OPEN STUDENT FOUNDATION
STD 10 : SCIENCE
IMPORTANT QUESTION DAY 10

CHAPTER:10 | Date : 27/02/24
Total Marks : 25 | Time : 1 h

Section A

● **Write the answer of the following questions. [Each carries 1 Mark]** **[20]**

1. A doctor suggest a lens of + 2.5 D power for defect of eye, then this person have ..... type of defect of eye.
2. In prism, emergent ray makes an angle with incident ray, this angle is known as .....
3. In myopia, image of object is formed ..... retina.
4. The sunset is visible to us about 2 minute ..... the actual sunset.
5. The planets act as ..... sources of light.
6. In myopia one cannot see nearby object clearly.
7. The reflection of the object forms upside down on the cornea of the eye, which is reversed by the brain.
8. Small droplet of rain act as convex lens.
9. The structure of the human eye can be compared to a camera to some extent.
10. Myopia is said to be caused when the light rays from a far away object falls at a distance just before the retina.
11. The human eye form the image of an object at its .....
    (A) Crystalline lens (B) Iris (C) Retina (D) Cornea
12. Where image is formed in the eye of person with myopia ?
    (A) On retina (B) Region behind retina
    (C) Region infront of retina (D) On iris
13. The phenomenon of light responsible for the working of the human eye is .....
    (A) reflection (B) refraction
    (C) power of accommodation (D) persistance of vision
14. The amount of light entering the human eye is controlled by .....
    (A) ciliary (B) Iris (C) cornea (D) pupil
15. Which phenomenon is responsible for twinkling of stars ?
    (A) Atmospheric reflection (B) Atmospheric refraction
    (C) Reflection (D) Total internal reflection
16. Name the light sensitive part of the eye where image of an object is formed.
17. Write the function of crystalline lens in the human eye.
18. What are light sensitive cells ?
19. By which the amount of light entering the eye is controlled ?
20. In transparent medium which colour has maximum velocity ?

Section B

● **Write the answer of the following questions. [Each carries 2 Marks]** **[18]**

21. Why don't the Planets twinkle ?
22. Why does dispersion take place when white light is passed through prism ?

23. What is cataract of an eye ?

24. The image formed on retina is inverted but we see the object erect. Why ?

25. Why do birds fly back to their nest early in the evening ?

26. Why do you take time to see objects when you enter a dim lighted room from outside in the Sun ?

27. Why are two eyes more helpful for us to see as compare to one ?

28. Why does a ray of light splits into seven colours on passing through a glass prism ?

29. A person needs a lens of power –5.5 dioptres for correcting his distant vision. For correcting his near vision he needs a lens of power +1.5 dioptre. What is the focal length of the lens required for correcting (i) distant vision and (ii) near vision ?

Section C

● **Write the answer of the following questions. [Each carries 3 Marks]** **[18]**

30. Write the short note on Presbyopia.

31. Write the difference between Myopia and Hypermetropia.

32. Write short note on rainbow.

33. What is meant by scattering of light ?

34. Explain Tyndall Effect.

35. Why is the colour of the clear sky blue ?

Section D

● **Write the answer of the following questions. [Each carries 4 Marks]** **[4]**

36. Draw a human eye and explain the function of each part of it.

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Section A

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1. A doctor suggest a lens of + 2.5 D power for defect of eye, then this person have ..... type of defect of eye.

➠ hypermetropia

2. In prism, emergent ray makes an angle with incident ray, this angle is known as .....

➠ angle of deviation

3. In myopia, image of object is formed ..... retina.

➠ in front of

4. The sunset is visible to us about 2 minute ..... the actual sunset.

➠ after

5. The planets act as ..... sources of light.

➠ point

6. In myopia one cannot see nearby object clearly.

➠ False

7. The reflection of the object forms upside down on the cornea of the eye, which is reversed by the brain.

➠ True

8. Small droplet of rain act as convex lens.

➠ False

9. The structure of the human eye can be compared to a camera to some extent.

➠ True

10. Myopia is said to be caused when the light rays from a far away object falls at a distance just before the retina.

➠ True

11. The human eye form the image of an object at its .....
(A) Crystalline lens (B) Iris (C) Retina (D) Cornea

Ans. (C) Retina

12. Where image is formed in the eye of person with myopia ?
(A) On retina
(B) Region behind retina
(C) Region infront of retina
(D) On iris

