22MAU308N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2025
(Third Semester)

Branch - **MATHEMATICS**

MECHANICS

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Question No.	Question	K Level	CO
1	Select the principle that states "The moment of a force about any point is equal to the algebraic sum of moments of its components about that point" a) Lufkin's principle b) Varignon's principle c) Henry's principle d) Avogadro's principle	K1	CO1
2	Name the vector representing moment of a couple on a rigid body. a) Free vectors b) Bound vectors c) Sliding vectors d) Unit vectors	K2	CO1
3	Choose the correct option about "Centre of mass and centre of gravity of a rigid body" a) Always coincide with each other b) Never coincide with each other c) May or may not coincide with each other d) May or may not equal	K1	CO2
4	The principle of virtual work states that, for a body to be in equilibrium, the virtual work should be: a) Any value between zero and one b) Zero c) Maximum d) Minimum	K2	CO2
5	What angle should an athlete make to take longest possible jump? a) 90 degree with the ground b) 60 degree with the ground c) 45 degree with the ground d) 30 degree with the ground	K1	CO3
6	Which of the following is a scalar quantity? a) Velocity b) Acceleration c) Distance d) Force	K2	CO3
7	Which is the branch of physics that deals with the motion of a body by considering the cause? a) Statics b) Thermodynamics c) Astronomy d) Dynamics	K1	CO4
8	What is the force applied on a body with 5 kg of mass and an acceleration of 7 m/s^2? a) 35 N b) 5 N c) 7 N d) 0 N	K2	CO4
9	On calculating which of the following quantities, the mass of the body has an effect in simple projectile motion? a) Velocity b) Force c) Time of flight d) Range	K1	CO5
10	At what angle of projectile (θ) is the horizontal range minimum? a) $\theta = 45°$ b) $\theta = 60°$ c) $\theta = 90°$ d) $\theta = 75°$	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Question No.	Question	K Level	CO
11.a.	Solve three like parallel forces, acting at the vertices of triangle, have magnitudes proportional to the opposite sides. Show that their resultant passes through the incentre of the triangle.	K3	CO1
	(OR)		
11.b.	Explain equivalence of two couple with example.		
12.a.	Distinguish between centre of gravity and centre of mass.	K4	CO2
	(OR)		
12.b.	List the applications of the 'principle of virtual work'.		
13.a.	Write note on the speed, displacement, velocity and parallelogram law.	K2	CO3
	(OR)		
13.b.	Explain angular velocity of a particle moving along any curve.		
14.a.	Distinguish between mass and weight. Explain the work function of a varying force.	K4	CO4
	(OR)		
14.b.	Discuss the principle of conservation of energy.		
15.a.	Justify the path of a projectile is a parabola.	K5	CO5
	(OR)		
15.b.	Discuss the theorem of parallel axes.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Question No.	Question	K Level	CO
16	Explain the Resultant of coplanar couples theorem.	K2	CO1
17	Discuss the determination of Centre of gravity of a compound body and Centre of gravity of a remainder.	K3	CO2
18	Identify angular velocity of a particle moving along a circle with uniform speed.	K3	CO3
19	Analyze Conservation of linear momentum and explain the third law of motion with work function.	K4	CO4
20	Explain about the velocity of a projectile in magnitude and direction at the end of time.	K5	CO5

Z-Z-Z END