DELHI PUBLIC SCHOOL, DURGAPUR

QUESTION BANK & REVISION SHEET FOR MIDTERM EXAMINATION (2017-18)

CLASS-X

SUBJECT: PHYSICS

TOPIC: REFLECTION OF LIGHT AT CURVED SURFACE

1. State the laws of reflection.
2. State any two differences between real image and virtual image.
3. Draw a neat diagram of a concave mirror, and label the following: principal axis, pole, aperture, centre of curvature, radius of curvature, focus, and focal length.
4. Define focal point for a concave and convex mirror.
5. State any two applications of concave and convex mirrors each. Mention the relevant principle used in each case.
6. Why is concave mirror called converging mirror?
7. Why is convex mirror used as a rear-view mirror in the car?
8. What is the value of focal length for a plane mirror?
9. A parallel beam of light is to be brought to a point. What type of mirror has to be used to achieve this?
10. If an object is at infinite distance from a convex mirror, where will its image be formed? Draw the relevant ray diagram.
11. Which type of mirror is used in a torch? Why?
12. Write down mirror formula for a concave mirror, when a real image is formed.
13. How can you identify a spherical mirror from the knowledge of its focal length?
14. How can you identify a plane, concave and convex mirror without touching them?
15. What is linear magnification? What does its sign indicate?
16. With the help of neat ray diagram, write down the position and nature of the images formed by a concave mirror for the following positions of the object:
    (i) Between pole and the focus
    (ii) At focus
    (iii) Between focus and centre of curvature
    (iv) At the centre of curvature
    (v) Beyond centre of curvature
    (vi) At infinity
17. How can you explain the nature of the image formed by a plane mirror, using the mirror formula?
18. Why is the focal point of a convex mirror virtual?
19. What kind of mirror is used by a dentist?
20. Field of view of which mirror is wider – concave or convex?

Numerical-based questions

1. If the focal length of a concave mirror is 16 cm, find its radius of curvature.
2. When an object of height 5 cm is placed at a distance of 20 cm in front of a concave mirror, 2 times magnified real image is formed. Calculate the image distance and the size of the image formed.

3. An object of height 10 cm is placed at a distance of 30 cm in front of a concave mirror of focal length 20 cm. Find the position, nature and the size of the image formed.
4. An object of height 5 cm is placed at a distance of 20 cm in front of a convex mirror of focal length 10 cm. Find the position, nature and the size of the image formed.
5. If an object is placed at a distance of 30 cm in front of a concave mirror of focal length 15 cm, then find out the position and the nature of the image formed.
6. An object is placed at a distance of 30 cm from a concave mirror of focal length 20 cm. Where will the image be formed?
7. A 2.0-cm-high object is placed perpendicular to the principal axis of a concave mirror. The distance of the object from the mirror is 30 cm, and its image is formed 60 cm from the mirror, on the same side of the mirror as the object. Find the height of the image formed.
8. A 1.2-cm-long pin is placed perpendicular to the principal axis of a convex mirror of focal length 12 cm, at a distance of 8 cm from it. (a)Find the location of the image. (b)Find the height of the image. (c)Is the image erect or inverted?
9. Sunlight is incident on a concave mirror, parallel to its principal axis. The image is formed at a distance of 12cm from the pole. Find the radius of curvature of the mirror.
10. An object is placed at a distance of 20cm from a convex mirror of focal length 25cm.Calculate the position of the image. Discuss its nature.
11. A 2.0-cm-high object is placed at a distance of 20cm from a concave mirror. A real image is formed at 40cm from the mirror. Calculate the focal length of the mirror and size of the image.
12. Find the position, size and the nature of the image formed by a spherical mirror from the following data. u = -20cm f= -15cm ho= 1.ocm .
13. A 2-cm-high object is placed at a distance of 32cm from a concave mirror. The image is real, inverted and 3cm in size. Find the focal length of the mirror and the position of the image.
14. A concave mirror forms an inverted image of an object placed at a distance of 12cm from it. If the image is twice as large as the object, where is it formed?
15. A concave mirror forms an erect image of an object placed at a distance of 10cm from it. The size of the image is double that of the object. Where is the image formed?
16. An object is placed at a distance of 12cm from a concave mirror of radius of curvature 6cm.Find the position of the image.
17. An object of height 2cm is placed at a distance of 15 cm from a concave mirror of focal length 10 cm. Draw a scale diagram to locate the image. From the diagram, find the length of the image formed.
18. The image of an object placed 16 cm from a concave mirror is formed at a distance of 24 cm from the mirror. Calculate the possible focal lengths of the concave mirror from this information.
19. An object is placed 20 cm from a convex mirror. Its image is formed 12 cm from the mirror. Find the focal length of the mirror.
20. An object is placed at a distance of 12cm from a concave mirror. The image formed is real and four times larger than the object. Calculate the distance of the image from the mirror.
21. An object is placed 24cm from a concave mirror. Its image is inverted and doubles the size of the object. Find the focal length of the mirror and the position where the image is formed.
22. Where an object should be placed before a concave mirror of focal length 20cm so that a real image is formed at a distance of 60cm from it?
23. An object is placed at a distance of 12cm from a convex mirror of radius of curvature 12cm.Find the position of the image.