Ans. (C) Region infront of retina

13. The phenomenon of light responsible for the working of the human eye is .....
(A) reflection
(B) refraction
(C) power of accommodation
(D) persistance of vision

Ans. (B) refraction

14. The amount of light entering the human eye is controlled by .....
(A) ciliary (B) Iris (C) cornea (D) pupil

Ans. (B) Iris

15. Which phenomenon is responsible for twinkling of stars ?

(A) Atmospheric reflection (B) Atmospheric refraction

(C) Reflection (D) Total internal reflection

Ans. (B) Atmospheric refraction

16. Name the light sensitive part of the eye where image of an object is formed.

➠ Retina

17. Write the function of crystalline lens in the human eye.

➠ The crystalline lens provides the proper focal length required to focus objects at different distances on the retina.

18. What are light sensitive cells ?

➠ Rods and cones.

19. By which the amount of light entering the eye is controlled ?

➠ Iris

20. In transparent medium which colour has maximum velocity ?

➠ Red

Section B

● **Write the answer of the following questions.** [Each carries 2 Marks] **[18]**

21. Why don't the Planets twinkle ?

➠ The Planets are much closer to the earth and are thus seen as extended sources.

➠ If a planet is considered as a collection of a large number of point-sized source of light, the total variation in the amount of light entering our eye from all the individual point-sized sources will average out to zero, thereby nullifying the twinkling effect.

22. Why does dispersion take place when white light is passed through prism ?

➠ Different wavelength of rays have different colours and rays of all wavelengths (colours) have same velocity in vacuum.

➠ The velocity of rays of different colours are different when they pass through prism and hence from absolute refractive index $n = \frac{c}{v}$ or $\frac{\lambda}{\lambda'}$, they bend through different angles. As a result white light is dispersed.

➠ The red light bends the least while the violet the most. All other colours are between these two. Thus the rays of each colour emerge along different paths and thus become distance. It is the bands of distinct colour which is known as spectrum. In spectrum there are bands of different colours.

23. What is cataract of an eye ?

➠ The crystalline lens of people at old age becomes milky and cloudy. This condition is called cataract.

➠ This causes partial or complete loss of vision. It is possible to restore vision through a cataract surgery.

24. The image formed on retina is inverted but we see the object erect. Why ?

➠ The image formed on retina is inverted, as this image is formed on the light sensitive cells called rods and cones of the retina which generates electrical signals.

➠ This signal reaches brain via optic nerve. It is the brain that interprets this image and processing the image it helps in perceiving objects as they are.

25. Why do birds fly back to their nest early in the evening ?

➠ Birds lack light sensitive cells called rods, due to lack of these cells they cannot see the objects clearly in less / dim light. Therefore birds fly back to their nest early in the evening.

26. Why do you take time to see objects when you enter a dim lighted room from outside in the Sun ?

➠ In the sunlight the size of pupil is small but when one enters the dim light room, it takes sometime for iris to adjust the size of pupil and the light sensitive cells to get activated.

27. Why are two eyes more helpful for us to see as compare to one ?

➠ Two eyes are more helpful as one eye gives a view of 150° angle. Whereas two eyes increases the view by making it wider to 180° angle. Two eyes also helps to see the objects in dim light or darkness clearly. Two eyes gives stereoscopic vision helping us to assess the depth of vision.

28. Why does a ray of light splits into seven colours on passing through a glass prism ?

➠ When light rays enter the glass prism the angle at which it bends makes the light split into its seven component because the speed of each component of light is different and due to which every component bends at different angle.

29. A person needs a lens of power –5.5 dioptres for correcting his distant vision. For correcting his near vision he needs a lens of power +1.5 dioptre. What is the focal length of the lens required for correcting (i) distant vision and (ii) near vision ?

