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

SUBJECT CODE 21 UPS 508

REG.NO. :

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

END-OF-SEMESTER EXAMINATIONS: NOVEMBER – 2023

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

SEMESTER : V **TIME : 3 HOURS**

PART – III

OPTICS AND SPECTROSCOPY

SECTION – A (10 X 1 = 10 MARKS)

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

1. The wavefronts of a Fresnel diffraction are

   (a) Spherical (b) Cylindrical (c) Plane (d) Both (a) and (b)

2. Unpolarized light of intensity I passes through a single polaroid, the intensity of polarized light is approximately

   (a) I (b)2I (c)I/2 (d)I/4

3. In Raman spectra, the lines having wavelength greater than that of incident wavelength are called _____ lines

   (a) Stokes (b) Anti-Stokes (c) Absorption (d) Emission

4. In which of the following do all spectral lines show a triplet structure?

   (a) Paschen-Back effect (b) Zeeman effect (c) Stark effect (d) Compton effect

5. Laser is based on the phenomenon of

   (a) Spontaneous emission (b) Stimulate emission (c) Adsorption (d) Total internal reflection

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

6. State the basic conditions for the phenomenon of interference of light.
7. What is the only event to prove that light is a transverse wave?
8. What are the two basic fundamental vibrations in IR spectroscopy?
9. Outline any two differences between NMR and NQR?
10. Can two level laser system be used for the production of laser?

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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) What are Newton's rings? How it is used to determine the refractive index of liquid?

(OR)

b) Show that the area of each half period zone of a plane wavefront is equal to $\pi b\lambda$, where 'b' is distance of external point on the screen from the wavefront.

12. a) Explain double refraction in uniaxial crystal.

(OR)

b) Write short notes on specific rotation in optical activity.

13. a) Show that the spacing between rotational spectrum of diatomic molecules is "2B'(where B is rotational constant)

(OR)

b) Outline the applications of Microwave and IR spectroscopy.

14. a) Explain the principle of ESR. Mention its applications.

(OR)

b) Give the theory and experimental verification of Stark effect.

15. a) Discuss the Einstein's theory for stimulated absorption, spontaneous and stimulated emission of radiation.

(OR)

b) Discuss the light propagation in an optical fiber and obtain an expression for numerical aperture.

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 a neat diagram, explain the construction and working of a He-Ne laser.

17. Discuss the theory of diffraction grating. Describe how it is used to determine the wave length of light.

18. Explain in detail the methods of detecting plane, circularly and elliptically polarized light.

19. Describe the scanning process involved in an infra-red spectrum of a solid sample.

20. Outline the experimental arrangement for the normal Zeeman effect. Deduce the expression for Zeeman shift.

21. Describe with neat sketch the construction and reconstruction of holographic image. Mention the important applications of holography.

ETHICAL PAPER

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