

VALUE BASED QUESTIONS IN OPTICS - CLASS XII

1. Most of us are fascinated by a stage magician's sensational tricks that appear to make objects and animals suddenly appear (or) disappear. Of course, they do not really appear (or) disappear. The magician requires special skills to make the performance quick and smooth so as to "fool" the audience. It is all done with mirrors.
  - (a) The very first mirror illusion, "The Sphinx", was invented in 1876. What was the role of mirrors?
  - (b) Harry Houdini, the world famous master of illusions, made a 10,000 pound elephant disappear on the stage. The act was called the Vanishing Elephant. How did he accomplish this trick?
  - (c) Draw a simple ray diagram to explain the feat.
2.
  - (a) What is a corner cube reflector and what is its important property?
  - (b) Apollo astronauts who visited the Moon left a number of corner cube reflectors on its surface. Why?
  - (c) A more down-to-earth application of retro reflectors is found on many roads. What is that application?
  - (d) What is reflective clothing?
3. Before fibre optics, endoscopes (instruments used to view internal portions of the human body) consisted of lens systems in long, narrow tubes. Some endoscopes contained a dozen (or) more lenses and produced relatively poor images. Because the lenses had to be aligned in certain ways, the tubes had to have rigid sections, which limited the endoscopes maneuverability. Such an endoscope could be inserted down the patient's throat into the stomach to observe stomach lining. However, there were blind spots due to the curvature of the stomach and the inflexibility of the instrument.
  - (a) How has the fibre-optic bundles eliminated the aforesaid problems?
  - (b) What is an arthroscope?
  - (c) How heart valves are observed directly using fibre optics?
4. The use of lasers has had a large impact on modern medicine in areas ranging from elective cosmetic surgery to life-saving cancer surgery.
  - (a) When did the first eye surgery take place? And what is its Indian connection?
  - (b) How is laser surgery used in the area of vision correction?
  - (c) Name any two other areas in modern medicine where laser finds application.
5. A child is observing a thin film such as a layer of oil on water show beautiful colours when illuminated by white light. He feels happy and surprised to see this. His teacher explains him the reason behind it. The child then gives an example of spreading of kerosene oil on water to prevent malaria and dengue.
  - (i) What value was displayed by his teacher?
  - (ii) Name the phenomenon involved.
6. Rahul uses yellow light in single slit diffraction experiment with a slit width of 0.6 mm. The teacher replaced yellow light by X-rays. Now Rahul is not able to observe the

diffraction pattern. He is confused. The teacher again replaces X-rays by yellow light and the pattern reappears. Seeing the confusion on Rahul's face, the teacher explains the reasons.

(i) Which value is displayed by the teacher?

(ii) Give the necessary condition for diffraction.

7. Prashant participated in group discussion on human eye and its defects in his school. In the evening he noticed his father is reading a book by placing it at a distance of 50 cm (or) more from his eye. He advised him to check his eye.

(i) Why did Prashant advise his father for an eye checkup?

(ii) Suggest the focal length/power of reading spectacle for him, so that he may easily read at the distance of distinct vision.

(iii) Name the values displayed by Prashant.

8. A teacher has given three lenses 0.5D, 4.0D and 10.0D to a student. He is not sure as to which lens would be used for constructing a good astronomical telescope. So he consults his seniors and the teacher and constructs a telescope. Later he shows the telescope to the junior classes and explained about the choice of lenses.

(i) What value has he shown by doing these?

(ii) Which lenses are used as objective and which one is an eye piece?

9. Students of class 12 bring mirrors in their classroom for science fair. Mirrors are so arranged that one can see 6 images of himself. All the students of other classes too came to see this was very happy and Neeta, a class of 10 student was determined to know the reason behind it. She went to the library, consulted other students and next day came up with the answer.

(i) What values were depicted by Neeta?

(ii) Give reasons for seeing 6 images.

10. Rohit was watching a programme on the topic "MOON" on the discovery channel. He came to know from the observation recorded from the surface of the moon that the sky appears dark from there. He was surprised and wanted to know the reason behind it. He discussed with his friends, and they had reasons as

(1) Phenomenon of refraction of light

(2) Phenomenon of scattering of light

Answer the following questions based on the anecdote given above.

(i) What values were displayed by Rohit?

(ii) What values were displayed by his friends?

(iii) Mention some examples where you can see these phenomena.

## VALUES:

1. Sympathy
2. Empathy
3. Helpfulness
4. Curiosity
5. Sharing of knowledge
6. Motivation
7. Critical thinking
8. Service to others
9. Cooperation
  
10. Presence of mind
  
11. Compassion
  
12. Awareness about society etc.,
  
13. Caring others
  
14. Friendship
  
15. Thanks and gratefulness.