

CHAPTERWISE QUESTION

HUMAN EYE AND THE COLOURFUL WORLD

CLASS X

Time : 1½ hrs.

SET A

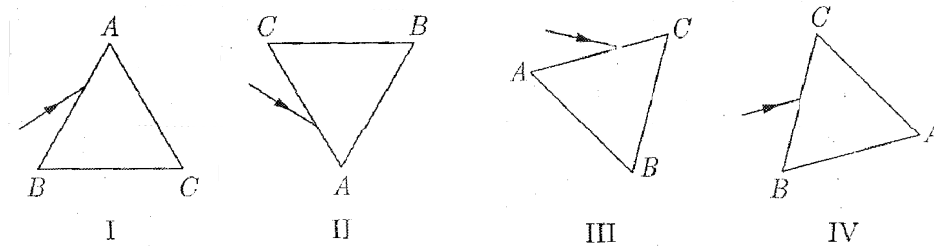
Mark : 40

SECTION - A

8 × 1 = 8

- Twinkling of stars is due to atmospheric
 - dispersion of light by water droplets
 - scattering of light by dust particles
 - internal reflection of light by clouds
 - refraction of light by different layers of varying refractive indices
- At the moment dew formation starts on a cool night, the air
 - Must lose all water vapour
 - Must remain unsaturated
 - Must get mixed up with some out
 - Must become saturated
- The clear sky appears blue, because
 - blue light gets absorbed in the atmosphere
 - ultraviolet radiations are absorbed in the atmosphere
 - violet and blue lights get scattered more than lights of all other colours by the atmosphere
 - light of all other colours is scattered more than the violet and blue colour lights by the atmosphere
- Even in absolutely clear water, a diver cannot see very clearly because
 - rays of lights get diffused
 - velocity of light is reduced in water
 - ray of light passing through the water makes it turbid
 - the focal length of the eye lens in water gets changed and the image is no longer focussed sharply on the retina.
- A student sitting on the last bench can read the letters written on the blackboard but is not able to read the letters written in his text book. Which of the following statements is correct?
 - The near point of his eyes has receded away
 - The near point of his eyes has come closer to him
 - The far point of his eyes has come closer to him
 - The far point of his eyes has receded away
- A glass slab is placed over a page on which the word VIBGYOR is printed with each letter in corresponding colour. Then, which of the following is correct?
 - The images of all the letters will be in the same place as that on paper
 - Letter V is raised more
 - Letter R is raised more
 - None of the above

7. A prism ABC (with BC as base) is placed in different orientations. A narrow beam of white light is incident on the prism as shown in figure. In which of the following cases, after dispersion, the sixth colour from the top corresponds to the colour of the sun?



- a) (I) b) (II) c) (III) d) (IV)
8. A person with a myopic eye cannot see object beyond -1.2m distinctly. The power of the corrective lens used to restore proper vision is
- a) -0.83 D b) -0.92 D c) $+0.21\text{ D}$ d) $+0.91\text{ D}$

In the following questions (No. 9-10) a statement of Assertion followed by a statement of Reason is given. Choose the correct answer out of the following choices. $2 \times 1 = 2$

- a) If both the assertion and the reason are true and the reason is a correct explanation of the assertion.
- b) If both the assertion and reason are true but the reason is not a correct explanation of the assertion.
- c) Assertion is true but reason is false. d) Assertion is false but reason is true.
9. Assertion (A) : A prism can split the incident white light into bands of different colours.
Reason (R) : The different colours of light bend through different angles with respect to the incident rays.
10. Assertion (A) : Rainbow is formed in the sky due to the dispersion of sunlight by water droplets.
Reason (R) : Light of shorter wavelength is scattered much more than the light of longer wavelength.

SECTION - B

11. Why do we see a rainbow in the sky only after rainfall? 2
12. How can change of size of eyeball be one of the reason for: (a) Myopic (b) Hypermetropic
Compare the size of eyeball with that of a normal eye in each case. How does this change of size affect the position of image in each case? 2

OR

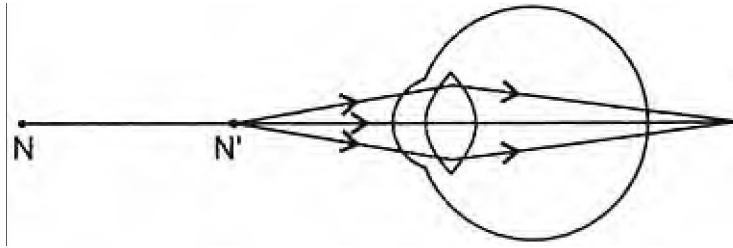
What is meant by least distance of distinct vision? How does this vary between the very young and old people?

13. What is dispersion of light? Name the (i) component of white light that deviates the least, (ii) component of white light that deviates the most, while passing through a glass prism.

