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Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MAY 2024

Fourth Semester

Complementary Course—Physics

PHYSICAL OPTICS, LASER PHYSICS AND SUPERCONDUCTIVITY

(For B.Sc. Chemistry Model I, B.Sc. Geology and B.Sc. Chemistry Environment and Water Management)

[2013 to 2016 Admissions]

Time : Three Hours Maximum : 60 Marks

Part A

Answer **all** *questions briefly.*

Each question carries 1 *mark.*

1. State the conditions for interference.
2. What are biaxial crystals ?
3. What is meant by dispersive power ?
4. State Brewster's law in mathematical form.
5. What are Polaroids ?
6. Define population inversion.
7. List any two properties of laser beams.
8. What are super conductors ?

(8 × 1 = 8)

Part B

Answer any **six** *questions.*

Each question carries 2 *marks.*

9. What are coherent sources ? Explain.
10. Explain interference by division of wave fronts.
11. Briefly explain interference in thin films.
12. Differentiate between resolving power and dispersive power.
13. State the significance of Young's double slit experiment.

Turn over

14. How plane of vibration is different from plane of polarization ?
15. Explain the action of half wave plates.
16. What is Meissner effect ? Explain.
17. Explain spontaneous emission process.
18. Sketch lasing action in ruby laser.

(6 × 2 = 12)

Part C

Answer any **four** *questions.*
Each question carries 4 *marks.*

19. Green light of wavelength 510 nm from a narrow slit is incident on a double slit. On a screen placed 2 m. away, a separation of 10 fringes is found to be 2 cm. Calculate the slit separation.
20. Newton's rings are formed in reflected light of wave length 589 nm with a lens of radius of curvature 1.1 m and a glass plate. Find the radius of the 7th dark ring.
21. Find the highest order spectrum of sodium light of wavelength that can be observed using a grating with 6×10^5 lines per cm.
22. Determine the polarizing angle on the surface of water. Refractive index of water air interface is 1.33.
23. Calculate the thickness of a quarter wave plate made of quartz crystal to be used with light of wavelength 500nm if the refractive index of extraordinary light is 1.553 and that of ordinary light is 1.544.
24. Differentiate between type I and type II superconductors.

(4 × 4 = 16)

Part D

Answer any **two** *questions.*
Each question carries 12 *marks.*

25. Describe Young's double slit experiment with theory for the determination of wavelength of sodium light.
26. Bring out Fresnel diffraction at a straight edge with mathematical support.
27. Discuss the production of elliptically and circularly polarized light in detail.
28. Give an account on helium-neon laser with energy level diagram and experimental arrangement.

(2 × 12 = 24)