the phenomena occurring at the interface.	10
5.	Using Maxwells equations, mathematically prove the electromagnetic wave nature of light.	10
6.	(i) Give a comparative conceptual analysis of Maxwells equations in a medium and in free space. (ii) What is the significance of Gauss law of electrostatics and magnetostatics?	10