➠ Focal length of lens $f = \frac{1}{P}$

(i) For distant vision, concave lens is required for correcting the myopia.

$\therefore f = \frac{1}{P} = \frac{1}{-5.5} = -0.1818 \text{ m} \approx -18.2 \text{ cm}$

(ii) For near vision, concave lens is required for correcting the hypermetropia.

$f = \frac{1}{P} = \frac{1}{1.5} = 0.666 \text{ m} \approx 66.7 \text{ cm}$

Section C

● **Write the answer of the following questions.** [Each carries 3 Marks] **[18]**

30. Write the short note on Presbyopia.

➠ The power of accommodation of the eye decreases with ageing.

➠ For most people, the near point recedes away. They find it difficult to see near by objects comfortably and distinctly without corrective eye-glasses. This defect is called Presbyopia.

➠ It arises due to the gradual weakening of the ciliary muscles and diminishing flexibility of the eye lens.

➠ A person may suffer from both myopia and hypermetropia. Such people require bi-focal lenses.

➠ A common type of bi-focal lenses consists of both concave and convex lenses. The upper portion consists of a concave lens. If facilitates distant vision. The lower part is a convex lens. It facilitates near vision.

➠ These days, it is possible to correct the refractive defects with contact lenses or through surgical interventions.

31. Write the difference between Myopia and Hypermetropia.

➠

Myopia	Hypermetropia
(1) In Myopia a person cannot see the far object clearly but can see the near object clearly.	(1) In hypermetropia a person cannot see the near by object clearly but can see the far object clearly.
(2) This is caused when the light rays from a far away object falls at a distance just before the retina.	(2) This is caused when the light rays from a nearby object falls at a distance behind the retina.
(3) The lens of eye do not become thin according to the requirement but remain thick.	(3) The lens of eye do not become thick according to requirement but remain thin.
(4) This defect is seen in small aged person.	(4) This defect is seen in older aged person
(5) It can be treated by using concave lenses of suitable power.	(5) It can be treated by using convex lenses of suitable power.

32. Write short note on rainbow.

➠ In the presence of sunlight in the morning or in the evening when it is raining a natural spectrum appears in the sky in the opposite direction of sun. It is called rainbow.

➠ It is caused by dispersion of sunlight by tiny water droplets present in the atmosphere which acts as a prism. Water droplets refract and disperse the incident sunlight then reflect it internally and finally refract it again when it comes out of the raindrop. Then sunlight is divided into seven different colours and create rainbow.

➠ Hence during night or in noon time rainbow cannot be formed.

33. What is meant by scattering of light ?

➠ When beam of light incident on the molecular atoms or particles of dimension which is in the wavelength range of white light absorbs light at first then they throw the light in various direction. This is called scattering of light.

➠ Hence, light rays instead of advances in completely original path, its partial parts are seen in other direction. This phenomenon is called **scattering of light.**

➠ Some wonderful phenomenon are seen due to scattering of light these are as below :

- Blue colour of the sky,
- Colour of water in deep sea,
- The reddening of the sun at sunrise and the sunset.

➠ The path of a beam of light passing through a true solution is not visible but it can be visible through a colloid solution where the size of the particles is larger.

➠ The colours of scattered light depend on the dimension (size) of particles.

➠ Very fine particles **scatter mainly blue light** while particles of larger size scatter light of longer wavelengths.

➠ If the size of the scattering particles is large enough, then the scattered light may even appear white.

34. Explain Tyndall Effect.

➠ The earth's atmosphere is a mixture of minute particles. These particles includes smoke, tiny water droplets, suspended particles of dust and molecules of air.

➠ When a beam of light strikes fine particles, the path of the beam becomes visible, because the light reaches us after being reflected (scattered) by these particles.

➠ The phenomenon of scattering of light by the colloidal particles give rise to Tyndall effect.

➠ This phenomenon is seen when a fine beam of sunlight enters a smoke-filled room through a small hole.

