CBSE
X CLASS

PHYSICS - CHEMISTRY

TARGET - 500
MATERIAL

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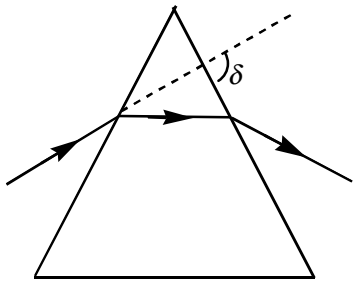
PHYSICS

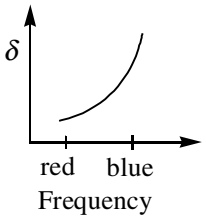
1. LIGHT - REFLECTION AND REFRACTION

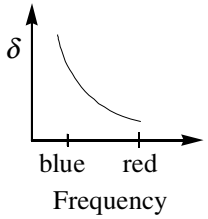
I. Multiple Choice Questions :

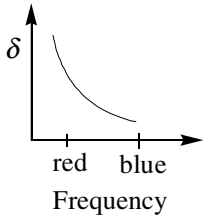
1. Light rays are deviated by a prism as shown in the figure. [ ]

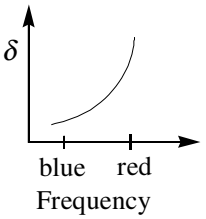


The deviation angle δ is measured for light rays of different frequency, including blue light and red light. Which of the following graph is correct? [ ]

a) 

b) 

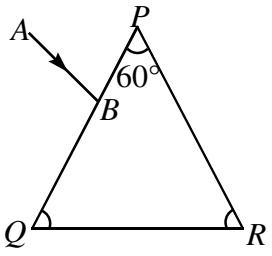
c) 

d) 

2. Which of following source gives monochromatic light? [ ]
   a) Sodium lamp b) Mercury lamp c) Spark lamp d) All of the above

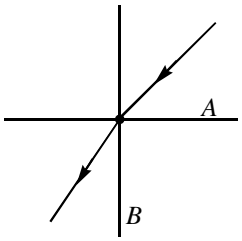
3. Two thin lenses of power +3.5 D. and – 2.5 D are placed in contact. The power of the lens combination is [ ]
   a) + 1 D b) + 1.5 D c) + 2.5 D d) + 2 D

4. In given figure, a light ray AB is incident normally on one face PQ of an equilateral glass prism. The angles at faces PR is: [ ]



a) 60° b) 30° c) 45° d) 90°

5. A ray of light is refracted as per the following diagram. Which of the following medium is optically denser? [ ]



a) Medium A

b) Medium B

c) Cannot be identify

d) Both medium are denser

6. The image formed by a concave mirror is observed to be virtual, erect and larger than the object. Where should be the position of the object? [ ]

a) Between the principal focus and the centre of curvature
b) At the centre of curvature
c) Beyond the centre of curvature
d) Between the pole of the mirror and its principal focus.

7. Angle of deviation is depends on: [ ]

a) Angle of prism
b) Nature of material of prism
c) Angle of incidence on the prism
d) All of the above

8. A full length of a distant tall building can definitely be seen by using [ ]

a) a concave mirror

b) a convex mirror

c) a plane mirror

d) both concave as well as plane mirror

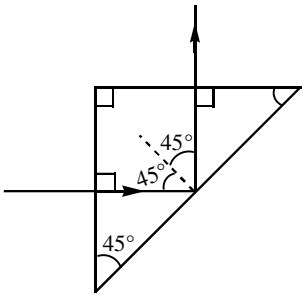
9. A light ray is incident perpendicularly to one face of a 90° prism and is totally internally reflected at the glass-air interface. If the angle of reflection is 45°, we conclude that the refractive index

a) $n > \frac{1}{\sqrt{2}}$

b) $n > \sqrt{2}$

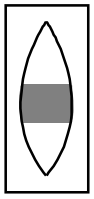
c) $n < \frac{1}{\sqrt{2}}$

d) $n < \sqrt{2}$



[ ]

