

**PSG COLLEGE OF ARTS & SCIENCE**  
(AUTONOMOUS)

**MSc DEGREE EXAMINATION DECEMBER 2023**  
(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 transverse nature of light is exhibited by the ..... (a) interference of light      (b) polarization of light (c) dispersion of light      (d) refractive of light	K1	CO2
	2	Holography is a ..... step process. (a) one      (b) two (c) three      (d) four	K2	CO2
2	3	The Sum frequency generation is a ..... process. (a) diametric      (b) parametric (c) ferrometric      (d) ferrimetric	K3	CO3
	4	Phase conjunction is also referred to as ..... (a) phase matching      (b) sum frequency (c) difference frequency      (d) wave front reversal	K1	CO3
3	5	The scanning tunneling microscope is based on the concept of ..... (a) quantum tunneling      (b) atomic tunneling (c) nuclear tunneling      (d) mechanical tunneling	K2	CO4
	6	The reactive and radiative near field designations is also a function of ..... (a) frequency      (b) phase (c) wavelength      (d) power density	K2	CO4
4	7	Quantum dots are also sometimes referred to as ..... (a) nucleus      (b) natural atoms (c) artificial atoms      (d) protons	K1	CO5
	8	The semiconductor quantum dots are nanoscale material clusters composed of .... (a) $10^3-10^5$ (b) $10^4-10^5$ (c) $10^2-10^5$ (d) $10^1-10^5$	K2	CO5
5	9	The phenomenon of diffraction was discovered by..... (a) Fresnel      (b) Fraunhofer (c) Huygens      (d) Grimaldi	K1	CO1
	10	In Fresnel diffraction the relative phase difference between the curved wavefront is ..... (a) constant      (b) zero (c) linearly increasing      (d) non-constant	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 the internal and external conical refraction.	K2	CO2
		(OR)		
	11.b.	Discuss the applications of hologram.		
2	12.a.	Determine wave equation description of nonlinear optical interactions.	K3	CO3
		(OR)		
	12.b.	How did you determine the density matrix calculations of linear susceptibility.		
3	13.a.	Explain the volume integral method in nano optics.	K2	CO4
		(OR)		
	13.b.	Discuss the aperture scanning near field optical microscopy.		
4	14.a.	Explain the dipole-dipole interactions.	K2	CO5
		(OR)		
	14.b.	Explain the photonic crystals.		
5	15.a.	Evaluate from a vector to a scalar theory.	K2	CO1
		(OR)		
	15.b.	Explain the 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	Explain the construction and reconstruction process of hologram.	K2	CO2
2	17	Deduce an expression for the sum frequency generation and difference frequency generation in non linear optics.	K3	CO3
3	18	Explain near field illumination and far field detection in in confocal microscopy.	K2	CO4
4	19	With a relevant theory and illustration explain in detail on delocalized excitations.	K3	CO5
5	20	Explain the Rayleigh- Sommerfield's formulation of diffraction.	K1	CO1

Z-Z-Z

END