24. If the height of the object in the previous problem is 1.2cm, what will be the height of the image?
25. When a concave mirror is placed facing the sun, the sun's rays converge to a point 10cm from the mirror. Now, an erect, 2-cm-long pin is placed 15cm away on the principal axis of the mirror. If you want to get the image of the pin on a card, where would you place the card? What would be the nature and height of the image?
26. The far point of a person suffering from myopia is 2 meters from the eye. Find the focal length and power of the corrective lens that will correct his vision.

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TOPIC: REFRACTION OF LIGHT

Theory-based questions

1. Define refraction of light.
2. Why does refraction take place?
3. State the laws of refraction.
4. State the difference between relative and absolute refractive index.
5. Prove that, $_1\mu_2 = \frac{1}{_2\mu_1}$.
6. Write down the values of refractive indices of air, water and glass.
7. Arrange the following media A, B and C, having refractive indices μ_1, μ_2 and μ_3 respectively ($\mu_1 < \mu_2 < \mu_3$), on the basis of:
   (i) Optical density of the medium
   (ii) Speed of light in that medium
   (iii) Angle of refraction formed in that medium
8. Define refractive index of a medium in terms of speed of light in that medium.
9. Mention any one application of refraction.
10. How is relative refractive index of a medium linked with its absolute value?
11. Describe the process of refraction through a rectangular glass slab. Hence, prove that, incident ray and emergent rays are parallel to each other.
12. How is refractive index of a medium calculated from the knowledge of real and apparent depth? Draw the relevant diagram.
13. If the refractive index of medium A is 1.5 with respect to medium B, then what will be the refractive index of medium B with respect to medium A?
14. What is the physical significance of refractive index?
15. With the help of neat ray diagram, write down the position and nature of the images formed by a concave mirror for the following positions of the object:
   (i) Between pole and the focus
   (ii) At focus
   (iii) Between focus and centre of curvature
   (iv) At the centre of curvature
   (v) Beyond centre of curvature
   (vi) At infinity
16. Define principal focus for a convex lens.

17. Why is convex lens called converging lens?
18. Write down two applications of convex and concave lens each.
19. Write down the formula for linear magnification for a lens.
20. What are the different types of lenses used other than convex and concave lenses?
21. For what position of the object, magnified and virtual image is formed for a convex lens?
22. Write down the lens formula for a convex lens, if the image is real.
23. Draw a neat ray diagram to define the principal focus for a concave lens.
24. Define power of a lens. Write its unit.
25. If two bi-convex lenses of focal length f_1 and f_2 are kept in contact with each other, what is the equivalent focal length of the combination?
26. Why does a stick, dipped into water, appear to bend inside the water?

Numerical-based questions

1. The refractive index of glass is 1.5. How will this value change, if the glass is dipped in to a liquid of refractive index 1.33?
2. If a rectangular glass paper-weight of thickness 6 cm is placed over a newspaper, the letters printed on the newspaper appears to come up by a height of 2 cm. Calculate the refractive index of the glass.
3. If the speed of light in a medium is 2×10^8 m/s, calculate the refractive index of that medium. Identify that medium.
4. If an incident ray makes an angle 45^0 with the surface of a transparent medium and makes 30^0 angle with the normal drawn at the point of incidence, in that second medium, calculate the refractive index of the medium.
5. How faster will the light travel through a medium of refractive index 1.33?
6. The speed of light in an unknown medium is measured to be 2.76 x 108 m/s. (a) What is the index of refraction of the medium? (b) Does it match any of the materials listed in your Table?
7. Optical fibers are generally composed of silica, with an index of refraction around 1.44. (a) How fast does light travel in a silica fiber?
8. Light travels from air into an optical fiber with an index of refraction of 1.44. (a) In which direction does the light bend? (b) If the angle of incidence on the end of the fiber is 22o, what is the angle of refraction inside the fiber? (c) Sketch the path of light as it changes media.
9. Light traveling through an optical fiber (n=1.44) reaches the end of the fiber and exits into air. (a) If the angle of incidence on the end of the fiber is 30o, what is the angle of refraction outside the fiber? (b) How would your answer be different if the angle of incidence were 50o?
10. A 4.00-cm tall light bulb is placed a distance of 45.7 cm from a double convex lens having a focal length of 15.2 cm. Determine the image distance and the image size.
11. A 4.00-cm tall light bulb is placed a distance of 8.30 cm from a double convex lens having a focal length of 15.2 cm. (NOTE: this is the same object and the same lens, only this time the object is placed closer to the lens.) Determine the image distance and the image size.
12. A 4.00-cm tall light bulb is placed a distance of 35.5 cm from a diverging lens having a focal length of -12.2 cm. Determine the image distance and the image size.
13. Determine the image distance and image height for a 5-cm tall object placed 45.0 cm from a double convex lens having a focal length of 15.0 cm.
14. Determine the image distance and image height for a 5-cm tall object placed 30.0 cm from a double convex lens having a focal length of 15.0 cm.
15. An inverted image is magnified by 2 when the object is placed 22 cm in front of a double convex lens. Determine the image distance and the focal length of the lens.