2

SECTION - C

14. a) A student is unable to see clearly the words written on the blackboard placed at a distance of approximately 3 m from him. Name the defect of vision the boy is suffering from State the possible causes of this defect and explain the method of correcting it.
- b) Why do stars twinkle? Explain. **3**
15. Study the diagram and answer the questions that follows :



- a) Identify the defect of vision represented by this diagram.
- b) List the two possible causes of this defect.
- c) With the help of ray diagram explain how this defect can be corrected. **3**
16. State the cause of dispersion, when white light enters a glass prism. Explain with a diagram. **3**
17. **Answer the following :** **3**
- a) Which part of the eye controls the amount of light entering the eye?
- b) How is the sense of vision carried from the eye to the brain?
- c) When you enter from a bright sunshine into a dark room, you are not able to see clearly for sometime, why?
18. A person needs a lens of power -4.5 D for correction of her vision.
- a) What kind of defect in vision is she suffering from?
- b) What is the focal length of the corrective lens?
- c) What is the nature of the corrective lens? **3**

SECTION - D

19. What is meant by scattering of light? Mention the factor on which it depends. Explain why the colour of the clear sky is blue? An Astronaut in space finds sky to be dark. Explain reason for this observation. **5**

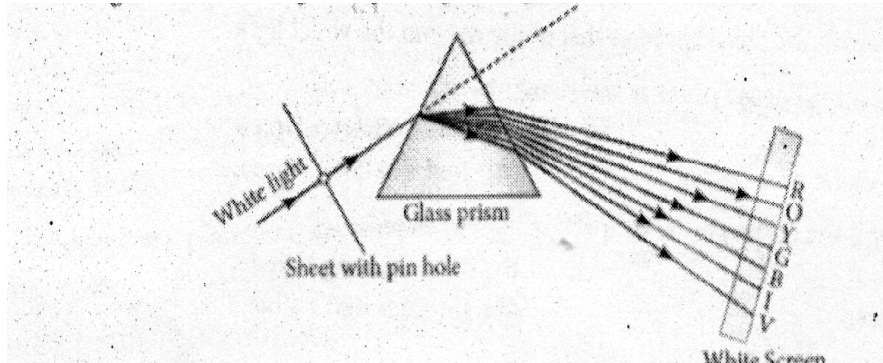
OR

Draw a neat labelled diagram of the structure of the human eye and mention the functions of any four parts.

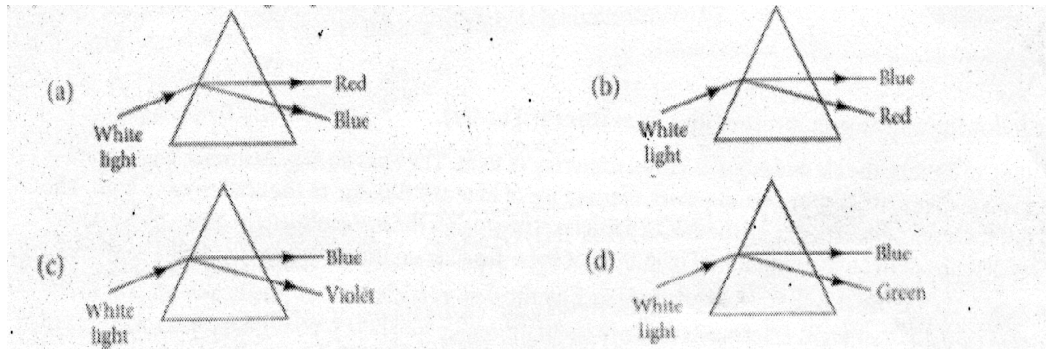
SECTION - E

20. Read the following and answer the questions.

When white light is incident on one refracting surface of the prism, the light splits up into constituent colours. - violet, blue, green, yellow, orange and red. The process of splitting of white light into its seven constituent colours is called dispersion. When the dispersed white light is made to fall on a screen, we get the band of seven colours is called the spectrum of white light. Red colour bends the least on passing through the prism and violet colour through maximum angle on passing through the prism.



- i) The splitting of white light can be done by 1
 a) lens b) prism c) mirror d) none of these
- ii) Which property of light is used by prism to form a spectrum? 1
- iii) Which of the following dispersion is correct? 1



- iv) When a red light passes through a prism, it 1
 a) will not split b) will split into seven colours
 c) will split into white colour d) will split into many different colours

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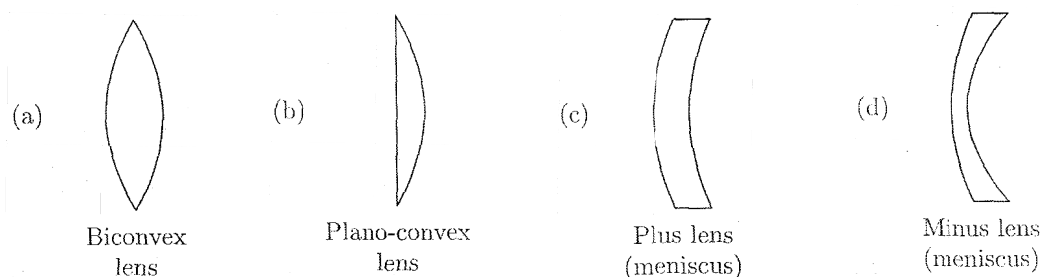
SET B

