



Reg. No.:

Name:

University of Kerala

First Semester FYUGP Degree Examination, December 2025

Discipline Specific Core Course

PHYSICS

UK1DSCPHY101 - Principles of Dynamics

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	State the SI unit of impulse?	RE	3
2	Define angular velocity.	RE	2
3	Explain the relationship between torque and angular acceleration	UN	4
4	Describe mass in terms of second law .	UN	1
5	Explain fictitious forces	UN	2
6	Describe the principle of conservation of linear momentum.	UN	3

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 scalar and vector product of two vectors.	UN	1
8	Differentiate between angular velocity and angular acceleration of a rigid body.	UN	4
9	A body of mass 2 kg moving with velocity 5 m/s comes to rest in 0.5 s. Calculate the impulse.	AP	3
10	Calculate the centripetal acceleration of a point 7.5 cm away from the axis of centrifuge spinning at 7.5×10^4 rev/min.	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	A)	AP	1, 1

Qn No.	Question	CL	CO
	<p>a) A force $F = 10\mathbf{i} + 6\mathbf{j}$ N acts on a particle that moves through a displacement $d = 4\mathbf{i} + 3\mathbf{j}$ m. Compute the work done by the force.</p> <p>b) A position vector $\mathbf{r} = 2\mathbf{i} + 3\mathbf{j} + k\mathbf{k}$ m and a force vector $\mathbf{F} = \mathbf{i} - 2\mathbf{j} + 2k$ N act on a particle. Compute the torque acting on the particle about the origin.</p> <p>OR</p> <p>B)</p> <p>(a) Employ the definition of velocity and acceleration to find the expression for displacement in one dimension $s = ut + \frac{1}{2}at^2$.</p> <p>(b) Use the equation $s = ut + \frac{1}{2}at^2$ to solve for the distance covered by a car starting from rest with acceleration 2 m/s^2 in 4 seconds.</p>		
12	<p>A)</p> <p>Analyse centripetal force and derive an expression for ideal speed and angle of car on a turn in banked curves</p> <p>OR</p> <p>B)</p> <p>a) Deduce the coefficient of static friction do a car tyre need on a flat curve.</p> <p>b) Investigate the main consequences and importance of Coriolis force.</p>	AN	2, 2
13	<p>A)</p> <p>A ball of mass ($m_1 = 1 \text{ kg}$) moving with velocity ($u_1 = 6 \text{ m/s}$) collides elastically with a stationary ball of mass ($m_2 = 2 \text{ kg}$).</p> <p>a) Evaluate the key characteristics of elastic collision.</p> <p>b) Deduce the equations for conservation of momentum and conservation of kinetic energy for this collision.</p> <p>c) Deduce the final velocities of both balls after the collision.</p> <p>OR</p> <p>B)</p> <p>a) Critically assess the significance of Newton's Second Law in deriving the Law of Conservation of Linear Momentum for an isolated system.</p> <p>b) State the Impulse-Momentum Theorem.</p> <p>c) Evaluate the recoil velocity of a 70 Kg ice hockey goalie, originally at rest, who catches a 0.150 Kg hockey puck slapped at him at a velocity of 35 m/s. How much kinetic energy is lost during a collision?</p>	EV	3, 3
14	<p>A)</p>	CR	4, 4

Qn No.	Question	CL	CO
	<p>a) Formulate an expression for the moment of inertia (I) of a uniform rod of mass (M) and length (L) about an axis perpendicular to the rod and passing through its centre of mass.</p> <p>b) Formulate an expression for the moment of inertia (I) of the same rod about an axis perpendicular to the rod and passing through one of its ends.</p> <p>OR</p> <p>B)</p> <p>a) Formulate the expressions for the moment of inertia (I) of a solid disc of mass (M) and radius (R) in the following cases:</p> <p>i) About an axis perpendicular to the plane of the disc and passing through its centre of mass.</p> <p>ii) About an axis along the diameter of the disc.</p>		

Model QP