

QP CODE: 21100924



Reg No : .....

Name : .....

**B.Sc DEGREE (CBCS) EXAMINATION, MARCH 2021**

**Fourth Semester**

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

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

2017 Admission onwards

B8BC833B

Time: 3 Hours

Max. Marks : 60

**Part A**

*Answer any **ten** questions.*

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

1. How can we obtain coherent sources?
2. Explain why a broad source is necessary for observing colors in thin film?
3. Write two differences between interference and diffraction.
4. What is Fraunhofer diffraction?
5. Distinguish between ordinary and extraordinary rays in double refraction.
6. What is an analyser?
7. What is a dextro rotatory substance?
8. What is spontaneous emission?
9. Compare the refractive indices of core and cladding of an optical fiber.
10. How ferroelectric domains are related to ferroelectricity?
11. Define rms value of current in a resistor circuit. Give its relation with the maximum value of current.
12. Define 'power factor' related to an ac circuit.

(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. In Newton's rings experiment find the radius of curvature of the lens surface in contact with the glass plate when a light of wavelength 589nm is illuminated. The diameter of the third ring is 3.2 mm. The light is falling at such angle that it passes through the air film at an angle of zero degree to the normal.
15. In a plane diffraction grating the number of lines per centimeter is 5000. Find the angular separation between the wavelengths 546 nm and 548nm in the second order.
16. A plane transmission grating has 140000 lines to an inch for a length of 6 inches. If the wavelength region is  $5 \times 10^{-5}$  cm, find the resolving power of the grating in the first order and the smallest wavelength difference that can be measured.
17. Determine the polarizing angle on the surface of water. Refractive index of water air interface is 1.33.
18. Write a note on (a) optical resonator and (b) optical pump.
19. Determine the value of electric field in a material for which the electric susceptibility is 4 and polarisation is  $3 \times 10^{-7}$  C/m<sup>2</sup>.
20. With necessary figure, explain the growth and decay of current in an inductive circuit
21. A series LCR circuit driven with rms voltage 120 V at frequency 60 Hz, contains a resistance 200ohms, an inductance with reactance 80 ohms and a capacitor with capacitive reactance 150 ohms (a) What are the power factor of the circuit. (b)What is the average power dissipated?

(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. Discuss the interference in thin films due to reflected light.
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)

