



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	: B2+TB2
Duration	: 90 mins	Max. Marks	: 50
Class No	: 4916, 4918, 4920, 4924, 4926, 4928, 4930, 4950		

Answer ALL Questions

Sl. No	Question	Max Marks
1	Derive the 1D wave equation for transverse wave in a string. Write down the expression for velocity of wave propagation.	10
2	What are the eigen frequencies of a standing wave in a string fixed at both ends? Will it be the same for different harmonics? Justify your answer by deriving necessary equations with pictorial representations for first 3 harmonics.	10
3	(a) Why do we hear a flick at the free end of the string when we consider a wave meeting at the boundary of two different impedances? (b) A transverse wave on a string is modeled with the wave function $y(x, t) = 0.2 \sin(6.28x - 1.57t)$, where all physical quantities are in SI units. Find the amplitude, wave number, wavelength, time period, speed of the wave.	5 5
4	Obtain the wave equation for an electromagnetic wave traveling in free space in terms of \vec{E} and \vec{B} .	10
5	(a) What are the modifications made by Maxwell to Ampere's law. Explain it giving appropriate expression for the same. (b) Consider a vector field $\vec{A} = x^2\hat{i} + y^2\hat{j} + z^2\hat{k}$ Check i) If the field is solenoidal? ii) If the field is irrotational?	5 5