

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION MAY 2026
(Second Semester)
Branch - PHYSICS

MECHANICS & FLUID DYNAMICS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Which of the following quantity remains conserved, when no external torque acts on a system? (i) Linear momentum (ii) Angular velocity (iii) Angular momentum (iv) Torque	K1	CO1
	2	The thrust produced by a rocket depends mainly on (i) Rate of ejection of gases and exhaust velocity (ii) Mass of rocket only (iii) Volume of fuel (iv) Atmospheric pressure only	K2	CO1
2	3	The distance between centre of suspension and centre of oscillation is equal to the one of the below mentioned quantities. Identify the correct one. (i) Length of simple pendulum (ii) Radius of gyration (iii) Length of compound pendulum (iv) Time period	K1	CO2
	4	What is the moment of inertia of the system when the mass of a rotating body is doubled keeping its radius same? (i) Half (ii) Double (iii) Four times (iv) Eight times	K2	CO2
3	5	The parallelogram law of forces is valid only for (i) Coplanar forces (ii) Non-coplanar forces (iii) Parallel forces (iv) Random forces	K1	CO3
	6	Identify the position of the centre of gravity of a thin hollow cone. (i) At vertex (ii) At centre (iii) At a distance $3h/4$ from vertex (iv) At base	K2	CO3
4	7	What is the floating condition of a body in a liquid? (i) Weight > buoyant force (ii) Weight < buoyant force (iii) Weight = buoyant force (iv) Density is zero	K1	CO4
	8	Which of the following principle is applicable for the working of Hydraulic machines? (i) Archimedes' principle (ii) Bernoulli's theorem (iii) Pascal's law (iv) Newton's third law	K2	CO4
5	9	According to Bernoulli's theorem, What happens to pressure when the velocity of a fluid increases? (i) Increases (ii) Decreases (iii) Remains constant (iv) Becomes zero	K1	CO5
	10	What is the unit of pressure energy per unit volume? (i) Joule (ii) Pascal (iii) Newton (iv) Watt	K2	CO5

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SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Apply the conservation laws of momentum and energy to calculate the final velocities of colliding particles in the case of 1 D elastic collision.	K3	CO1
		(OR)		
	11.b.	Write a note on angular momentum and torque. Explain the law of conservation of angular momentum by taking the relation which connects torque and angular momentum,		
2	12.a.	With suitable theory and graphical interpretation, analyse the method of determining 'g' using a compound pendulum.	K4	CO2
		(OR)		
	12.b.	Using the general theorem of moment of inertia, analyse how the moment of inertia of a circular disc is obtained.		
3	13.a.	State and explain Lami's theorem.	K2	CO3
		(OR)		
	13.b.	Determine the centre of gravity of a solid and hollow hemi sphere.		
4	14.a.	Give Pascal's law and its applications.	K2	CO4
		(OR)		
	14.b.	Discuss metacentric height and stability of floating bodies.		
5	15.a.	Using Toricelli's theorem, explain the efflux experiment. Also, mention the applications of fluid mechanics in industry sector	K3	CO5
		(OR)		
	15.b.	Apply Bernoulli's theorem to explain the working of a Venturimeter.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Explain how the principle of conservation of momentum is applied in the rocket and derive the velocity equation for this variable mass system.	K3	CO1
2	17	Analyse the experimental procedure of a fly wheel and derive the equation of moment of inertia of the fly wheel system.	K4	CO2
3	18	Define centre of gravity (C.G) and derive C.G for a solid tetrahedron and Right solid cone.	K2	CO3
4	19	Explain pressure variation in static fluid and derive the hydrostatic pressure equation.	K2	CO4
5	20	Discuss the types of energy possessed by the fluid in a steady flow and derive Bernoulli's equation from Euler's equation.	K3	CO5

Z-Z-Z

END