➠ This effect can be observed when sunlight passes through a canopy of a dense forest because tiny water droplets is in the mist scatter light.

➠ The blue colour seen in the smoke emitted due to the burning of engine oil of motorcycle is an account of Tyndall effect.

➠ Tyndall effect is applicable to determine the dimension of colloidal particles and density of particles in aerosols.

35. Why is the colour of the clear sky blue ?

➠ The molecules of air and other fine particles in the atmosphere have smaller size than the wavelength of visible light.

➠ These are scattering light of shorter wavelength at the blue end than light of longer wavelengths at the red end.

➠ The red light has a wavelength about 1.8 times greater than blue light.

➠ When sunlight passes through the atmosphere, the fine particles in air scatter the blue colours more strongly than red. The scattered blue light enters our eyes. Hence sky would have looks blue.

➠ If the earth had no atmosphere, there would not have been any scattering. Then, the sky would not have looked dark.

➠ The sky appears dark to passengers flying at very high altitudes as scattering is not prominent at such heights.

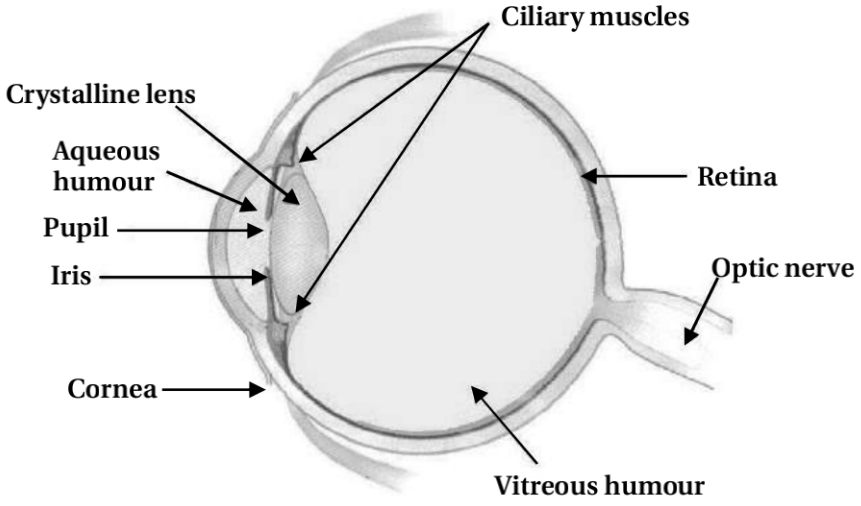
Section D

● **Write the answer of the following questions.** [Each carries 4 Marks] **[4]**

36. Draw a human eye and explain the function of each part of it.

➠ The human eye is like a camera.

➠ The human eye and its important parts are shown as in below figure.



The Human Eye

➠ **Parts of eyes :** Crystalline lens, Cornea, Iris, Pupil, Ciliary muscles, Retina.

- **Crystalline lens :** Behind the iris is a double convex lens made of transparent and flexible tissue.
- **Cornea :** Thin membrane of eye through which light enters the eye first and gets refracted. It forms the transparent bulge on the front surface of the eyeball.
- The eyeball is approximately spherical in shape with a diameter of about 2.3 cm.
- Most of the refraction for the light rays entering the eye occurs at the outer surface of the cornea.
- **Iris :** It is a dark muscular diaphragm that controls the size of the pupil.
- **Pupil :** Small hole in the iris, that appears black because no light is reflected from it. Pupil regulates and controls the amount of light entering the eye. The iris can change the area-aperture of the pupil.
- **Ciliary muscles :** It holds the lens and can modify the lens focal length. For this it focus the image on the retina by making the lens thin-thick.
- **Retina :** The eye lens forms an inverted and real image of the object on the retina.
- It is a screen in the eye, delicate membrane with lot of light sensitive cells called rods and cones. These cells get activated on illumination and produce electric signals.
- These signals are sent to the brain via the optic nerves. The brain interprets these signals and finally, processes the information so that we perceive the objects as they are.