10. If the central portion of a convex lens is wrapped in black paper as shown in the figure.



[ ]

a) No image will be formed by the remaining portion of the lens

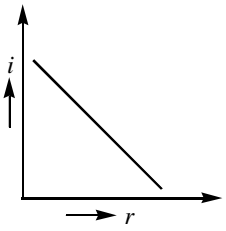
b) The full image will be formed but it will be less bright

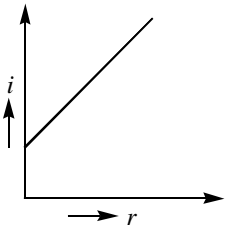
c) The central portion of the image will be missing

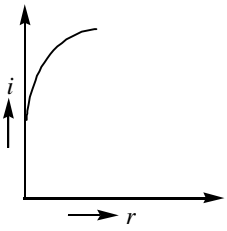
d) There will be two images each produced by one of the exposed portions of the lens

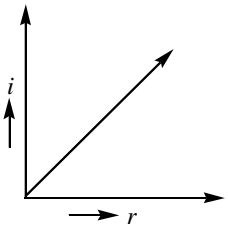
11. An object is immersed in a fluid. In order that the object becomes invisible, it should [ ]
a) Behave as a perfect reflector
b) Absorb all light falling on it
c) Have refractive index one
d) Have refractive index exactly matching with that of the surrounding fluid

12. Which of the following correctly represents graphical relation between angle of incidence (i) and angle of reflection (r) ? [ ]

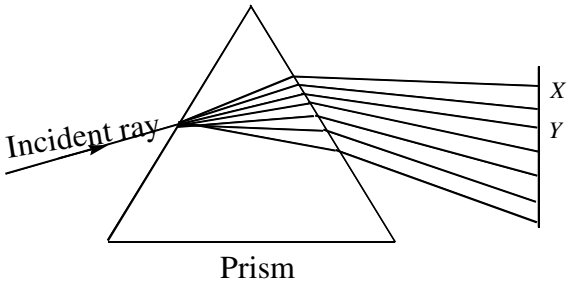
a) 

b) 

c) 

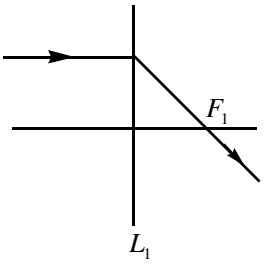
d) 

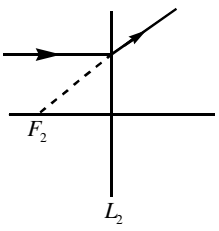
13. As light travels from a rarer to a denser medium it will have [ ]
a) increased velocity b) decreased velocity
c) decreased wavelength d) both (b) and (c)

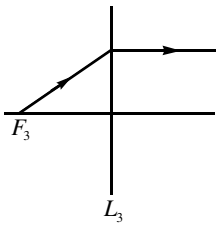
14. 

Dispersion of light by glass prism is shown in the above figure. Here x and y indicates ..... and ..... colour respectively. [ ]
a) red, blue b) red, indigo c) red, yellow d) violet, green

15. The following figures show the path of light rays through three lenses marked L_1, L_2 and L_3 and their focal points F_1, F_2 and F_3 respectively. [ ]

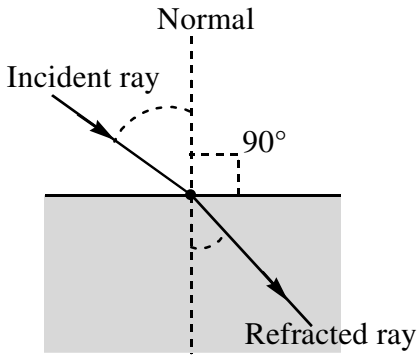
i) 

ii) 

iii) 

Which of the following diagram shows the concave lens properties?
a) (i) b) (ii) c) (iii) d) (i), (ii)

16. Consider the following statements about refraction of light : [ ]



1) The incident ray, refracted ray and the normal ray lie in the same plane.
2) The angle of incidence is equal to the angle of refraction.

