

Reg. No.:



Name:

University of Kerala

W7481

First Semester FYUGP Degree Examination, December 2025

Discipline Specific Core Course

PHYSICS

UK1DSCPHY100 - Foundation Course in Physics-I

Academic Level: 100-199

2025-Admission

Time: 1 Hour 30 Minutes(90 Mins.)

Max. Marks: 42

**Part A. 6 Marks.Time:6 Minutes.(Cognitive Level:Remember(RE)/Understand(UN)) Objective Type. 1 Mark
Each.Answer all questions**

Qn No.	Question	CL	CO
1	Define unit vector.	RE	1
2	Define simple harmonic motion	RE	5
3	Outline the graphical representation of the variations of kinetic energy, potential energy and total energy with displacement of a particle executing simple harmonic motion.	UN	5
4	Distinguish between work and energy.	UN	2
5	Describe the physical concept of gradient with an example.	UN	1
6	Explain why pushing a door farther from the hinge makes it easier to open compared to pushing near the hinge.	UN	4

Part B.8 Marks.Time:24 Minutes.(Cognitive Level:Understand(UN)/Apply(AP))Short Answer. 2 marks each.Answer all questions

Qn No.	Question	CL	CO
7	Summarize how torque is related to the rate of change of angular momentum.	UN	4
8	Explain why the acceleration in simple harmonic motion is always directed toward the equilibrium position and how this ensures oscillatory motion.	UN	5
9	A force of 100 N acts at 30° to the direction of motion. The object moves 10 m. Calculate the work done by the force.	AP	2
10	Compute the divergence of the vector $A = 4x^2z\mathbf{i} - yz^2\mathbf{j} - 7xy^2\mathbf{k}$ at the point(1 -1 -2)	AP	1

Part C. 28 Marks.Time:60 Minutes (Cognitive Level:Apply(AP)/Analyse(AN)/Evaluate(EV)/Create(CR)) Long Answer:7 marks each.Answer all 4 Questions choosing among options * within each question

Qn No.	Question	CL	CO
11	A) (a) State Gauss's divergence theorem and explain its significance in converting a surface integral into a volume integral. (b) Apply the theorem to evaluate the total flux of the vector field $\vec{F} = x\hat{i} + y\hat{j} + z\hat{k}$ through the surface of a hemisphere of radius R situated above the xy-plane, centered at the origin. OR B) Calculate $\iint_S \vec{F} \cdot \vec{n} ds$, where $\vec{F} = 4xz\vec{i} - y^2\vec{j} + yz\vec{k}$ and S is the surface of the cube bounded by $x=0, x=1, y=0, y=1, z=0, z=1$	AP	1, 1
12	A) Deduce the time period of oscillation for the system of two particles connected by a spring. OR B) Examine the oscillation of two particles connected by a spring and deduce the period of oscillation	AN	5, 5
13	A) Evaluate the difference between conservative and non-conservative forces using examples like gravity and friction. Discuss how energy transformation differs in both cases and what remains constant in conservative systems. OR B) Evaluate the work-energy theorem for a particle moving under a variable force on a straight line and a curved path	EV	2, 2
14	A) Formulate the angular momentum of a rotating rigid body about a fixed axis and hence generate the moment of inertia about the axis of rotation. OR B) Develop a comprehensive analysis of rigid body rotation about a moving axis and hence formulate the total kinetic energy of a solid sphere rolling without slipping.	CR	4, 4