

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2026
(Third Semester)

Branch - PHYSICS

ATOMIC, MOLECULAR AND LASER PHYSICS

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.	Questions	K Level	CO
	1	The angular momentum of an electron in Bohr's model is (i) Zero (ii) Constant (iii) Quantized (iv) Infinite	K1	CO1
	2	When an atom is placed in a magnetic field, the electron orbit (i) Expands (ii) Contracts (iii) Precesses (iv) Stop	K2	CO1
	3	At higher magnetic field, the splitting of spectral lines disturbed. This effect is called (i) Stark effect (ii) Inverse Zeeman Effect (iii) anomalous Zeeman effect (iv) Paschen back effect	K1	CO2
	4	Which of the following theories cannot be explained by classical theory (i) Electron theory (ii) Photo electric effect (iii) Classical free electron theory (iv) Lorentz theory	K2	CO2
	5	Moseley's law relates frequency of X-Rays to (i) Atomic number (ii) Atomic mass (iii) Mass number (iv) Mass density	K1	CO3
	6	In Lue's method, Centripetal force provided by (i) Electric field (ii) Gravity (iii) magnetic field (iv) Nuclear Force	K2	CO3
	7	Interaction of electromagnetic radiation with matter mainly involves (i) Nuclear Reaction (ii) Chemical Precipitation (iii) Energy transfer between radiation and molecules (iv) Change in atomic mass	K1	CO4
	8	The observed wavelength shift in raman spectroscopy is (i) red shift (ii) wavelength shift (iii) compton shift (iv) energy shift	K2	CO4
	9	The process responsible for Laser action (i) Spontaneous Absorption (ii) Spontaneous Emission (iii) Stimulated Absorption (iv) Stimulated Emission	K1	CO5
	10	The active medium of a ruby Laser is (i) Aluminum oxide doped Chromium (ii) Silicon Crystal (iii) Ne gas (iv) GaAS	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.	Label the evidences in favour of Bohr's theory	K2	CO1
		(OR)		
	11.b.	Short note on the selection rules of optical spectra		
2	12.a.	State and explain the Paschen Back Effect.	K3	CO2
		(OR)		
	12.b.	Discuss the construction and working of Photo Voltaic cell		
3	13.a.	Explain the Continuous X-ray spectra characteristics	K4	CO3
		(OR)		
	13.b.	Discuss the construction and working of powder crystal method		
4	14.a.	State and explain the Beer–Lambert Law.	K5	CO4
		(OR)		
	14.b.	List out the characteristics of raman lines		
5	15.a.	Inference the different types of pumping methods	K5	CO5
		(OR)		
	15.b.	Describe the construction and working of He-Ne Laser with energy level diagram		

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 experimental arrangement for the normal Zeeman effect and determine the Zeeman shift	K2	CO1
2	17	Derive the photoelectric equation and explain the experimental determination of h .	K5	CO2
3	18	Obtain the Compton shift by the theoretical method and verified through the experimental verification	K3	CO3
4	19	Discuss the construction and working of Raman spectroscopy instrument with its applications.	K4	CO4
5	20	Obtain the Einstein's Coefficients of A and B and also give their conclude their result	K2	CO5

Z-Z-Z

END