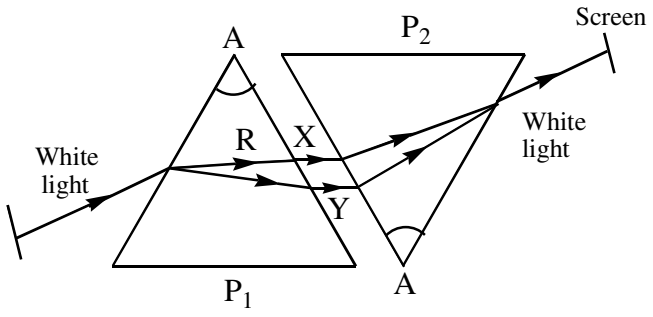
Choose the correct option from the codes given below:

a) Only 1 b) Only 2 c) Both 1 and 2 d) Neither 1 nor 2

17. The clear sky appears blue as shown in the figure because [ ]

a) blue light gets absorbed in the atmosphere
b) ultraviolet radiations are absorbed in the atmosphere
c) violet and blue lights get scattered more than lights of all other colours by the atmosphere
d) light of all other colours is scattered more than the violet and blue colour lights by the atmosphere

18.



Here X and Y indicates: [ ]

a) Green colour, violet colour b) Red colour, violet colour
c) Violet colour, red colour d) Green colour, red colour

19. When white light passes through the achromatic combination of prisms, then what is observed?
a) Deviation b) Dispersion [ ]
c) Both deviation and dispersion d) Atmospheric refraction

20. A student traces the path of a ray of light through a glass prism for different angles of incidence. He analysis each diagram and draws the following conclusion: [ ]
I) On entering prism, the light ray bends towards its base.
II) Light ray suffers refraction at the point of incidence and point of emergence while passing through the prism.
III) Emergent ray bends at certain angle to the direction of the incident ray.
IV) While emerging from the prism, the light ray bends towards the vertex of the prism.
Out of the above inferences, the correct ones are:
a) I, II and III b) I, III and IV c) II, III and IV d) I and IV

II. Assertion and Reason Type Questions :
a) Both A and R are correct and R is the correct explanation of A
b) Both A and R are correct but R is not the correct explanation of A
c) A is correct, R is incorrect
d) A is incorrect, R is correct

21. **Assertion (A) :** Large concave mirrors are used to concentrate sunlight to produce heat in solar cookers. [ ]
Reason (R) : Concave mirror converges the light rays falling on it to a point

22. **Assertion (A) :** If the rays are diverging after emerging from a lens; the lens must be concave.
Reason (R) : The convex lens can give diverging rays. [ ]

23. **Assertion (A) :** Light travels faster in glass than in air. [ ]
Reason (R) : Glass is denser than air.

24. **Assertion (A) :** A ray of light incident along the normal to the plane mirror retraces its path after reflection from the mirror. [ ]
Reason (R) : A ray of light along the normal has angle of incidence as $\frac{\pi}{2}$ and hence, it retraces its own path after reflection from mirror.

25. **Assertion (A) :** The height of an objective is always considered positive. [ ]
Reason (R) : An objective is always placed above the principal axis in this upward direction.

26. **Assertion (A) :** When a concave mirror is held under water, its focal length will increase. [ ]
Reason (R) : The focal length of concave mirror is indepedent of the medium in which it is placed.

27. **Assertion (A) :** Higer is the refractive index of a medium or denser the medium, lesser if the velocity of light in that medium. [ ]
Reason (R) : Refractive index is inversly proportional to velocity.

28. **Assertion (A) :** Reflection on cinema screen is irregualr [ ]
Reason (R) : In irregualr reflection, laws of reflection does not valied.

29. **Assertion (A) :** Plane mirror is used as dressing table mirror [ ]
Reason (R) : Plane mirror forms virtual erect and same size of image as object

30. **Assertion (A) :** Concave mirror is used as densists mirror [ ]
Reason (R) : Concave mirror is forms virtual enlarged image when object is placed closed to the mirror.

III. Skill Based Questions :

1. What is the scattering of light ? Explain with the help of an example.

2. Manju is uses a concave mirror for image formation for different positions of an object. What inferences can be drawn about the following when an object is placed at a distance of 10 cm from the pole of a concave mirror of focal length 15 cm ?
a) Position of the image
b) Size of the image
c) Nature of the image
Draw a labelled ray diagram to justify your inferences.

