22PHP312N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2025
(Third Semester)

Branch - **PHYSICS**

PHOTONICS AND APPLICATIONS

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	LASER is a short form of a) Light amplification by spontaneous emission of radiation b) Light amplification by stimulated emission of radiation c) Light absorption by stimulated emission of radiation d) Light absorption by spontaneous emission of radiation	K1	CO1
	2	The characteristics of laser beam are a) Highly directional b) Highly intense c) Highly monochromatic d) All of them	K2	CO3
2	3	Optical pumping happens via _____ a) Spontaneous emission b) Spontaneous Absorption c) Stimulated emission d) Stimulated Absorption	K1	CO2
	4	Which of the following is a unique property of laser? a) Directional b) Speed c) Coherence d) Wavelength	K2	CO3
3	5	Which of the following is a gas laser? a) He-Ne laser b) Ruby laser c) Semiconductor laser d) Nd-YAG laser	K1	CO5
	6	In case of Ruby laser, the resultant pink colour is due to presence of Cr+3 ions in the appropriate concentration which a) Replace Al atoms in the crystal lattice b) Replace Oxide atoms in the crystal lattice c) Replace Na atoms in the crystal lattice d) None of the above	K2	CO4
4	7	What is the primary condition required for nuclear fusion to occur? a) Low pressure b) High temperature c) A catalyst d) High-speed neutrons	K1	CO3
	8	Laser is used in LIDAR for what purpose? a) High-Speed Photography b) Range finder c) Optical Carrier signal d) Drilling	K2	CO5
5	9	What determines light intensity in a CRT? a) Voltage b) Current c) Momentum of electrons d) Fluorescent screen	K1	CO2
	10	What should be the biasing of the LED? a) Forward bias b) Reverse bias c) Forward bias than Reverse bias d) No biasing required	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.	Explain spontaneous emission and its mechanism.	K2	CO1
		(OR)		
	11.b.	Describe Coherence and its types.	K4	CO4
2	12.a.	What is optical pumping?	K2	CO1
		(OR)		
	12.b.	Discuss about active and passive methods of mode locking in lasers.	K4	CO3
3	13.a.	Explain He–Ne laser with neat sketch.	K2	CO1
		(OR)		
	13.b.	Interpret in brief about GaAs laser.	K4	CO5
4	14.a.	How is distance measured using light or lasers?	K2	CO3
		(OR)		
	14.b.	Develop the pulse echo technique in LIDAR.	K4	CO4
5	15.a.	Compare Photoluminescence and cathode luminescence.	K2	CO3
		(OR)		
	15.b.	Elaborate the role of LCD in numeric display.	K4	CO1

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	Interpret Einstein's coefficients and their relation.	K5	CO3
2	17	Summarize laser Mirror and explain its types.	K2	CO4
3	18	Explain with neat sketch about He–Cd and He–Se lasers.	K4	CO1
4	19	Define nuclear fusion and explain about Beam Modulation telemetry.	K4	CO2
5	20	Explain about CRT and its applications.	K4	CO1

Z-Z-Z END