B.Sc DEGREE (CBCS) EXAMINATIONS, OCTOBER 2021

Fourth Semester

Complementary Course - PH4CMT01 - PHYSICS-OPTICS & ELECTRICITY

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

2019 Admission only

A27AD287

Time: 3 Hours   Max. Marks : 60

Part A

*Answer any **ten** questions.*

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

1. Relate phase difference and path difference of a wave.

2. What happens to the energy of the interfering waves during interference of light?

3. A slowly draining soap film observed in reflected sunlight exhibits brilliant bands of colors one after the other. Explain.

4. What is half period element?

5. Distinguish between dispersive power and resolving power of a grating.

6. Distinguish between ordinary and extraordinary rays in double refraction.

7. State malu's law.

8. What do you mean by active medium in laser?

9. Name the three levels in three level laser systems.

10. Differentiate between polar and non-polar molecules.

11. Give the condition for resonance circuit in a series LCR circuit.

12. What do you mean by 'resonance' in an LCR circuit?

(10×1=10)

Part B

*Answer any **six** questions.*

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

13. A light source emits light of two wavelengths 430nm and 510nm. The source is used in a double slit experiment. The distance between source and screen is 1.5 m and the

distance between the slits is 0.025 mm. Calculate the separation between the 3rd order bright fringes due to these two wavelengths.

14. Light of wavelength 550nm from a narrow slit is incident on a double slit. The overall separation of 5 fringes on a screen 200 centimeter away is 1 centimeter. Calculate the slit separation and fringe width.

15. Explain the phenomenon of colours of thin films.

16. Light of wavelength 589.6 nm is incident normally on a plane transmission grating with 6000 lines per centimetre. Find the difference in angle of deviation in the first and second order spectra.

17. A 20 cm long tube containing 50 cm3 sugar solution producers and optical rotation of 100. Calculate the quantity of sugar solution contained in the solution. Specific rotation of sugar is 650.

18. What is laser?Explain the main components in a laser source? Distinguish between spontaneous emission and stimulated emission.

19. The dielectric constant of a polymer is 8. The electric field in the dielectric is 106 v/m. Calculate the electric displacement vector and polarisation.

20. A pure inductor of 20mH is connected to a source 230 V. Find the inductive reactance and rms current in the circuit if hte frequency of the source is 50 Hz

21. A 1.5 micro Farad capacitor is charged to 60 V by a battery, which is then removed. At time t=0, a12 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. Explain the formation of Newton's rings. How can these be used to determine the wavelength of monochromatic light?

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. With necessary mathematical equations and phasor diagrams discuss the variation os current and voltage through (a) resistor circuit, (b) pure inductor circuit and (b)capacitor circuit

(2×10=20)