3. a) Define optical centre of a spherical lens.
b) You are given a convex lens of focal length 30 cm. Where would you place an object to get a real, inverted and highly enlarged image of the object ? Draw a ray diagram showing the image formation.
c) A concave lens has a focal length of 20 cm. At what distance should an object be placed so that it forms an image at 15 cm away from the lens ?

4. a) State the relationship between focal length and radius of curvature of a spherical mirror.
b) Why is the refractive index of a medium always greater than one ?
c) A lens has – 4 D power. Is the lens concave or convex ?

5. a) Define power of a lens and write its S.I. unit.
b) A convex lens of power 4 D is placed at a distance of 40 cm from a wall. At what distance from the lens should a candle be placed so that its image is formed on the wall

6. a) Which mirror do we use as a rear-view mirror in vehicles ?
b) Draw a ray diagram to illustrate the formation of an image when an object is placed anywhere in front of the mirror on its principal axis. State the nature and position of the image formed.

7. a) Explain in brief, convex lens is converging in nature.
b) A convex lens forms a real and inverted image of a needle at a distance of 50 cm from it. Where is the needle placed in front of convex lens if the image is equal to the size of the object? Also find the power of the lens.

8. a) A divergent lens has focal length of 20 cm. At what distance should the object from the lens be placed so that an image is formed 10 cm away from the lens ? What is the magnification produced, by the lens ?
b) Draw a ray diagram to show the position and nature of the image formed by a convex lens when an object is placed between optical centre and focus of the lens.

9. A mirror is fitted in a wall of the AGRA FORT. When you stand at a proper location, a full size image of the Taj Mahal can be seen in this mirror.
   a) What kind of mirror is it ?
   b) Draw a ray diagram for such a mirror when the object is at infinity.

10. You are given a convex lens of focal length 10 cm. Where will you place an object to get a real, inverted and highly enlarged image of the object. Draw a ray diagram.

11. The image formed by a spherical mirror is real, inverted and is of magnification -2 . If the image is at a distance of 30 cm from the mirror, where is the object placed ? Find the focal length of the mirror. List two characteristics of the image formed if the object is moved 10 cm towards the mirror.

12. i) Define optical centre of a spherical lens.
    ii) A divergent lens has a focal length of 20 cm. At what distance should an object of height 4 cm from the optical centre of the lens be placed so that its image is formed 10 cm away from the lens. Find the size of the image also.
    iii) Draw a ray diagram to show the formation of image in above situation.

13. Rohit is uses a concave mirror which produces three times enlarged real image of an object placed at 12 cm in front of it. Calculate the radius of curvature of the mirror.

14. a) Define 1 dioptre of power. Find the focal length of a lens of power – 2.0 D.
    b) Why does a lemon kept in water in a glass tumbler appear to be bigger than its actual size?
    c) Study the table given below and state the medium in which light ray will travel fastest. Why ?

Me dium	A	B	C
Refractive index	1.33	1.5	2.4

15. a) State laws of refraction.
    b) A ray of light is incident normally to the surface of a glass slab placed in air. Find the angle of incidence and angle of refraction in this case.

16. A 3 cm tall object is placed 18 cm in front of a concave mirror of focal length 12 cm. At what distance from the mirror should a screen be placed to see a sharp image of the object on the screen. Also calculate the height of the image formed.

17. Ram placed an object in front of a convex lens of focal length 15 cm. The image formed is three times the size of the object. Calculate the two possible distances of the object from the lens.

18. The image of a candle flame placed at a distance of 30 cm from a mirror is formed on a screen placed infront of the mirror at a distance of 60 cm from its pole. What is the nature of the mirror? Find its focal length, if the height of the flame is 2.4 cm, find the height of its image. State whether the image formed is erect or inverted.

19. An object 4 cm in height is placed at 15 cm in front of a concave mirror of focal length 10 cm. At what distance from the mirror should a screen be placed to obtain a sharp image of the object. Calculate the height of the image.

