(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2020 - 2021 ONLY)

SUBJECT CODE 20UPS508

REG.NO.

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

END-OF-SEMESTER EXAMINATIONS: DECEMBER – 2022

B.Sc. PHYSICS **MAXIMUM MARKS: 70**

V SEMESTER **TIME : 3 HOURS**

PART - III

OPTICS & SPECTROSCOPY

SECTION - A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.
MULTIPLE CHOICE QUESTIONS. **(K1)**

1. The main principle used in interference of light is _____
   a) Heisenberg's Uncertainty Principle b) Superposition Principle
   c) Quantum Mechanics d) Fermi Principle
2. The working of a Nicol prism is based on the phenomenon of _____
   a) Refraction b) Reflection
   c) Diffraction d) Double refraction
3. What is the frequency range of microwave spectroscopy?
   a) 3×10^{9}–3×10^{6} Hz b) 3×10^{5}–3×10^{6} Hz
   c) 3×10^{5}–3×10^{8} Hz d) 3×10^{6}–3×10^{12} Hz
4. Which of the following is used as detector crystal in ESR spectrometer?
   a) Silicon rectifier b) Silicon tungsten rectifier
   c) Silicon boron rectifier d) Silicon quartz rectifier
5. Which of the following optical fibre has more distortion?
   a) Single step-index fibre b) Graded index fibre
   c) Multimode step-index fibre d) Glass fibre

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES **(K2)**

6. How is an air wedge formed?
7. What is meant by optical rotation?
8. What is a simple harmonic oscillator?
9. What is Anomalous Zeeman Effect?
10. What are the three processes of laser action?

(CONTD……..2)

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SECTION – B (5 X 4 = 20 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

(K3)

11. a) How do you determine wavelength of a light source Fresnel's biprism experiment? Explain.

(OR)

b) What is plane transmission grating? Give its theory of operation.

12. a) Describe the Fresnel theory of optical activity.

(OR)

b) Write a short note on Brewster's law and Brewster's window.

13. a) Give an account of rotational spectra of rigid diatomic molecules.

(OR)

b) Describe the principle and instrumentation of infrared spectroscopy.

14. a) Explain the quantum mechanical theory of normal Zeeman effect.

(OR)

b) What is Paschen back effect and Stark effect? Explain

15. a) Write a short note on critical angle and numerical aperture of an optical fiber.

(OR)

b) Explain Discuss the principle and working of a He-Ne laser.

SECTION – C (4 X 10 = 40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS
(16th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS.
(FROM Qn. No : 17 to 21) (K4 (Or) K5)

16. With relevant theory explain the determination of wavelength of a monochromatic light using Newton's rings experiment.

17. What is meant by diffraction? Deduce an expression for Fresnel's diffraction at a circular aperture.

18. Discuss the theory of circularly and elliptically polarized light.

19. What is Raman effect? Give its characteristics and explain the experimental study of Raman effect.

20. With relevant theory explain the construction and working of a NMR spectrometer? Give its applications.

21. Briefly explain the propagation of light through an optical fiber. Give its applications in communication systems.

ETHICAL PAPER

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