



ST. FRANCIS DE SALES COLLEGE

A FRANSALIAN INSTITUTE OF HIGHER EDUCATION **AUTONOMOUS**

NAAC A GRADE • AFFILIATED TO BANGALORE UNIVERSITY • AICTE APPROVED • 2(F) & 12 (B) RECOGNITION OF UGC • ISO 9001:2015 CERTIFIED
Electronics City P.O., Bengaluru - 560 100, Karnataka, INDIA • (+91) 8088140679 • pro@stfscollege.in • www.stfscollege.in

END SEMESTER EXAMINATION – APRIL/MAY 2026

PHYSICS - IV SEMESTER BSC

**25BSC44B: OPTICS, LASERS, FIBRE OPTICS AND
HOLOGRAPHY**

Time: 3 Hours.

Max. Marks: 80

Instruction: *Answer should be written completely in English.*

SECTION - A

Answer any **TEN** questions. Each question carries **TWO** marks.

(10X2=20)

1. What are coherent sources? Give example.
2. Does the phenomenon of interference violate the principle of conservation of energy? Justify.
3. Thin films of oil on water appear colored when seen under sunlight. Why?
4. Diffraction is common in sound waves but not common in light waves. Why?
5. What is Rayleigh's criterion of an optical instrument?
6. Define resolving power of a telescope.
7. State Brewster's law.
8. Define lasing action.
9. Sun glasses are made of polaroids and not of coloured glasses. Why?
10. What is meant by acceptance cone?
11. Mention the factor on which light gathering ability of a fibre depends. Explain.
12. How does an extrinsic attenuation cause in an optical fiber?

SECTION - B

Answer any **FOUR** questions. Each question carries **FIVE** marks.

(4X5=20)

13. In a Newton's rings experiment the diameter of 10th ring changes from 1.40 to 1.27 cm when a liquid is introduced between the lens and the plate. Calculate the refractive index of the liquid.
14. The two head-lights of an approaching automobile are 1.22 m apart. If the pupil diameter (of the eye) is 3 mm, find the distance of the observer from the automobile for just resolution. Assume mean wavelength of light to be 550 nm.
15. Calculate the minimum number of lines in a grating which will just resolve the sodium lines in the first order spectrum. The wavelengths are 5890 Angstroms and 5896 Angstroms.



16. A column of sugar solution of 0.2m rotates the plane of polarization of light through 34degree. If the specific rotation for sugar solution is 0.0118 SIU, calculate the strength of the solution and the amount of sugar per cubic meter of that solution.
17. An optical fibre has a NA of 0.20 and a cladding refractive index of 1.59. Determine the acceptance angle for the fibre in water which has a refractive index of 1.33.
18. Calculate the number of modes an optical fiber will transmit.
Given the following data: $n(\text{core}) = 1.50$, $n(\text{clad}) = 1.48$, core radius = 50 micro meter, wavelength of light = 1 micro meter.

SECTION - C

Answer any **FOUR** questions. Each question carries **TEN** marks.

(4X10=40)

19. What are Newton's rings? How are they formed? How can the refractive index of a liquid be determined using Newton's rings?
20. Explain the phenomenon of Fresnel's diffraction at a straight edge. Obtain the conditions for the positions of maximum and minimum intensity.
21. Explain Rayleigh criterion of resolution.
22. Explain the superposition of two plane polarized waves with perpendicular vibrations and discuss the plane, circular and elliptical polarized light.
23. Mention three basic requirements for the production of a laser. Describe the construction, energy level diagram and working of a He-Ne laser.
24. Explain recording and reconstruction of hologram.

