22102722

QP CODE: 22102722

Reg No : .....

Name : .....

# B.Sc DEGREE (CBCS) REGULAR EXAMINATIONS, AUGUST 2022

## Fourth Semester

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

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

2020 Admission Only

E9050736

Time: 3 Hours

Max. Marks : 60

### Part A

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. A slowly draining soap film observed in reflected sunlight exhibits brilliant bands of colors one after the other. Explain.
2. What is a half period zone ? Why is it called so?
3. Explain resolving power of a grating.
4. Explain polarization by selective absorption.
5. State and explain malu's law.
6. What is the function of optical resonator?
7. Name the three levels in three level laser systems.
8. Write two examples of polar molecules.
9. What you mean by electric displacement vector D?
10. Write down two examples of ferroelectric crystals.
11. Name different crystal systems.
12. Write down Bragg's law.

(10×1=10)

### Part B

*Answer any **six** questions.*

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

13. In a double slit experiment $n^{th}$ bright fringe is formed at a point on the screen for a wavelength 6000Å. When the source is replaced by a wavelength of 5000 Å then $(n + 1)^{th}$ bright fringe is formed at the same point. Find the value of n.

14. Given that angular width of a fringe formed is 0.1°. If the wavelength of light used is 4500 Å, then calculate the spacing between the slits.

15. Newton's rings are observed in reflected light of wavelength 5893 Å. The diameter of $10^{th}$ dark ring is 0.005 m. Find the radius of curvature of the lens and thickness of the air film.

16. Light is incident normally on a diffraction grating through which first order diffraction is seen at $32^{o}$. Find the position of second order diffraction.

17. 25 gram of cane sugar is dissolved in water to make up 60 cc of solution. 20 cm length of this solution produces 53° optical rotation. Calculate the specific rotation.

18. What is laser? What are the main components in a laser source? Distinguish between meta-stable state and excited state.

19. Explain the phenomenon electric polarisation.

20. The ionic radii of Cs and Cl are 0.165 nm and 0.181 nm and their atomic weights are 133 and 35.5 respectively. The space lattice of CsCl is simple cubic. Calculate the density of CsCl.

21. Discuss the NaCl crystal structure.

(6×5=30)

**Part C**

*Answer any **two** questions.*

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

22. Explain the interference phenomenon in thin films. What are the differences between interference and diffraction?

23. What is polarization of light? How can you produce and detect plane polarised light?

24. With the help of geometry of optical fibre explain how light is propagated through and optical fibre. Derive the equation of numerical aperture of an optical fibre.

25. Derive an expression for interplanar spacing between the lattice planes.

(2×10=20)