

Roll No. _____

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SIVS-N 184 A-16
B.Sc. IVth Semester Degree Examination
Physics
(Physical Optics, Laser, Fibre Optics & Computational Physics)
Paper : IV
(New)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

- 1) Answer All questions from Section 'A'
- 2) Answer any Five questions from Section 'B' & any Four questions from section 'C'.

Section - A

I Answer the following : **(1×15=15)**

1. Can a sustained interference pattern be observed using two independent sources?
2. What is the light intensity at central fringe in Lloyd's mirror experiment?
3. What is spatial coherence?
4. What types of diffraction takes place when a cylindrical wavefront is incident on narrow slit?
5. Define the term 'Resolving Power' of a grating
6. What should be the order of size of an obstacle to observe diffraction phenomenon?
7. Which type of waves can not be polarized?
8. Brewster's angle for a certain medium is 50° . What is the refractive index of the medium?
9. What is the power of convex lens of focal length 20 cm?
10. How many cardinal points are defined for an optical system?
11. On what principle, an optical fibre works?
12. What is 'Population Inversion'?

13. Expand LASER.
14. Which key - word is used to terminate the loop?
15. Name 'unconditional jump' label.

Section - B

II. Answer any five of the following : **(5×5=25)**

16. Derive an expression for fringe width in 'Young's double slit experiment'.
17. Discuss interference at thin films. What are the factors that change the color?
18. With a neat labelled diagram explain the phenomenon of Fraunhofer diffraction at a single slit.
19. Explain Huygen's principle of double refraction.
20. Distinguish between Huygen's & Ramsden's eye pieces.
21. Explain the reconstruction of image in 'holography'.
22. Explain the different types of 'Logical' & 'Relational' operators.

Section - C

III. Answer any Four of the following : **(4×10=40)**

23. a) Describe an experiment for determination of wavelength of light using fresnel's biprism.
b) A biprism is placed 5×10^{-2} meter from a slit, illuminated by light of wave length 5890 \AA . The width of fringes obtained on the screen at 75×10^{-2} meter from the bi - prism is 9.424×10^{-4} meter. What is the distance between two coherent sources? **(7+3)**
24. a) Derive an expression for resolution of a plane transmission grating.
b) A grating of width $2''$, is ruled with 15000 lines per inch. Find the smallest wavelength separation that can be resolved in second order at a mean wavelength of 5000 \AA . **(7+3)**
25. a) Explain the production and detection of
 - i) Plane
 - ii) Circularly
 - iii) Elliptically polarised light.

- b) Calculate the thickness of a quarter wave plate for light of wavelength 6000\AA .

Given $\mu_o = 1.536$, $\mu_e = 1.561$.

(8+2)

26. Derive an expression for achromatic combination of two lenses in contact. (10)

27. a) Explain with block diagram of optical fibre communication system.

- b) Give advantages of optical fibre communication.

(7+3)

28. a) What are the decision making statements in C programming? Explain.

- b) Write a C program to find wavelength of light using data from Newton's Rings expt.

/* n - number of rings

w| - Wavelength

D - Diameter of dark ring

R - Radius of curvature of lens */

(5+5)

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