Continuous Assessment Test I – November 2022

Programme	: B.Tech		Semester	: Fall 2022-23
Course	: Engineering Physics		Code	: BPHY101L
			Class ID	: CH20222231700417
Faculty	: Rajasekarakumar Vadapoo		Slot	: D2/TD2
Time	: 90 Minutes		Max. Marks	: 50

Answer any FIVE Questions (5 x 10 = 50)

1.	Derive the wave equation on a string.	10
	Note: Show the schematic clearly. Derive the equation with the clear step by step approach and explicitly state the approximations adopted.	
2.	Two poles A and B are separated by a distance of 2 m. A string made of metal which has uniform diameter of 2 cm is tied to the poles A and B. The mass of the rope is 100 gms. Due to the disturbance created in the centre of the rope the standing waves are produced in the string and moving at a velocity of 2 m/s. Calculate the followings with necessary units: a) Linear density of the string b) Tension on the string c) Number of nodes and antinodes in third harmonic d) Frequency of second harmonic Note: Depict the appropriate drawings.	10
3.	a) State and explain harmonic waves with an example with proper schematic. b) How do you find the impedance of a string? $Z = 1/c$ c) Show schematically with proper details about the scenario of reflection and transmission of waves on a string at a boundary. Also give the corresponding coefficients.	2+2+6
4.	Let, $\vec{A} = 2yz\hat{i} + 2xy^4z\hat{j} - xz^3\hat{k}$, where $\hat{i}, \hat{j}, \hat{k}$ are unit vectors in 3-D Cartesian Co-ordinates. Also, $\Phi = 3xy^4z^2$. Find (a) $\vec{\nabla}.\vec{A}$ (b) $\vec{\nabla} \times \vec{A}$ (c) $\nabla^2\Phi$	3.5+3.5+3
5.	State Maxwell equations of both differential and integral forms with appropriate explanations about the constituent elements.	10
6.	a) What are the electromagnetic waves? Explain. b) State and explain at least two scenarios where you could use surface and volume integral. c) State and explain Hertz's experiment.	2.5+2.5+5