Mark : 40

SECTION -

8 × 1 = 8

- The angle formed between two refracting surfaces of a prism is:
 - angle of refraction
 - angle of deviation
 - angle of incidence
 - angle of prism
- In the visible spectrum the colour having the shortest wavelength is
 - Green
 - Red
 - Violet
 - Blue
- The splitting of white light into several colours on passing through a glass prism is due to
 - refraction
 - reflection
 - interference
 - diffraction
- When ciliary muscles are relaxed, focal length of eye lens is
 - maximum
 - minimum
 - Neither maximum nor minimum
 - Cannot say
- A person uses a lens of power +3 D to normalise vision. Near point of hypermetropic eye is
 - 1.66 m
 - 0.66 m
 - 0.33 m
 - 1 m
- For a healthy eye, the rays of light entering the eye form a sharp image on retina. For a myopic eye, the rays from distant objects focus in front of the retina forming a blurred image. Which of the following lenses shown below will help to correct myopia?



- Which amongst the given radiation is preferred for taking photographs in fog?
 - Ordinary visible light
 - Infrared
 - Microwave
 - X-rays
- The danger signals installed at the top of tall building are red in colour. These can be easily seen from a distance because among all other colours, the red light.
 - is scattered the most by smoke or fog
 - is scattered the least by smoke or fog

- c) is absorbed the most by smoke or fog
- d) moves fastest in air

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 - b) If both the assertion and reason are true but the reason is not a correct explanation of the assertion.
 - c) Assertion is true but reason is false.
 - d) Assertion is false but reason is true.
9. Assertion (A) : The angle of incidence and the angle of emergence are equal.
Reason (R) : The angle of refraction and the angle of deviation are not equal.
10. Assertion (A) : In case of rainbow, light at the inner surface of the water drop gets internally reflected.
Reason (R) : The angle between the refracted ray and normal to the drop surface is greater than the critical angle.

SECTION - B

11. A child sitting in a classroom is not able to read clearly the writing on the blackboard.
- a) Name the type of defect from which his eye is suffering.
 - b) With the help of a ray diagram show how this defect can be remedied. **2**
12. Sushil went to an eye specialist for check up. He prescribed him to use spectacle lens of + 0.5D power.
- a) Name the defect of vision he is suffering from.
 - b) Find the focal length of spectacle lens. **2**

OR

- a) Explain how a normal human eye is able to see distinctly the object placed at a distance as well as those placed at a nearer distance.
 - b) What is the far point and near point of a normal human eye?
13. Why do we observe the seven colours when white light passes through a glass prism? Which component of white light deviates the least? **2**

SECTION - C

14. A person is unable to read a book clearly when kept at a distance of 25 cm from his eye. Name the defect. How can it be corrected? Draw ray diagrams for (i) defective eye (ii) corrected eye and explain them. **3**

15. State one function each of iris, pupil, and cornea. **3**
16. a) Calculate maximum power of accommodation of a person having normal vision.
b) A person needs to use glasses for reading newspaper. Identify the defect in her vision and the type of lens she would need to correct it.
c) Sometimes when we enter into a dark room from bright sunlight we are unable to see objects clearly. Why? **3**
17. **Answer the following:** **3**
- a) Which liquid fills the space between eye lens and retina?
b) What is the number of receptors contained in the retina?
c) Why can you not see an object clearly if it is placed very close to your eye?
18. How will you use two identical prisms so that a narrow beam of white light incident on one prism emerges out of the second prism as white light? Draw the diagram. **3**

SECTION - D

19. Account for the following:
- a) Part of the human eye that helps in changing the focal length of the eye lens.
b) The condition resulting due to the eye lens becoming cloudy.
c) The factors on which colour of the scattered white light depends.
d) The sky appears dark to the astronauts in the space. **5**

OR

- a) If a person wears lens of power - 6D for distant vision and for correcting his near vision he needs a lens of +2D. Determine the focal length of the lenses in both the case.
b) Give reason for the following natural phenomenon:
i) Stars twinkle
ii) Planets do not twinkle
iii) Stars appear raised in the sky.

SECTION - E

20. **Read the following and answer the questions.**

The band of the coloured components of light beam is called spectrum i.e., VIBGYOR.

The splitting of light into its component colours is called dispersion. The different component colour of light bends at different angle with respect to incident angle, the red light bends the least while the violet bends the most. Isaac Newton was the first, who obtained spectrum of sunlight by using glass prism. He tried to split the spectrum of white

light more by using another similar prism, but he could not get any more colours.

He repeated the experiment using second prism in an inverted position with respect to the first prism.

Allowed all the colours of spectrum to pass through second prism, he found white light merges on the other side of second prism. He concluded that sunlight is made up of seven visible colours.

- i) When white light is passed through a hollow prism then there is - **1**
- a) No dispersion and no deviation b) Only deviation
c) Only dispersion d) Both dispersion and deviation
- ii) When white light passes through the achromatic combination of prism, then what is observed? **1**
- iii) Name the phenomenon is involved in the formation of rainbow. **1**
- a) Reflection, refraction, dispersion
b) Refraction, dispersion and total internal reflection
c) Refraction, dispersion and internal reflection d) None of these
- iv) The colour of sky appears blue. Why? **1**