2025/11

SET A

BACHELOR OF OPTOMETRY
FIRST SEMESTER (REPEAT)
GEOMETRICAL OPTICS
BOP-101

[USE OMR SHEET FOR OBJECTIVE PART]

Duration: 3 hrs. **Full Marks: 70**

Objective

Time: 30 mins. **Marks: 20**

Choose the correct answer from the following: ***1×20=20***

1. Which component of the eye is most responsive to light and provides broad vision in dim lighting?
   a. Rods b. Cones
   c. Choroid d. Sclera

2. The condition where the eye's lens becomes milky and loses transparency is termed as:
   a. Cataract b. Myopia
   c. Hypermetropia d. Presbyopia

3. For magnifying small print in a dictionary, which lens would be ideal to use?
   a. A convex lens of focal length 50 cm b. A concave lens of focal length 50 cm
   c. A convex lens of focal length 5 cm d. A concave lens of focal length 5 cm

4. Power of a convex and concave lens:
   a. Positive, Negative b. Both Positive
   c. Both Negative d. Negative, Positive

5. What is the size of human eye?
   a. 1 cm b. 2.3 cm
   c. 3.8 cm d. 4.5 cm

6. For shaving or make-up purposes, which mirror would you choose?
   a. Plane mirror b. Concave mirror
   c. Convex mirror d. None of these

7. The process by which white light splits into seven colours on passing through a prism is termed as:
   a. Reflection b. Interference
   c. Diffraction d. Dispersion

8. Among the following colours, the maximum deviation in a prism is suffered by:
   a. Blue b. Yellow
   c. Green d. Orange

9. Find the magnification of a convex lens that produces an image that is twice the size of the object:
   a. 2 b. -2
   c. ½ d. - ½

10. Iris regulates the quantity of incident light by reducing or enlarging the aperture of the:
    a. Cornea
    b. Lens
    c. Pupil
    d. Retina

11. What is the expression for the angle of deviation (δ) of a prism having refractive index μ, assuming the prism angle A is small?
    a. $\delta = \left(\frac{\mu - 1}{\mu + 1}\right)A$
    b. $\delta = (\mu - 1)A$
    c. $\delta = \frac{\text{Sin}\left(\frac{A + \delta}{2}\right)}{\text{Sin}\left(\frac{A}{2}\right)}$
    d. $\delta = (\mu + 1)A$

12. For a prism having prism angle 60° and refractive index √2, a light ray experiences minimum deviation. Find the angle of incidence.
    a. 70^0
    b. 0^0
    c. 45^0
    d. 60^0

13. If the image formed by a mirror is always erect irrespective of the distance, which mirror does this describe?
    a. Only plane
    b. Only concave
    c. Only convex
    d. Either plane or convex

14. When two plane mirrors are set at an angle of 40° facing each other and an object lies between them, how many images are seen?
    a. 5
    b. 7
    c. 9
    d. 3

15. A light ray makes an angle of 70° with its reflected ray. What is the value of the angle of incidence?
    a. 45^o
    b. 30^o
    c. 55^o
    d. 35^o

16. The refractive index of Human Eye lens is:
    a. 1.003
    b. 1.35
    c. 1.42
    d. 1.67

17. Human Eye construct the .....image at the retina.
    a. Direct
    b. Inverted
    c. Blurry
    d. Blind

18. The sign convention of focal length of concave mirror is:
    a. Positive
    b. Negative
    c. Zero
    d. Infinity

19. The component of the eye responsible for adjusting light intake is called:
    a. Sclera
    b. Cornea
    c. Iris
    d. Pupil

20. The condition in which faraway objects look unclear is known as:
    a. Cataract
    b. Myopia
    c. Hypermetropia
    d. Presbyopia

-- --- --

Descriptive

Time : 2 hr. 30 mins. Marks : 50

[Answer question no.1 & any four (4) from the rest]

1. Derive the relation $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$. 5+2+3=10

   A concave mirror of focal length 15 cm has an object 4 cm tall placed 25 cm in front of it. Where should the screen be placed to get a sharp image, and what will be the image's nature and size?

2. a) A myopic person has a far point 80 cm from the eye. Determine the type and power of the lens needed to correct this defect. 5+5=10

   b) Reena is unable to read a book placed closer than 100 cm from her eyes. Identify the eye defect and calculate the power of the corrective lens required. (Assume the near point of a normal eye is 25 cm.)

3. What are the common refractive defects of the human eye? Explain the defect called *Myopia* (near-sightedness) and describe how it can be corrected. 4+6=10

4. An object 2.0 cm in height is positioned 15 cm away from a convex lens whose focal length is 10 cm. Determine the image characteristics — its position, size, nature and find the magnification produced. 3+2+2+3=10

5. Derive the relationship between focal length, refractive index and radii of curvature for a convex lens. 10

6. Draw a neat and labelled diagram of the human eye, naming its various parts. State the function of each part, and illustrate how the human eye forms an image on the retina. 5+3+2=10

7. Explain the phenomenon of refraction of light through a prism and derive the relation $\delta = (\mu - 1)A$, where the symbols have their usual meanings. 4+6=10

8. Define the reflection of light. State the laws governing reflection and describe the characteristics of the image formed by a plane mirror. 2+2+6=10

= = *** = =