



VIT

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

Continuous Assessment Test (CAT - I), February 2024

Programme	: B.Tech UG Seniors	Semester	: Winter 2023-2024
Course Title	: Modern Physics	Course Code	: PHY1005
School	: School of Advanced Sciences	Slot	: E2+TE2
Duration	: 90 mins	Max. Marks	: 50
Class No	: 4909, 1984		

Part – A (5 x 10 = 50)

Answer ALL Questions

Sl. No	Questions	Max Marks
1	Explain the isothermal and adiabatic process with the suitable PV diagram and obtain the expression for work done by isothermal and adiabatic process.	10
2	Draw and demonstrate the construction and working principle of Carnot's cycle. Derive the work done by the Carnot's cycle and describe about its efficiency.	10
3	(a) Define entropy. With suitable examples, explain the behavior of entropy in spontaneous and driven process. (b) 50 grams of water at 0°C is mixed with an equal mass of water at 80°C. Calculate the resultant increase in entropy.	5 5
4	Deduce the general equation of motion and solution for damped oscillation of simple mass-spring system. By considering the solution, explain the behavior of the system when it's over damped, critical damped and under damped with suitable diagrams.	10
5	(a) Deduce equation of motion and its solution of forced oscillator. (b) A wave displacement is given by $y = \sin 2\pi (0.2x - 5t)$ (in mks units). Find (i) the amplitude of the wave, (ii) the magnitude of the propagation vector, (iii) the wavelength, (iv) the time period, and (v) the wave velocity.	5 5