16. A double concave lens has a focal length of -10.8 cm. An object is placed 32.7 cm from the lens's surface. Determine the image distance.
17. Determine the focal length of a double concave lens that produces an image that is 16.0 cm behind the lens when the object is 28.5 cm from the lens.
18. A 2.8-cm diameter coin is placed a distance of 25.0 cm from a double concave lens that has a focal length of -12.0 cm. Determine the image distance and the diameter of the image.
19. The focal point is located 20.0 cm from a double concave lens. An object is placed 12 cm from the lens. Determine the image distance.
20. Calculate the power of a convex lens having focal length 100 cm.

TOPIC: HUMAN EYE, DISPERSION OF LIGHT AND SCATTERING

Theory-based questions

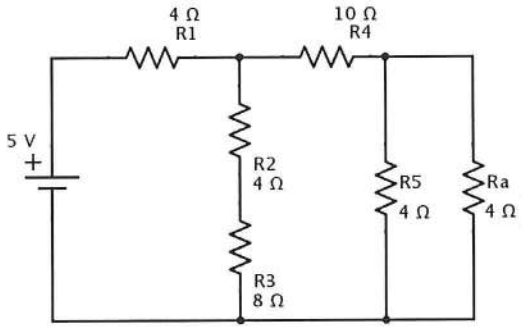
1. Draw a neat diagram of a human eye and write down the functions of the following parts: Retina, Pupil, Lens, Aqueous humor, Vitreous humor, Optic nerve.
2. What is Blind spot? Where is it found?
3. What do you mean by accommodation of human eye?
4. Define power of accommodation of human eye and Calculate its value for a normal human eye.
5. What is Myopia? How is it caused? How can it be corrected? Explain with the help of a diagram.
6. What is Hypermetropia? How is it caused? How can it be corrected? Explain with the help of a diagram.
7. What is presbiopia? How is it caused? How can it be corrected?
8. What is astigmatism? How can it be corrected?
9. What is dispersion?
10. Draw a neat diagram to show the dispersion of light when passed through a glass prism.
11. How is rainbow formed?
12. If you see a rainbow in the morning, in which direction of the sky will you see it?
13. What is scattering?
14. Explain the blue colour of sky?
15. Why clouds are white?
16. A red coloured piece of glass appears white when it is ground. Explain why?
17. What is Tyndall effect?
18. Write the constituent colours of white light in order of increasing wavelength.
19. When you enter a dark room from sunlight, you cannot see things for a while and after sometime you start seeing things. Explain this observation.
20. Why do stars twinkle?
21. Define near point and least distance of distinct vision. What is its value for a normal human eye?
22. Define far point. What is its value for a normal human eye?
23. Draw a neat labelled diagram showing the refraction of light through a glass prism.
24. The sun is seen a few minutes before actual sunrise and after actual sun set. Explain why?
25. The sky appears black when viewed from the surface of moon. Explain why?
26. Why danger signals are of Red colour?
27. Why sun appears reddish during sunrise and sunset?
28. The setting sun is more reddish than rising sun. Explain why?
29. What is persistence of vision? How does it help us in seeing motion pictures?

