

**2023**  
**AUGUST**

**Basic Optics**

Full Marks - 80

Time - 3 Hours

*The figures in the margin indicate full marks for the questions*

*Answer all questions*

- 1) Fill in the blanks: [1X10=10]
- Polarization of light process \_\_\_\_\_.
  - The condition to eliminate distortion is \_\_\_\_\_.
  - Resolving power of microscope depends upon \_\_\_\_\_.
  - For a destructive interference, phase difference between wave is \_\_\_\_\_.
  - A person using a lens as a simple microscope sees an \_\_\_\_\_.
  - The condition of Fresnel diffraction is \_\_\_\_\_.
  - For which colour, the magnifying power of a microscope increase \_\_\_\_\_.
  - The colour of which scattered most in the atmosphere \_\_\_\_\_.
  - The I R region of the spectrum has wavelength of \_\_\_\_\_.
  - Lux is a unit of \_\_\_\_\_.
- 2) Briefly answer the following: [2X5=10]
- Give two differences between microscope and telescope.
  - Define total internal reflection.
  - What is achromatism?
- 3) Answer ANY FIVE of the following questions: [6X5=30]
- How is the wave length of Na light determines by "Newton's Ring" method? Derive the formula used.
  - Obtain the condition for achromatism of two thin lenses of the same material placed at a distance apart.
  - Define angular dispersion and dispersive power. Derive the condition to produce deviation without depression in a combination of prisms.
  - Define Roman Scattering. Explain its phenomenon.
  - Discuss chromatic aberration and its phenomenon.
  - Write short note on direct vision spectroscopy.
- 4) Answer ANY THREE of the following questions: [10X3=30]
- Explain Rayleigh criterion for resolution and determine the resolving power of the telescope.
  - Derive an expression for the angular dispersion of a plane diffraction grating.
  - Explain the principle and construction of Babinet compensator.
  - Find out the focal length of the thick lens when the object is at infinity. Prove that  $X_1 X_2 = f^2$ , where the terms  $X_1$ ,  $X_2$  - height of the object and  $f$  - mean focal length.

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(SS/BOPT-1/BAOP/08-23)

Turn over