



**QP CODE: 22102807**

**Reg No** : .....

**Name** : .....

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

**Fourth Semester**

**Complementary Course - PH4CMT01 - PHYSICS-OPTICS & ELECTRICITY**

(Common for B.Sc Mathematics Model I, B.Sc Statistics Model I)

2020 Admission Only

7CA6B6B5

Time: 3 Hours

Max. Marks : 60

**Part A**

*Answer any **ten** questions.*

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

1. What are the condition for two sources to be coherent?
2. Why Newton's rings are circular?
3. What conclusions can be drawn if the center of the Newton's ring system seen in reflected light is bright.
4. What is fraunhofer diffraction?
5. What is plane diffraction grating?
6. How can you show that both the ordinary and extraordinary rays are plane polarized with their planes of vibration mutually perpendicular ?
7. What is meant by specific rotation?
8. What is the range of life time in excited state?
9. What is meant by acceptance angle of a fiber?
10. Write the relations between dielectric constant and electric susceptibility and explain the terms.
11. What is the energy supplied when a current of  $i$  units flows through an inductor of self inductance  $L$  units?





12. Define rms value of voltage in a resistor circuit. Give its relation with the maximum value of voltage.

(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. Two straight and narrow parallel slits one millimeter apart are illuminated by a monochromatic light. Fringes formed on the screen held at distance of 100cm are 0.5 mm apart. What is the wavelength of the light used.
15. Obtain an expression for the resolving power of a grating.
16. When sunlight incident on water surface at glancing angle of  $37^\circ$  the reflected light is found to be completely plane polarized. Determine the refractive index of water and angle of refraction.
17. Plane polarised light passes through a quartz plate with its optic axis parallel to the faces. Calculate the least thickness of the plate for which the emergent beam will be plane polarized. Given  $n_E = 1.5533$  and  $n_O = 1.5442$  and  $\lambda = 500 \text{ nm}$ .
18. Write a note on (a) two different pump sources and (b) active medium in laser.
19. Explain the phenomenon electric polarisation.
20. A light bulb is rated at 100W for a 220 V supply. Find (a) the resistance of the bulb, (b) the peak voltage of the source and (c) the rms current through the bulb.
21. A 1.5 micro Farad capacitor is charged to 60 V by a battery, which is then removed. At time  $t=0$ , a 12 mH coil is connected in series with the capacitor to form an LC oscillator. What is the potential difference across the inductor as a function of time?

(6×5=30)

**Part C**

*Answer any **two** questions.*

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

22. Obtain an expression for fringe width in young's double slit experiment.





23. Derive an expression for conditions of brightness and darkness on a plane thin film.
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. Discuss the current and voltage variations through a series LCR circuit when an AC is applied to it. Discuss the conditions for resonance in that circuit. Also discuss the band width and sharpness of the circuit.

(2×10=20)

