2024/12

SET A

BACHELOR OF OPTOMETRY
FIRST SEMESTER
GEOMETRICAL OPTICS
BOP-101

[USE OMR SHEET FOR OBJECTIVE PART]

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

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

(Objective)

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

1. Angle of deviation (δ) for a prism (refractive index μ and supposing prism angle A to be small) is given by:
   a. $\delta = \left(\frac{\mu-1}{\mu+1}\right)A$
   b. $\delta = (\mu - 1)A$
   c. $\delta = \frac{\sin\left(\frac{A+\delta}{2}\right)}{\sin\left(\frac{A}{2}\right)}$
   d. $\delta = (\mu + 1)A$

2. A ray of light incident on a 60^0 angled prism of refractive index $\sqrt{2}$ suffers minimum deviation. The angle of incidence is:
   a. 70^0
   b. 0^0
   c. 45^0
   d. 60^0

3. No matter how far you stand from a mirror, your image appears erect. The mirror is likely to be:
   a. Only plane
   b. Only concave
   c. Only convex
   d. Either plane or convex

4. If two plane mirrors are placed at an angle 40^o facing towards each other and an object is placed in between them then the number image formed is:
   a. 5
   b. 7
   c. 9
   d. 3

5. The angle between incident ray and reflected ray is 70^o. What is the angle of incidence?
   a. 45^o
   b. 30^o
   c. 55^o
   d. 35^o

6. What type of mirror will you prefer for shaving or make-up?
   a. Plane mirror
   b. Concave mirror
   c. Convex mirror
   d. None of these

7. The splitting of white light into seven colours on passing through the prism is:
   a. Reflection
   b. Interference
   c. Diffraction
   d. Dispersion

8. Which of the following colours suffers maximum deviation in a prism?
   a. Blue
   b. Yellow
   c. Green
   d. Orange

9. A convex lens produces an image that is twice the size of the object, what is magnification?
   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. Which among the following is highly sensitivity to light and enable wide-angle vision at low levels of illuminance?
   a. Rods
   b. Cones
   c. Choroid
   d. Sclera

12. The defect in eye in which the crystalline lens becomes milky and cloudy is known as:
   a. Cataract
   b. Myopia
   c. Hypermetropia
   d. Presbyopia

13. Which of the following lenses would you prefer to use while reading small letters found in a dictionary?
   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

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

15. Size of a human eye is about:
   a. 1 cm
   b. 2.3 cm
   c. 3.8 cm
   d. 4.5 cm

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. What is the focal length of concave mirror?
   a. Positive
   b. Negative
   c. Zero
   d. Infinity

19. The part of the eye that helps to regulate or adjust exposure of light in to eye is:
   a. Sclera
   b. Cornea
   c. Iris
   d. Pupil

20. Which of the following makes faraway objects to appear blurry to the eye?
   a. Cataract
   b. Myopia
   c. Hypermetropia
   d. Presbyopia

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(Descriptive)

Time : 2 hr. 30 mins. **Marks : 50**

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

1. Derive the lens formula $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$. An object 4 cm in size, is placed at 25 cm in front of a concave mirror of focal length 15 cm. At what distance from the mirror, should a screen be placed in order to obtain a sharp image? Find the nature and size of the image. 5+2+3=10

2. Describe the phenomenon of refraction through a prism. Prove that $\delta = (\mu - 1)A$, where the symbols have their usual meanings. 4+6=10

3. Derive the relation for a convex lens 10

$$\frac{1}{f} = \left(\frac{n_l}{n_m} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

4. A 2.0 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 10 cm. The distance of the object from the lens is 15 cm. Find the nature, position, and size of the image. Also find its magnification. 3+2+2+3=10

5. What are the common refractive defects of vision? Discuss Myopia or Near-Sightedness, and how it is corrected. 4+6=10

6. Draw the structure of a human eye and mention the parts. Write the functions of each part. Diagrammatically show Human eye constructs an image at retina. 5+3+2=10

7. What do you mean by reflection of light? State the laws of reflection. Mention the properties of image formed by a plane mirror. 2+2+6=10

8. a) The far point of a myopic person is 80 cm in front of the eye. What is the nature and power of the lens required to correct the defect? 5+5=10
   b) Veena cannot read a book held closer than 100 cm. Name the eye defect and prescribe a corrective lens of suitable power (Near point for normal eye is 25 cm).

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