

Roll No. _____

[Total No. of Pages : 2

SIVS 182 A-15
B.Sc. IVth Semester Degree Examination
Physics
(Optics and relativity)
Paper - IV

Time : 3 Hours

Maximum Marks : 80

Instructions to candidates:

1. Answer all questions from section -A
2. Answer any five questions from section -B and four from Section - C

Section - A

L Answer the following in one or two sentences **(15×1=15)**

1. What is plane wave front?
2. Write the relation between intensity and amplitude.
3. Give an example of monochromatic source
4. Define interference of light
5. What is half wave plate?
6. Define grating element.
7. Define limit of resolution
8. What is the phenomenon behind colour of thin film?
9. What is world point?
10. Write the importance of Michelson Morley experiment
11. What is abberation?
12. Give an example of uniaxial crystal
13. Define non-inertial frame of reference
14. Define specific rotation?
15. What is half period zone?

Section - B

II. Answer any Five

(5×5=25)

16. State Huygen's principle. Verify laws of reflection for a plane wave front using Huygen's principle.
17. Distinguish between Fresnel and Fraunhofer diffraction
18. Derive the velocity addition theorem
19. What is relativity of simultaneity?
20. Describe young's double slit experiment.
21. Write a note on Ramsdon eyepiece
22. How quarter Wave plate is used to distinguish unpolarised light and Circularly polarised light.

Section - C

III. Answer any Four

(4×10=40)

23. a) What are Newton rings? Give the theory for reflected system (6)
b) In Newton ring experiment the diameters of the 5th & 10th rings are 0.2×10^{-2} m and 0.6×10^{-2} m. Calculate the wave length of light used. Given radius of curvature = 1 m. (4)
24. a) Describe the construction of Fresnel's half period zone and show that intensity at any point is one fourth of that due to first half period zone. (7)
b) A plane transmission grating has 40,000 lines with grating element 12.5×10^{-5} m. Calculate the maximum R.P for which it can be used in the range of wavelength 5000×10^{-10} m. (3)
25. a) What is specific rotation? Explain the working of Laurent's half shade polarimeter. (7)
b) Calculate the length of the solution of concentration 10% which produces an optical rotation of 15° . The specific rotation of the solution is $0.0305 \text{ rad m}^2 \text{ kg}^{-1}$ (3)
26. a) Mention the cardinal points in a lens system (5)
b) Write a note on Huygens eye-piece (5)
27. a) Derive an expression for mass-energy relation. (5)
b) Derive an expression for length contraction (5)
28. a) Derive the Lorentz transformation equation. (7)
b) A rod of length 2m with a velocity 10^8 ms^{-1} with respect to observer. What is the apparent length of the rod as observed by the Observer? (3)