

(FOR THE CANDIDATES ADMITTED

SUBJECT CODE **22 UPS 508**

DURING THE ACADEMIC YEAR 2022-23 ONLY)

REG.NO.

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : NOVEMBER – 2024

B.Sc. – PHYSICS

MAXIMUM MARKS: 50

V SEMESTER

TIME : 3 HOURS

PART – III

OPTICS AND SPECTROSCOPY

SECTION – A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

(K1)

1. Chromatic aberration in a lens is caused by
(a) reflection (b) interference (c) diffraction (d) dispersion
2. In Fraunhofer diffraction the incident wave should be
(a) plane (b) elliptical (c) spherical (d) cylindrical
3. Which of the following phenomenon can only be seen in transverse waves?
(a) diffraction (b) interference (c) polarization (d) dispersion
4. The transition zone for Raman spectra is
(a) between the vibrational and rotational levels (b) between electronic levels
(c) between magnetic levels of nuclei (d) between magnetic levels of unpaired electrons
5. The unique property of Laser is
(a) coherence (b) directional (c) speed (d) wavelength

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES

(K2)

6. Define dispersive power.
7. What is Fraunhofer diffraction?
8. What is Brewster's law?
9. What are Stokes and anti-Stokes lines?
10. What is the role of He in He – Ne laser?

(CONTD 2)

SECTION – B**(5 X 3 = 15 MARKS)****ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.****(K3)**

11. a) Explain the spherical aberration for a lens.
(OR)
b) Two thin converging lenses of focal lengths 10cm and 20cm respectively are to form achromatic combination. Calculate the effective focal length of the combination.
12. a) Explain the phenomenon of Fraunhofer diffraction at a single slit.
(OR)
b) Discuss in detail the Fresnel's theory of rectilinear propagation of light.
13. a) Explain the phenomenon of double refraction in uniaxial crystals.
(OR)
b) Describe the theory of Laurent's half-shade polarimeter.
14. a) Mention some of the applications of microwave spectroscopy.
(OR)
b) Write a note on simple harmonic oscillator. Deduce the expression for simple Harmonic Oscillator.
15. a) Differentiate between spontaneous emission and stimulated emission.
(OR)
b) Explain the construction and types of optical fiber.

SECTION – C**(5 X 5 = 25 MARKS)****ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.****(K4 (Or) K5)**

16. a) Derive the condition for achromatism of two thin lenses separated by a distance.
(OR)
b) Briefly explain the defects coma and astigmatism in a lens.
17. a) Describe with theory the determination of the refractive index of a liquid by Newton's rings method.
(OR)
b) Describe in detail how you would use a transmission grating to determine the wavelength of light.
18. a) Describe the construction of a Nicol prism and show how it can be used as a polarizer and analyser.
(OR)
b) What are elliptically and circularly polarized lights? How are they produced? Explain.
19. a) Give the theory of rotational spectra of a diatomic molecule.
(OR)
b) Explain the quantum theory of Raman effect.
20. a) Describe the principle, construction and working of a ruby laser with neat diagram.
(OR)
b) Discuss the propagation of light through a fiber optic communication system with diagrammatic representation.