Episode No.17
Faculty – Praveen KM
Telecast dt -09.04.17
Sub: *PHYSICS*
Topic -RAY OPTICS AND OPTICAL INSTRUMENTS

1. A car is fitted with a convex mirror of focal length 20cm. A second car 2.8 m behind the first car is overtaking at a relative speed of 15 ms^{-1}. The speed of the image of second car as seen by the mirror of the first is

   (a) $\frac{1}{10} ms^{-1}$ **(b)** $\frac{1}{15} ms^{-1}$ (c) 10 ms^{-1} (d) 15 ms^{-1}

2. Let xy plane be the boundary between two transparent media. Medium 1 with Z ≥ 0 has R.I. of $\sqrt{2}$ and medium 2 with Z < 0 has R.I $\sqrt{3}$. A ray of light given by $\vec{A}=6\sqrt{3}\hat{i}+8\sqrt{3}\hat{j}+10\hat{k}$ is incident in medium 1 on the plane of seperation. The angle of refraction in medium 2 ls

   (a) 45^0 (b) 60^0 (c) 75^0 (d) 30^0

3. A right angled prism is to be made by selecting a proper material and angles A and B (B≤A). It is desired that a ray of light incident on face AB emerges parallel to the incident direction after two internal reflections. What should be the minimum refractive index 'n' for this to be possible?

   (a) $n_{\min}=\frac{1}{\sin A}$ (b) $n_{\min}=\frac{\sin A}{\sin B}$ **(c)** $n_{\min}=\frac{1}{\sin B}$ (d) $n_{\min}=\sqrt{\sin A \sin B}$

4. A glass dumbell of length 30cm and μ = 1.5 has ends of 3cm radius of curvature. An object is situated in air at a distance of 12cm from the end of dumbell along the axis. Find the position of image formed due to refraction at one end only.

   (a) 16cm **(b) 18cm** (c) 20cm (d) 24cm

5. A concave less forms the image of an object such that the distance between the object and image is 10cm and the magnification produced is ¼. The focal length of the lens will be.

   (a) -6.2 cm **(b) -4.4 cm** (c) -8.6 cm (d) -10cm

6. A point object is placed at a distance of 12cm on the axis of a convex lens of focal length 10cm. On the other side of the lens, a convex mirror is placed at a distance of 10cm from the lens such that the image formed by the combination coincides

with the object itself. What is the focal length of the convex mirror?

(a) 10cm (b) 15cm (c) 20cm **(d) 25cm**

7. A plano convex lens of refractive index 1.5 and radius of curvature 30cm is silvered at the curved surface. Now this lens has been used to form the image of an object. At what distance from this lens an object be placed in order to have a real image of the size of the object?

(a) 80cm **(b) 60 cm** (c) 30 cm (d) 20cm

8. The size of the image of an object which is at infinity as formed by a convex lens of focal length 30cm is 2cm. If a concave lens of focal length 20cm is placed between the convex lens and the image at a distance of 26cm from the convex lens. Find the new size of image.

(a) 1.25 cm **(b) 2.5 cm** (c) 1.05 cm (d) 2cm

9. Calculate the focal length of a reading glass of a person if his distinct vision is 75cm.

(a) 100.4cm (b) 75.2cm **(c) 37.5cm** (d) 25.6 cm

10. A person with defective eyesight is unable to see objects clearly nearer than 1.5m. He wants to read a book placed at a distance of 30cm from his eyes. Find the power of the lens he require for his spectacles.

(a) +2.67D (b) -2.67D (c) +2.5D (d) -2.5D

11. A compound microscope has a magnifying power 30. The focal length of its eye-piece is 5cm. Assuming the final image to be at the least distance of distinct vision, the magnification produced by the objective will be

(a) +5 **(b) -5** (c) +6 (d) -6