



## Avinashilingam Institute for Home Science and Higher Education for Women

Deemed to be University Estd. u/s 3 of UGC Act 1956, Category 'A' by MHRD (now MoE)

Re-accredited with 'A++' Grade by NAAC. CGPA 3.65/4, Category I by UGC

Coimbatore - 641 043, Tamil Nadu, India

### Bachelor's Degree Examination – May 2025

#### II Semester

Class : I UG / 2023 Batch

Major : Optometry

Time: 3 Hours

Max. Marks: 100

### 22BOPC09 Geometric Optics II

#### Course outcomes:

On the successful completion of the course, students will be able to

- CO1. To comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the human body.
- CO2. To learn about the muscles and glands of human body.
- CO3. To discuss the mechanics of blood supply and its relationship to organs.
- CO4. To comprehend the anatomy of head and neck.
- CO5. To inspect the anatomy of nervous system and cranial nerves.

#### Part A

10 x 1 = 10

#### Choose the Correct Answer

1. The reflected images from the front and back surfaces of the crystalline lens of the eye are called  
a. Purkinje images  
b. Eigen images  
c. Foucault images  
d. Tscherning images  
CO1 K1
2. Spherical equivalent of  $-6.00 \times 90 = \dots\dots\dots$   
a. +3.00 DS  
b. -3.00 DS  
c. -6.00 DS  
d. +6.00 DS  
CO1 K3
3.  $\dots\dots\dots$  is the image of the field stop formed by all optical elements before.  
a. Exit pupil  
b. Entrance Pupil  
c. Exit window  
d. Entrance window  
CO2 K1
4.  $\dots\dots\dots$  ray from an object point passes through the axial point in the plane of the entrance pupil.  
a. Chief ray  
b. marginal ray  
c. Skew ray  
d. Paraxial ray  
CO2 K1
5. Chromatic aberration can be eliminated by using  $\dots\dots\dots$  lens.  
a. Cylindrical  
b. Bifocal  
c. Achromatic  
d. Concave  
CO3 K2
6. Distortion is an example of  $\dots\dots\dots$  aberration.  
a. chromatic  
b. spherical  
c. seidal  
d. comatic  
CO3 K2
7. Keplerian telescopes are often referred to as  $\dots\dots\dots$   
a. Reflecting  
b. Refracting  
c. Astronomical  
d. Terrestrial  
CO4 K2
8. Length of compound microscopes is  $\dots\dots\dots$   
a. Equal to the focal length of the objective lens  
b. Equal to the focal length of the eyepiece lens  
c. The sum of the focal lengths of the objective and eyepiece  
d. Independent of the focal lengths  
CO4 K2
9. The axial length of the eye as per Gullstrand Schematic eye is  $\dots\dots\dots$   
a. 24mm  
b. 20mm  
c. 25mm  
d. 22mm  
CO5 K2
10. Refractive index of aqueous given by Gull Strand is  $\dots\dots\dots$   
a. 1.25  
b. 1.33  
c. 1.50  
d. 1.45  
CO5 K2

**Part B****5 x 6 = 30****Answer ALL questions****Each answer should not exceed 400 words or two pages**

- 11.a. Two different cylindrical lenses are placed in front of a beam of parallel light, but one lens is concave and the other is convex. Predict and compare how the light will behave in both cases. CO1 K4  
(or)
- 11.b. Briefly explain the principal defects present in the images formed by spherical lenses. CO1 K2
- 12.a. Compare and contrast the role of the aperture stop and field stop in an optical system. How would changing these affect the brightness and clarity of an image? CO2 K4  
(or)
- 12.b. You are given the task of improving the performance of a microscope. How would you modify aperture and pupil to enhance image contrast and depth of field? CO2 K5
- 13.a. A high-resolution telescope captures blurred images despite having a large aperture. Upon investigation, it is found that the issue is due to aberrations. Identify possible types of aberrations responsible and suggest how they can be minimized. CO3 K2  
(or)
- 13.b. Distinguish between ray aberrations and wave front aberrations. CO3 K2
- 14.a. You are given two optical instruments: a telescope and a microscope. How would you modify their optical arrangements if you wanted to convert one into the other? CO4 K5  
(or)
- 14.b. Compare the working principles of a reflecting telescope and a refracting telescope. CO4 K4
- 15.a. How does the accommodation mechanism of the human eye relate to Gullstrand's model? CO5 K2  
(or)
- 15.b. Gullstrand's schematic eye with a reduced eye model. What are the advantages and limitations of using a more complex model like Gullstrand's for optical calculations? CO5 K4

**Part C****5 x 12 = 60****Answer ALL questions****Each answer should not exceed 800 words or four pages**

- 16.a. Describe image formation in cylindrical lenses. Explain CLC and spherical equivalent. CO1 K4  
(or)
- 16.b. Discuss interval of Sturm and CLC spherocylindrical lens notations. CO1 K2
- 17.a. Explain Entrance and exit pupil. Discuss depth of focus and depth of field. CO2 K4  
(or)
- 17.b. Distinguish between pincushion distortion and barrel shaped distortion. How these defects can be removed. CO2 K2
- 18.a. Define chromatic aberration. Describe various methods of elimination of it. CO3 K1  
(or)
- 18.b. Describe monochromatic aberrations and ways to minimise them. CO3 K1
- 19.a. Summarize various types of telescopes. CO4 K4  
(or)
- 19.b. Define entrance and exit pupil. Explain advantages and disadvantages of microscopes. CO4 K1
- 20.a. Draw Gullstrand's schematic eye and explain power calculation of optical components. CO5 K4  
(or)
- 20.b. Explain about refractive errors. CO5 K4

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