02/4/24 (QE)

TB244721B

Reg. No :.....

Name :.....

BACHELOR'S DEGREE (C.B.C.S) EXAMINATION, MARCH 2024

2022 ADMISSIONS REGULAR

SEMESTER IV - Chemistry COMPLEMENTARY COURSE 2 (PHYSICS)

PH4C02B18 - Physical Optics , Laser Physics and Superconductivity

Time : 3 Hours

Maximum Marks : 60

Part A

I. Answer any Ten questions. Each question carries 1 mark **(10x1=10)**

1. Distinguish between the division of wavefront and division of amplitude.
2. In a reflected system, the center of Newton's ring system is dark. Explain.
3. Compare convex lens and half period zone.
4. Explain the rectilinear propagation of light.
5. Explain the term principal plane.
6. Explain the nature of emergent polarized light when i) a plane polarized light ii) a circularly polarized light is passed through a quarter wave plate.
7. Explain the significance of blunt corners of the calcite crystal.
8. Explain thermal equilibrium of an atomic system.
9. Explain the stimulated and spontaneous emissions.
10. Differentiate between meridional ray and axial ray.
11. Explain the acceptance cone of a fiber.
12. Explain magnetic levitation.

Part B

II. Answer any Six questions. Each question carries 5 marks **(6x5=30)**

13. Derive the condition for the formation of interference minima.
14. Two coherent sources whose amplitudes are in the ratio 4: 7 produce an interference pattern. Calculate the ratio of maximum and minimum intensity in the fringe system.
15. Find longest wavelength that can be observed in the fourth-order for the transmission grating having 5,000 lines/cm.
16. An incident beam of light of intensity I_0 is made to fall on a Polaroid A. Another Polaroid B is so oriented with respect to A that there is no light emerging out of B. A third Polaroid C is now introduced mid-way between A and B. What is the intensity of light now between i) A and C ii) C and B? Give reasons for your answer.
17. A beam of linearly polarized light is changed into circularly polarized light by passing it through a sliced crystal of thickness 0.003 cm. Calculate the difference in refractive indices of the two rays in the crystal assuming this to be of minimum thickness that will produce the effect. The wavelength of light used is $6x10^{-7}m$.
18. Explain the working of YAG laser.
19. The ratio of population of two states energy levels out of which the upper one corresponds to metastable state is $2.54X10^{-30}$. Find the frequency of light emitted at $T = 130K$.

20. Calculate the numerical aperture, acceptance angle and critical angle of the fiber having core refractive index (n1) 1.50 and refractive index of cladding (n2) 1.45.
21. Describe ac and dc Josephson effect.

Part C

III. Answer any Two questions. Each question carries 10 marks **(2x10=20)**

22. With a neat diagram, describe Young's double-slit experiment.
23. Give the theory of diffraction pattern due to straight edge.
24. Explain the phenomenon of double refraction in uniaxial crystals. How is this phenomenon explained using Huygen's theory ?
25. With necessary theory, describe the lasing action in Helium Neon laser