

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2024
(First Semester)

Branch - PHYSICS

ADVANCED OPTICAL 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.	Question	K Level	CO
1	1	The light waves which travel only in a single plane is known as a. Polarised light b. Unpolarised light c. Spherical light d. Rectilinear light	K1	CO1
	2	Birefringence depends on a. Refractive index b. Vibration of light c. Intensity of light d. Velocity of light	K2	CO1
2	3	The process of difference-frequency generation is a. Ferrometric b. Parametric c. Diametric d. Antiferrometric	K1	CO2
	4	Linear susceptibility is associated with the movement of ----- as light passes through a medium. a. Electrons b. Protons c. Phonons d. Photons	K2	CO2
3	5	Polarisability is depends on the direction of a. Induced dipole b. Spontaneous dipole c. Permanent dipole d. All the above	K1	CO3
	6	The decay-length of evanescent surface wave from scanning tunneling microscope is a. 100 cm b. 100 mm c. 100 nm d. 100 m	K2	CO3
4	7	Large number of dipole-dipole interaction is present in a. Proteins b. Aminoacids c. Carbon d. Hydrogen	K1	CO4
	8	Photonic crystals can be fabricated for ---- dimension. a. One b. Two c. Three d. All	K2	CO4
5	9	Diffraction is a special type of a. Reflection b. Refraction c. Scattering d. Dispersion	K1	CO5
	10	The diffracting aperture is a ---- source of propagating wave. a. Primary b. Secondary c. Coherent d. Incandescent	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.	Explain the phenomenon of Dichroism.	K4	CO1
	(OR)			
	11.b.	Compare the spatial and temporal coherence.		
2	12.a.	Derive the difference-frequency generation equation.	K3	CO2
	(OR)			
	12.b.	Calculate the linear susceptibility of an atomic system by density matrix equation of motion.		
3	13.a.	Describe briefly multiple multipole method.	K4	CO3
	(OR)			
	13.b.	Explain the construction and working of aperture scanning near-field optical microscopy.		
4	14.a.	Discuss about the dipole-dipole interaction.	K2	CO4
	(OR)			
	14.b.	Explain the photonic crystals.		
5	15.a.	Explain Kirchhoff's formulation of diffraction.	K4	CO5
	(OR)			
	15.b.	Discuss about Fraunhofer diffraction.		

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	Discuss in detail construction and reconstruction process of hologram.	K4	CO1
2	17	Deduce an expression of coupled-wave equations for Sum-Frequency generation.	K5	CO2
3	18	Explain in detail principle, construction and working of confocal microscopy.	K4	CO3
4	19	Describe in detail delocalized excitation with relevant theory and illustration.	K6	CO4
5	20	Explain the Rayleigh- Sommerfeld's formulation of diffraction.	K5	CO5

Z-Z-Z

END