CBSE Test Paper-02

Chapter 11 Human Eye and the Colourful World

1. What is the observed colour of sky as seen from the moon surface? **(1)**

    a. Black
    b. Blue
    c. Red
    d. None of these.

2. The far point of a healthy person is **(1)**

    a. 0.15m
    b. Infinity
    c. 100m.
    d. 15cm

3. The muscles of the iris control the **(1)**

    a. Optic nerve
    b. Shape of the crystalline lens
    c. Focal length of the eye-lens
    d. Opening of the pupil

4. Ability of the eye lens to adjust its focal length is called **(1)**

    a. Accommodation
    b. None of these
    c. Power
    d. Adjustment

5. The lateral displacement of an incident ray passing out of a rectangular glass slab **(1)**

    a. independent of the thickness of the glass slab
    b. None of these
    c. is directly proportional to the thickness of the glass slab

d. inversely proportional to the thickness of the glass slab

6. What is the function of rods on the retina ? **(1)**

7. What is the function of sclerotic in human eye ? **(1)**

8. What is the relation between intensity of scattered light and its amplitude? **(1)**

9. How is the sense of vision carried from the eye to the brain? **(1)**

10. Why are we not able to see the object clearly for some time when we enter bright light to a room with dim light ? **(3)**

11. i. Why does the power to see near objects as well as far off objects clearly diminish with age? Name the defects that are likely to arise in eye in such a condition.
    ii. The far point of a myopic eye is 60 cm. Find the focal length of the lens used to correct it. **(3)**

12. Explain why the planets do not twinkle? **(3)**

13. A student has difficulty in reading the blackboard while sitting in the last row. What could be the defect the child is suffering from? How could it be corrected? **(3)**

14. A 14 year old student is not able to see clearly the questions written of the black board placed at a distance of 5 m from him. **(5)**

    a. Name the defect of vision he is suffering from?
    b. Draw the diagram to show this defect?
    c. Name the type of lens used to correct this defect?
    d. Name two possible cause of this defect.
    e. Draw the diagram to show how this defect can be corrected.

15. The near point of a hypermetropic eye is 1 m. What is the power of the lens required to correct this defect? Assume that the near point of the normal eye is 25 cm. **(5)**

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Answers

1. a. Black

   Explanation: The sky appears blue due to scattering of the blue colour by the earth's atmosphere. In moon there is no atmosphere hence nothing to scatter light. Thus, the sky appears dark as seen from the moon surface.

2. b. Infinity

   Explanation: The far point is infinity for normal eye. It is the farthest point upto which the eye can see object clearly.

3. d. Opening of the pupil

   Explanation: The pupil of an eye provide a variable aperture, whose size is controlled by iris

   a. When the light is bright: Iris contracts the pupil, so that less light enters the eye.
   b. When the light is dim: Iris expand the pupil, so that more light enters the eye. Pupil open completely, when iris is relaxed.

4. a. Accommodation

   Explanation: The ability of the eye to focus both near and distant objects, by adjusting the focal length of the eye lens, is called the accommodation of the eye.

5. c. is directly proportional to the thickness of the glass slab

   Explanation: The lateral displacement of an incident ray passing out of a rectangular glass slab is directly proportional to the thickness of glass slab, angle of incidence, and refractive index however it is inversely proportional to the wavelength of incident light.

6. Rods are sensitive to light. More the intensity of light, more are they excited.

7. Sclerotic is to provide a solid shape to eye and protect it from external injuries.
8. The intensity of scattered light is directly proportional to the square of the amplitude

a. of scattered light, i.e $I \propto a^2$ means greater the amplitude greater will be intensity of refraction and vice versa.

9. Optic nerves carry sensation of vision from eye to brain.

10. The pupil of the eye acts as a variable aperture whose size can be varied with the help of the iris. When the light is very bright, the iris contracts the pupil to allow less light to enter the eye. However in dim light the iris expands the pupil to allow more light to enter the eye. When we enter from a bright light area to a dim light area, the pupil is not able to expand quickly to allow more light into the eye. We are therefore not able to see the objects in dim light room momentarily.

11. i. The defects arise due to the gradual weakening of the ciliary muscles which is used to change the shape of lens in eye to help foccusing. Its weaking leads to decreased flexibility of the eye lens. Sometimes, a person may suffer from both myopia and hypermetropia. This condition of defect is called presbyopia. Such people often require bi-focal lenses to correct this defect.

ii. Using lens formula, $\frac{1}{v} - \frac{1}{u} = \frac{1}{f} \Rightarrow \frac{1}{(-60)} = \frac{1}{f}$

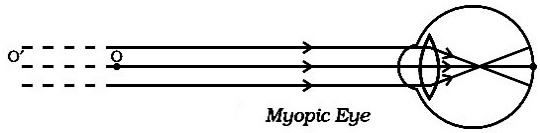
[given, v = -60 cm , u = ∞]

f = -60 cm. Thus, the lens used will be concave or diverging lens as the focal length is negative.

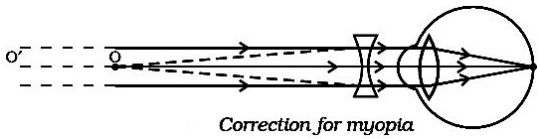
12. As Planets can be considered as a collection of a large number of point-size sources of light, Planets do not twinkle because they appear larger in size than the stars as they are relatively closer to earth. The different parts of these planets produce either brighter or dimmer effect in such a way that the average of brighter and dimmer effect is zero. Hence, the twinkling effects of the planets are nullified and they do not twinkle.

13. The student has difficulty in reading the blackboard in the last row implies that the student has difficulty in seeing the distant objects. This type of defect where a person cannot see beyond certain distance is called myopia. It could be corrected by wearing concave lens of suitable power.

14. a. The student is suffering from myopia.

b. 

c. Concave lens
   i. Decrease in the focal length of the eye lens
   ii. Eye ball gets elongated.

d. 

15. Here, u = - 25 cm (Normal near point)
    v = -1 m = -100 cm (Near point of defective eye)
    f=?
    Using lens formula,
    $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$
    or $\frac{1}{-100} - \frac{1}{-25} = \frac{1}{f}$
    or $-\frac{1}{100} + \frac{1}{25} = \frac{1}{f}$
    or $\frac{-1+4}{100} = \frac{1}{f}$
    or f = $\frac{100}{3}$ = 33.3 cm
    Thus, the convex lens of focal length +33.3 cm is required to correct defect.
    Here, f = 33.3 cm or 0.33 m
    Now, Power P = $\frac{1}{f(in\ m)}$
    $\frac{1}{+0.33}$ = +3.0 D
    Thus, the convex lens of power +3.0 D is required.