22TDCPHPTN / 22TDCPHPT

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

PG DEGREE EXAMINATION DECEMBER 2025
(Third Semester)

TRANS DISCIPLINARY COURSE
(Common to PG Programmes)

PHYSICS FOR MATHEMATICAL SCIENCES

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	What is the other name for Newton's first law? a) Law of force b) Law of inertia c) Law of gravity d) Law of momentum	K1	CO1
	2	Which velocity refers Muzzle velocity. a) Velocity of a car b) Initial velocity of a bullet c) Velocity of sound d) Final velocity of a rocket	K2	CO1
2	3	Define Impulse? a) Force × Distance b) Force × Time c) Work × Time d) Power × Time	K1	CO2
	4	How the position is expressed in spherical polar coordinates? a) x, y, z b) r, θ, φ c) v, t d) u, v	K2	CO2
3	5	Identify the ideal gas equation. a) $PV = nRT$ b) $PV = RT$ c) $PV = T/n$ d) $PV = n^2RT$	K1	CO3
	6	Choose the physical quantity in which the average kinetic energy of a gas depends. a) Pressure b) Temperature c) Volume d) Density	K2	CO3
4	7	Who explained the distribution of energy in black body spectrum? a) Rayleigh b) Planck c) Einstein d) Bohr	K1	CO4
	8	Identify the expression for Photon energy. a) mc^2 b) hv c) h/p d) $1/2\ mv^2$	K2	CO4
5	9	Bohr's model successfully explains which spectrum? a) Hydrogen spectrum b) Helium spectrum c) Neon spectrum d) All elements	K1	CO5
	10	Name the force on a charged particle in a magnetic field. a) Centripetal force b) Lorentz force c) Coulomb force d) Coriolis force	K2	CO5

Cont...

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.	Analyze the role of force and mass in Newton's laws of motion.	K5	CO1
		(OR)		
	11.b.	Assess dynamics of particle by using Newton's second law.		
2	12.a.	Summarize briefly about Cartesian and Spherical polar coordinates.	K3	CO2
		(OR)		
	12.b.	State and explain the law of conservation of momentum.		
3	13.a.	Derive the expression for mean, root mean square and most probable speeds of gas molecules.	K4	CO3
		(OR)		
	13.b.	Derive the ideal gas equation from the kinetic theory assumptions.		
4	14.a.	Define black body radiation. Illustrate the distribution of energy in black body spectrum.	K4	CO4
		(OR)		
	14.b.	Derive De Broglie wavelength expression with necessary theory.		
5	15.a.	Discuss about Lorentz transformations.	K2	CO5
		(OR)		
	15.b.	Illustrate the use of matrices in symmetry operations.		

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	Describe the Newton's first law of motion with suitable examples.	K2	CO1
2	17	Explain Newton's second law in terms of momentum and illustrate the impulse–momentum theorem with an example.	K4	CO2
3	18	Evaluate the specific heat capacity of gases using equipartition of energy.	K5	CO3
4	19	Summarize the significance of Schrödinger's wave equation with the relevant numerical solution to it.	K5	CO4
5	20	Discuss the postulates of Bohr model of an atom in detail.	K3	CO5

Z-Z-Z END