QP CODE: 23127000

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Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR / IMPROVEMENT / REAPPEARANCE EXAMINATIONS, OCTOBER 2023

Third Semester

Core Course - PH3CRT03 - OPTICS, LASER AND FIBER OPTICS

Common to B.Sc Physics Model I, B.Sc Physics Model II Applied Electronics, B.Sc Physics Model II Computer Applications & B.Sc Physics Model III Electronic Equipment Maintenance

2017 Admission Onwards

AD7B1113

Time: 3 Hours

Max. Marks : 60

Part A

*Answer any **ten** questions.*

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

1. Is it necessary that the interfering waves should have the same frequency to get sustained interference pattern. If so why?
2. Why an excessively thin film appears black in reflected light?
3. Write the condition for obtaining dark fringes in interference pattern due to transmitted light.
4. What will happen if wedge shaped film is placed in white light?
5. Distinguish between single slit and double slit diffraction pattern.
6. Brewster's law is not applicable for metallic surfaces. Why?
7. Define optic axis and principal plane of a crystal.
8. What is optical activity?
9. Name three properties that make laser light differ from ordinary light.
10. What is optical pumping?
11. Explain critical angle of an optical fibre.
12. What is a single mode fiber?

(10×1=10)

Part B

*Answer any **six** questions.*

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

13. The intensities of the maxima and minima and interference fringe pattern are in the ratio 16:9. Calculate the ratio between amplitude and intensities of 2 interfering beams.

14. Distance between the two slits is 0.1mm and the width of the fringes formed on the screen is 5mm. If the distance between the screen and the slit is one metre, calculate the wavelength of light used.

15. In a Newton's ring experiment the diameter of the 5^{th} dark ring is 0.336cm. The wavelength of light used is 588nm. Find the radius of curvature of lens.

16. A monochromatic light of 589 nm, located at a distance of 0.1m from a straight edge is allowed to incident on it. If the screen is kept at a distance of 0.5m from the edge, calculate the distance between the first and the second dark band.

17. Consider a circular aperture of diameter 2.2 mm illuminated by a plane wave. The most intense point on the axis is at a distance of 200 cm from the aperture. Calculate the wavelength.

18. Calculate the thickness of ice required to act like a half a plate for a wavelength of 590 nm. The refractive Indices for the ordinary and extraordinary rays are 1.309 and 1.313 respectively.

19. Draw a labelled energy level diagram and discuss the various transitions for three level and four level laser schemes.

20. Give a qualitative idea of formation and reconstruction of a hologram.

21. A signal of 100 mW is injected into a fiber. The outcoming signal from the other end is 40 mW. What is the loss in dB?

(6×5=30)

Part C

*Answer any **two** questions.*

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

22. With a neat diagram explain the principle and working of a Michelson's interferometer.

23. Using Fraunhofer theory of diffraction at a single slit, explain the diffraction by multiple slits(N-Slits).

24. Describe the process of production of plane polarized light by reflection. State Brewster's law and give its significance and applications. What does the law become when the ray travel from denser to rarer medium?

25. (i) Derive Einstein's relations and write its inferences.
(ii) Why is it difficult to achieve laser action in X-rays?

(2×10=20)