QP CODE: 24020671

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Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR EXAMINATIONS, APRIL 2024

Fourth Semester

Complementary Course - PH4CMT02 - PHYSICS - OPTICS AND SOLID STATE PHYSICS

(Common for B.Sc Chemistry Model I, B.Sc Geology Model I)

2017 Admission Onwards

03EB6E9E

Time: 3 Hours

Max. Marks : 60

Part A

*Answer any **ten** questions.*

*Each question carries **1** mark*

1. Explain Coherent sources. How can we obtain them?
2. What is meant by interference of light?
3. Why Newton's rings are circular?
4. What is a half period zone?
5. What are polaroids ? Give their uses.
6. Why core is having more refractive index than cladding?
7. What do you mean by step index fibre?
8. Write two examples of non-polar molecules.
9. Explain the term electric polarisation.
10. Explain the term susceptibility of the medium.
11. What is a crystal?
12. Write down the axial lengths of unit cell and interaxial angles in Orthorhombic crystal system.

(10×1=10)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. In a Newton's ring experiment the diameter of 4^{th} dark ring was found to be 0.4 cm. Find the radius of the 20^{th} dark ring.

14. A monochromatic light of wavelength 6.56×10^{-5} cm is incident on a plane transmission grating of width 2 cm. If the first order spectrum is formed at $18^0 14'$, find the total number of lines in the grating.

15. A plane transmission grating has 140000 lines to an inch for a length of 6 inches. If the wavelength region is 5×10^{-5} cm, find the resolving power of the grating in the first order and the smallest wavelength difference that can be measured.

16. Show that the reflected and refracted rays are at right angles when the rays are incident on a glass plate at the polarizing angle.

17. A 20 cm long tube containing 50 cm^3 sugar solution producers and optical rotation of 10^0. Calculate the quantity of sugar solution contained in the solution. Specific rotation of sugar is 65^0.

18. Write a note on (a) two different pump sources and (b) active medium in laser.

19. The dielectric constant of a polymer is 8. The electric field in the dielectric is 10^6 v/m. Calculate the electric displacement vector and polarisation.

20. Find the maximum radius of the interstitial sphere that can fit into the void at (1/2 ,1/2, 1/2) between the atoms in the body centred cubic structure.

21. X-rays of wavelength λ=1.5A are reflected from the (2 2 2) planes of a cubic crystal with unit cell a = 5A. Calculate the Bragg angle, θ, for n=1.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **10** marks.*

22. Discuss the formation of interference fringes on a screen due to the monochromatic light passing through two parallel slits on an opaque screen. Also arrive at the expression for Fringe width.

23. Discuss about huygen's explanation of double refraction in uniaxial crystals.

24. Explain why population inversion is not possible in two level systems. With the help of energy level diagrams explain three level laser systems and four level laser systems. Why the laser beam in a three level system is spiking?

25. Explain miller indices with an example.

(2×10=20)