

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2023**(Regular/Improvement/Supplementary)****PHYSICS: COMPLEMENTARY COURSE FOR CHEMISTRY & MATHEMATICS****GPHY2C02T: OPTICS, LASER AND ELECTRONICS****Time: 2 Hours****Maximum Marks: 60****SECTION A: Answer the following questions. Each carries *two* marks.****(Ceiling 20 Marks)**

1. Is it possible to observe interference fringes with light emanating from two independent sources? Why?
2. What is meant by constructive interference?
3. What is the condition for obtaining a minimum for Fraunhofer single slit diffraction?
4. Give an example for diffraction from daily life.
5. What is grating? Explain grating constant.
6. Write down the condition for getting second order maximum in a grating.
7. Distinguish between polarised light and unpolarised light.
8. What is a truth table of logic gates?
9. State Barkhausen condition for sustained oscillations.
10. How the output frequency differs in the case of full wave and half wave rectifier?
11. List the properties of Laser beam.
12. How do we make population inversion in ruby laser?

SECTION B: Answer the following questions. Each carries *five* marks.**(Ceiling 30 Marks)**

13. Two coherent sources are 0.18 mm apart and the fringes are observed on a screen 80 cm away. It is found that with a certain monochromatic source of light, the fourth bright fringe is situated at a distance of 10.8 mm from the central fringe. Calculate the wavelength of light.
14. Find the half angular width of the central bright maximum in the Fraunhofer diffraction pattern of a slit of width 12×10^{-5} cm when the slit is illuminated by monochromatic light of wavelength 6000\AA .

(PTO)

15. What is the longest wave length that can be observed in third order spectrum with a grating having 6000 lines/cm. Assume normal incidence.
16. Derive the equation for minimum thickness of quarter wave plate for light of wavelength λ .
17. Specific rotation of sugar solution is 65° . If the glass tube of the saccharimeter having length 20 cm contains sugar solution of concentration 0.1 gcm^{-3} , through what angle the plane of polarization turned.
18. A full wave rectifier uses two identical diodes of resistance 10Ω . The transformer provides an r.m.s. secondary voltage of 12 V between centre tap and one end. If the load resistance of rectifier is $1 \text{ K}\Omega$ calculate a) maximum ac voltage. b) maximum load current. c) dc output voltage. d) peak inverse voltage of diode.
19. The bigger the energy difference between two states, the much more likely is spontaneous emission compared to stimulated emission. Why?

SECTION C: Answer any one question. Each carries ten marks.

20. Describe with necessary theory how the wavelength of a monochromatic source of radiation can be determined using Newton's ring arrangement.
21. What is the basic principle of an amplifier? Describe with neat diagram how a transistor amplifier with CE configuration works.

(1 x 10 = 10 Marks)