



23123532

QP CODE: 23123532

Reg No : .....

Name : .....

**B.Sc DEGREE (CBCS) REGULAR EXAMINATIONS, MAY 2023**  
**Fourth Semester**  
**COMPLEMENTARY COURSE - PH4CMT02 - PHYSICS - OPTICS AND SOLID STATE**  
**PHYSICS**

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

2021 Admission Only

D7EBFD8B

Time: 3 Hours

Max. Marks : 60

**Part A**

Answer any **ten** questions.

Each question carries **1** mark.

1. What is the relation between phase difference and path difference?
2. Thick films illuminated by white light do not exhibit any color in white light. Explain why?
3. Explain what do you mean by diffraction of light.
4. Explain principal section of a crystal.
5. What is meant by specific rotation?
6. What is the range of life time in meta-stable state and in excited state?
7. What is total internal reflection?
8. Write two examples of non-polar molecules.
9. What are the values of  $P$  and  $\chi$  for metal as a polarizable body?
10. What you mean by electric displacement vector  $D$ ?
11. Define the lattice parameters of the unit cell.
12. Which are closed packed and loose packed crystal structures?

(10×1=10)

**Part B**

Answer any **six** questions.

Each question carries **5** marks.



13. Two coherent sources whose Intensities are in the ratio 25:16 produce interference fringes. Calculate the ratio of maxima to minimum intensity in the fringe system.
14. Discuss about young's double slit experiment.
15. In a Newton's ring experiment the diameter of 10<sup>th</sup> ring changes from 1.40 to 1.27 cm when a drop of liquid is introduced between the lens and the glass plate. Calculate the refractive index of the liquid.
16. Obtain an expression for the dispersive power of a grating.
17. A ray of light is incident on the surface of a plate of glass of refractive index 1.62 at the polarising angle. Calculate the angle of refraction.
18. Write a note on (a) two different pump sources and (b) active medium in laser.
19. Derive the relation connecting between Polarisation vector P and Electric field intensity E of dielectric materials.
20. Write a short note on (a) crystal structure (b) crystal lattice (c) Basis (d) translational vectors.
21. Find the interplanar spacing for the lattice planes of Miller indices (321), (210) and (111) for a cubic lattice with  $a=5.62\text{\AA}$ .

(6×5=30)

### Part C

Answer any **two** questions.

Each question carries **10** marks.

22. Derive an expression for conditions of brightness and darkness on a plane film.
23. What are the differences between fresnel and fraunhofer diffraction? Derive the expression for the wavelength in normal incidents.
24. With the help of energy level diagrams explain three level laser systems and four level laser systems. Explain any five applications of laser.
25. Discuss the fcc, bcc and sc structures.

(2×10=20)

