

M.Sc. S.Y. (Physics) (CBCS Pattern) Semester - IV  
**PSCPHYT16.2 - Paper-IV : Optics and Optical Instruments**

P. Pages : 2

Time : Three Hours



**GUG/S/23/11420**

Max. Marks : 80

**Either:**

1. a) Describe construction and working of Huygens eye-piece. Calculate the focal length, principal points and focal points in Huygens's eye-piece. **8**
- b) Explain in detail Cardinal points of an Optical system. **8**

**OR**

- e) Derive an expression for the equivalent focal length of a thick lens. **8**
- f) What is aberration? Explain the various types of aberration produced by a lens and which are the different methods to minimize them? **8**

**Either:**

2. a) Explain the necessary theory, the phenomenon of Fresnel's diffraction due to a straight edge, obtain resultant intensity at point O and below the point O. **8**
- b) Explain construction and working of Michelson's interferometer. **8**

**OR**

- e) Describe the experimental arrangement for observing Newton's ring. Further obtain an expression for diameter of dark and bright band. **8**
- f) How will you determine the refractive index of liquid using newton's ring? Further find the radius of curvature of plano-convex lens in Newton's ring experiment, the diameter of fifth and tenth ring are 0.336cm and 0.470cm resp. If the wavelength of light used is  $5890\text{\AA}$ . **8**

**Either:**

3. a) Explain the construction and working of Compound Microscope with the help of well labelled diagram. Further deduce the magnifying power of a compound microscope. **8**
- b) Explain in detail with suitable diagrams of (i) Camera Lucida and (ii) Periscope. **8**

**OR**

- e) What is Binocular? Describe working of Binocular with the help of well labelled diagram. **8**
- f) What is Prism spectroscope? Explain its different parts with suitable diagrams. **8**

**Either:**

4. a) What is holography? With suitable diagram explain how the holograph image is reconstructed. **8**
- b) Explaining the term “Optical Fiber”. Describe the Cladding and Obtain the expression for acceptance angle and numerical aperture of the fiber. **8**

**OR**

- e) Discuss MRI and explain its working. **8**
- f) Explain the principle and working of Fluoroscopy with neat and well labelled diagram. **8**
5. Attempt all the followings.
- a) Calculate the focal length of a lens in the form of a sphere of glass  $\mu = 1.5$  and radius 5cm. Also calculate the principal points. **4**
- b) Give the principle, construction and working of Nicol Prism. **4**
- c) Explain the following terms in short. **4**  
i) Aperture      ii) Eye piece      iii) Collimator      iv) Field glass.
- d) The core of an optical fiber has refractive index 1.6 and its cladding has refractive index 1.5. What is the approximate numerical aperture of the fiber? **4**

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