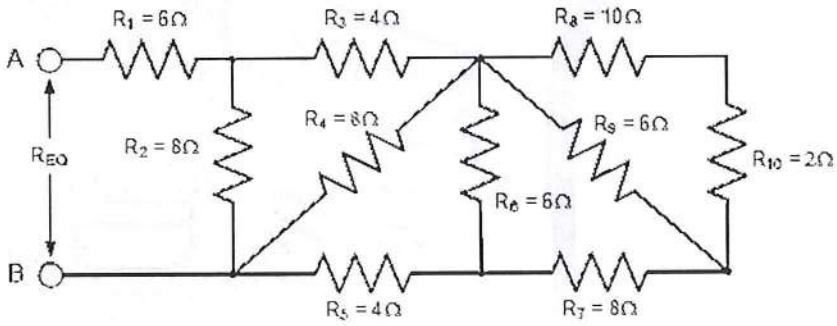
30. What are primary colours?
31. Why planets do not twinkle?
32. What is total internal reflection?
33. What is cataract? How is it corrected?
34. State one effect produced by the scattering of light by the atmosphere?
35. What is the nature of image formed on the retina of the eye?
36. What type of lens is used for correcting Hypermetropia?
37. What is the least distance of distinct vision of a normal human eye?
38. Name the muscle responsible for bringing change in the focal length of the eye lens?
39. Name one defect of vision which cannot be corrected by any type of spectacle lenses?
40. What is the function of optic nerve in human eye?
41. What is range of vision?
42. Why do different colours deviate through different angles on passing through a prism?
43. As light rays pass from air into glass prism, are they refracted towards or away from the normal?
44. Which colour has largest wavelength?
45. Which defect of vision can be rectified using a concave lens?
46. What phenomenon causes twinkling of star on a clear night?
47. What is meant by scattering of light?
48. Why does the sky appear black instead of blue to an astronaut?
49. What is the basic cause of atmospheric refraction?
50. Why does clear sky look blue?
51. Can visible light be scattered by atoms/molecules in earth's atmosphere?
52. What is a spectrum?
53. Name the defect of vision in person
54. Whose near point is more than 25cm away?
55. Whose far point is less than infinity?

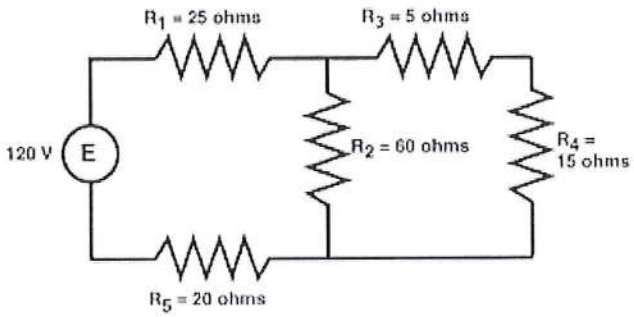
TOPIC: ELECTRICITY

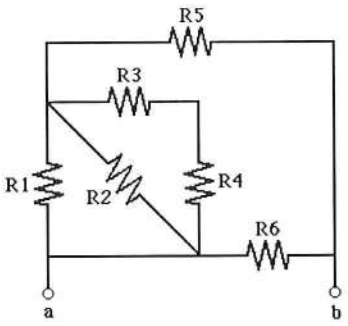
1. Write the value of charge and mass of electron.
2. How many electrons constitute a charge of three coulombs?
3. Define potential difference. Give its units.
4. Does ammeter have high resistance?
5. How is the potential difference maintained across the ends of a conductor?
6. State ohm's law. What are non-ohmic conductors?
7. A current of 2A flows through a 12V car headlight bulb for 6 minutes. How much energy transfer occurs during this time?
8. Electricians wear rubber sandals or shoes or rubber hand gloves while working, why?
9. How much work is done in moving a body carrying charge equivalent to that on 5 x 10^{19} electrons from a point at 25 volts to a point at 40 volts?
10. A copper wire has diameter 0.5mm and Resistivity of 8 1.6 $\times 10^{-8}$ Ω-m. What be the length of this wire to make its resistance10Ω? How much does the resistance change if diameter is doubled?
11. Alloys are used in electrical heating devices rather than pure metals. Give reason.
12. On what factor does the resistance of a conductor depend?
13. Calculate the number of electron consisting one coulomb of charge?

14. Apiece of wire of resistance 20Ω is drawn out so that its length is increased to twice its original length calculate the resistance of the wire is the new situation?
15. A student says that the resistance of two wires of same length and same area of cross section is same. This statement is correct if
    (a) Both wires are of different materials
    (b) Both wires are made of same material and are at different temperature.
    (c) Both wires are made of same material and are at same temperature.
    (d) Both wires are made of different materials and are at the same temperature.
16. Define 1 amp current. Write down the unit of conductance.
17. "The potential difference between two points is 5V." – What is meant by this statement?
18. How is the resistance dependent on the length and area of cross section of the conductor?
19. State and explain Ohm's law. What are the limitations of this law?
20. Name some ohmic and non ohmic conductor.
21. Calculate the equivalent resistance for series combination of resistors.
22. Calculate the equivalent resistance for parallel combination of resistors.
23. Calculate the equivalent resistance for the following combination of resistors:









R1 = R2 = R3 = R4 = R5 = R6 = 2 ohm

SYLLABUS

1. REFLECTION OF LIGHT AT CURVED SURFACE
2. REFRACTION OF LIGHT
3. HUMAN EYE, DISPERSION OF LIGHT AND SCATTERING
4. ELECTRICITY AND ITS EFFECT