Reg. No.: .....

Name: .....

University of Kerala

W7687

First Semester FYUGP Degree Examination, December 2025

Discipline Specific Core Course

PHYSICS

UK1DSCPHY101 - Principles of Dynamics

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	Name the rotational analogue of Force.	RE	4
2	State Newton's third law of motion	RE	1
3	Distinguish between scalar product and vector product with examples.	UN	1
4	Explain Coriolis force.	UN	2
5	Explain the term impulse.	UN	3
6	Define moment of inertia of a rotating object.	UN	2

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	Compare linear momentum and angular momentum.	UN	3
8	Summarize the rule for vector addition using the triangle method	UN	1
9	A wheel rotates through an angle of 4π radians in 2 seconds. Find its angular velocity.	AP	2
10	A child pushes a door with a force of 10 N at a distance of 0.5 m from the hinges. Calculate the torque produced on the door.	AP	4

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
	(a)Vector **A** has a magnitude of 6 units and is in the direction of the X axis. Vector **B** has a magnitude of 4 units in the XY plane making an angle of 30 degrees with the positive X axis. Find the vector product **C=A X B** (b) Determine the magnitude and direction of the resultant when two forces of 10 N and 15 N act at right angles to each other. OR B) (a) Apply equations of motion to find an expression for the maximum height of a body in projectile motion launched with a velocity *u* from the ground. (b) Calculate the maximum height reached by the projectile if it is launched vertically upward with an initial velocity of 20 m/s.		
12	A) a) Analyze the concept of 'banking of roads' and explain why it is necessary for vehicles taking turns on curved roads. b) Deduce an expression for the ideal or optimum speed (v_0) at which a car should negotiate a banked curve of radius r and angle of banking θ, assuming no friction is required. OR B) (a) Differentiate between centripetal acceleration and tangential acceleration while a body executes circular motion. (b) Analyze the mathematical relationship $a_c = \frac{v^2}{r}$ and $a_c = \omega^2 r$, where a_c is the centripetal acceleration, v is the linear velocity, ω is the angular velocity and *r* is the radius of the path of circular motion. (c) What is the magnitude of the centripetal acceleration of a car following a curve of radius 500 m at a speed of 25.0 m/s?	AN	2, 2
13	A) Compare and evaluate the differences between elastic and inelastic collisions in terms of conservation of momentum and energy, using necessary mathematical expressions. OR B) Consider that two particles of masses m_1 and m_2 travelling along the same straight line with initial velocities $\vec{v}_1$ and $\vec{v}_2$ respectively collide head-on, stick together and then move with some common velocity $\vec{v}_f$ after collision. Assess the type of collision and outline its characteristics and evaluate the final velocity $\vec{v}_f$.	EV	3, 3
14	A)	CR	4, 4

Qn No.	Question	CL	CO
	(a)Formulate the moment of inertia of a rotating body. (b) Deduce an expression for the moment of inertia of a circular disc about an axis passing through its (i) centre of mass and (ii) perpendicular to its plane. OR B) Formulate the expressions for the moment of inertia (I) of a solid cylinder of mass (M), radius (R), and length (l) in the following cases: i) About its own geometric axis. ii) About an axis perpendicular to its geometric axis and passing through its centre.		