



Reg. No.:

Name:

University of Kerala

First Semester FYUGP Degree Examination, December 2025

Discipline Specific Core Course

PHYSICS

UK1DSCPHY100 - Foundation Course in Physics-I

Academic Level: 100-199

2025-Admission onwards

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	Name the SI unit of power.	RE	2
2	Define curl of a vector function	RE	1
3	Outline the factors that affect moment of inertia of a rigid body	UN	4
4	Describe the gradient of a scalar field	UN	1
5	Summarize the reason for work done by the man is zero when he is holding a weight on his head and moving forward.	UN	2
6	Explain centre of suspension of a compound pendulum.	UN	5

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	Describe Gauss's divergence theorem and explain its importance	UN	1
8	Compare rotational and translational KE.	UN	4
9	A body of mass 0.5 kg attached to a spring oscillates with amplitude 0.2 m and frequency 2 Hz. Find its maximum velocity.	AP	5
10	Calculate the velocity of a freely falling body of mass 5 kg falling from a height of 20 m, just before hitting the ground (take $g = 10 \text{ m/s}^2$).	AP	2

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	<p>A)</p> <p>Calculate the directional derivative of the function $x^2 - 2y^2 + 4z^2$ in the direction of the vector $2\vec{i} + 2\vec{j} + \vec{k}$ at the point (1,1,-1)</p> <p>OR</p> <p>B)</p> <p>a) Illustrate the significance of curl and divergence.</p> <p>b) For a fluid in motion given by $\vec{v} = (y + z)\vec{i} + (z + x)\vec{j} + (x + y)\vec{k}$ show that the motion is irrotational.</p>	AP	1, 1
12	<p>A)</p> <p>Deduce the expression for the total energy in SHM</p> <p>OR</p> <p>B)</p> <p>Analyze the role of amplitude and frequency of a sensor undergoing SHM in influencing its maximum velocity. Examine the reason for the occurrence of maximum at the equilibrium position, and investigate the dependence of the nature of the motion on increasing or decreasing either the amplitude or the frequency.</p>	AN	5, 5
13	<p>A)</p> <p>Evaluate the Work–Energy theorem for straight line motion and motion along a Curve</p> <p>OR</p> <p>B)</p> <p>A stone is dropped from a height of 20 m. Neglecting air resistance, evaluate how gravitational potential energy changes into kinetic energy during its fall, and verify the law of conservation of energy at different points of motion.</p>	EV	2, 2
14	<p>A)</p> <p>Develop an expression for the moment of inertia of a uniform solid sphere about its diameter, explaining your reasoning and how symmetry helps.</p> <p>OR</p> <p>B)</p> <p>Formulate an expression for the moment of inertia about an axis passing through the tangent of a sphere, in terms of its dimensions.</p>	CR	4, 4