

M.Sc. (Physics) (CBCS Pattern) Semester-IV  
**PSCPHYT16.2 - Foundation Course F2.2 - Paper-XVI – Optics and Optical Instruments**

P. Pages : 2

Time : Three Hours



**GUG/W/24/11420**

Max. Marks : 80

- Notes : 1. All questions are compulsory.  
2. All questions carry equal marks.

**Either:**

1. a) What are the cardinal points of an optical system? Explain different cardinal points with suitable diagram. 8
- b) Deduce the position of cardinal points of 1 cm thick plano convex lens of refractive index 1.6, the radius of curvature of the curved surface being 20 cm. 8

**OR**

- e) Describe construction & working of Ramsden eyepiece? Calculate equivalent length focal length and cardinal points. 8
- f) What is an eye-piece? Explain with the help of diagram, the construction & working of Huygen's eye-piece indicating cardinal points & cross wire. Why it is referred as a negative eye piece. 8

**Either:**

2. a) Derive an expression for corrected optical path difference when monochromatic light of wavelength ( $\lambda$ ) is refracted from a thin film. 8
- b) How will you determine the refractive index of liquid by using Newton's Ring. 4
- c) Circular bright fringes are observed in Michelson's interferometer with light of wavelength 5896 Å. If the path difference between the mirrors is 0.3 cm. the central fringe is bright. Calculate the angular diameter of the seventh bright fringe. 4

**OR**

- e) Explain the necessary theory of Fraunhofer diffraction at a single slit. Draw the intensity distribution curve and obtain an expression for the width of the central maximum. 8
- f) Describe the resolving power of prism. 6
- g) Plane transmission diffraction grating has 40,000 lines & grating elements is  $12.5 \times 10^{-5}$  cm. Calculate maximum resolving power for which it can be used in the range of wavelength 5000 Å. 2

**Either:**

3. a) Drawing the Cross-section view of SLR camera? Explain each parts in details? Also state the advantages & disadvantages of SLR. 8
- b) Explain: 8
- i) Magnifying glass ii) Photo camera

**OR**

- e) Obtain the equation for magnifying power of compound microscope by explaining the construction and working of it. 8
- f) What is Binocular? Explain in details how Binocular works. 8

**Either:**

4. a) What is holography? With neat diagram explain how the holograph image is reconstructed. 8
- b) Explain the principle & working of Fluoroscopy. 8

**OR**

- e) Explain the term 'Optical Fibre'? Describe the various type of optical fibre. 8
- f) With neat and well labelled diagram, explain the principle & working of x-ray image production. 8

5. Answers all the followings.

- a) Explain chromatic aberration & its type in details. 4
- b) Give the principle, construction & working of Nicol Prism. 4
- c) Explain : 4
- i) Jeweler's glass ii) Eye glass
- d) Calculate numerical aperture and acceptance angle of optical fibre? Refractive index of optical core = 1.62 & Refractive index of cladding = 1.52, 4

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