SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
B.Sc.(Physics) END SEMESTER EXAMINATIONS APRIL-2023
SEMESTER - III
20UPHCT3006 - Optics and Spectroscopy

Total Duration : 2 Hrs 30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. What is spherical aberration in lenses? Describe the various methods to minimise this defect.
2. Explain the Fresnel's rectilinear propagation of light.
3. Describe the method of production of circularly polarized light with necessary theory.
4. Predict and explain the various factors affecting width of spectral lines.
5. Illustrate the colours in thin films due to reflection of light.
6. What is a zone plate? How it is constructed? Give the theory of zone plate and obtain an expression for the area of the nth half period zone.
7. Explain Quarter wave plate.
8. Ascertain in detail about the various types of molecular spectra with one example each and with neat diagram.

Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Define dispersive power of a prism. Explain how two narrow angled prisms of different dispersive powers may be combined to produce
   (a) Dispersion without deviation
   (b) Deviation without dispersion.
10. Describe with a neat sketch, Michelson's interferometer. Explain how it can be used to determine wavelength of light.
11. Justify the theory of Plane transmission grating. Describe in detail how you would use it to determine the wavelength of light.

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12. (i) What is optical activity? Describe half shade polarimeter to determine the specific rotatory power of sugar solution (8 marks).
    (ii) A glucose solution of unknown concentration is contained in a 12 cm long tube to rotate linearly polarized light by 2.5°. If the specific rotation of glucose is 52°, what is the concentration? (2 marks).

13. (i) Highlight the basic instrumentation of spectrophotometer.(6) marks
    (ii) Write the selection rules governing intensity of spectral lines.(4 marks)

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