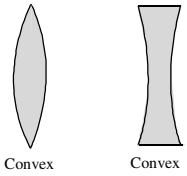
20. a) Name the kind of lens that can form;
i) an inverted magnified image. ii) an erect diminished image.

Draw ray diagrams to illustrate your answer in each case.

b) Draw a ray diagram to show the image formed of an object placed between f and 2f distances from a convex lens.

IV. Case Based Questions :

1. A concave lens is thick at the edges and thin at the centre, while a convex lens is thick at the centre and thin at the edges. We can distinguish between a concave lens and a convex lens without touching them. For this keep a book close to a lens and observe the image of the text of the book through the lens. If the letters appear enlarged, then it is a convex lens and if the letters appear diminished then it is a concave lens.



Convex lens converges light rays and hence known as converging lens. Similarly, concave lens diverges light rays and is known as diverging lens. Linear magnification produced by a lens is equal to the ratio of the image distance to the object distance. Power of a lens is defined as the reciprocal of its focal length.

i) What type of image is always made by a concave lens ?

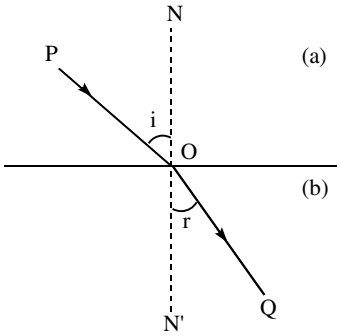
ii) If magnification produced by a spherical lens is + 0.75, then what is the nature of the lens ?

iii) What is the power of a convex lens with focal length 80 cm ?

(OR)

iii) What kind of lens is present in human eye ?

2. When light ray goes from one transparent medium to another transparent medium, it suffers a change in direction, into second medium. The extent of the change in direction suffered by the phenomenon of change in the path of light rays when going from one medium to another medium is known as refraction. Ray is a given pair of media can be expressed in terms of refractive index. The refractive index is related to an important physical quantity in the relative speed of light in different media.



i) A ray of light enters into the glass from air. Does it bend towards normal ?

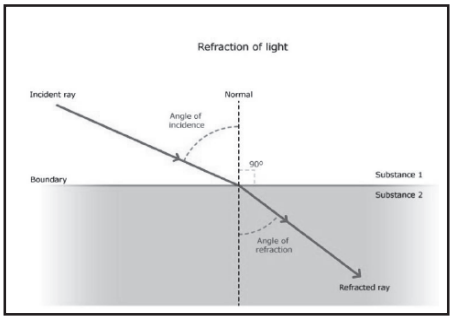
ii) What is the unit of refractive index ?

iii) Light enters from air to glass having refractive index 1.50. What is the speed of light in the glass? The speed of light in vacuum is $3 \times 10^8 ms^{-1}$.

(OR)

iv) When light goes from one medium to another, which of the three parameters, frequency, wavelength, velocity change ?

3. "Change in path of a light ray as it passes from one medium to another medium is called refraction of light."



When light travels from a rarer medium to a denser one, it bends towards the normal ($i > r$) and when travels from a denser medium to a rarer one. it bends away from the normal ($i < r$).

Where, i = Angle of incidence

and r = Angle of refraction

We can see refraction in our daily life, some of the examples are given below :

The bottom of a tank or pond containing water appears to be raised due to refraction of light which takes place when light rays pass from the pool of water into the air. The letters appear to be raised when viewed through a glass slab placed over the document because of refraction of light.

When a light ray enters in a glass slab, then the emergent ray is parallel to the incident ray but it is shifted sideward slightly.

In this case, refraction takes place twice, first when ray enters glass slab from air and second when exits from glass slab to air.

i) What do you mean by optically rarer and denser medium ?

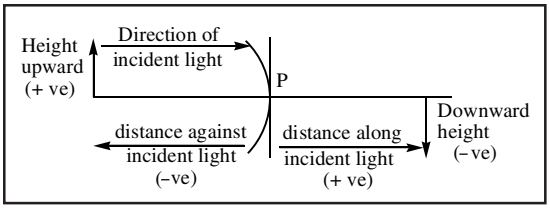
ii) What is the cause of refraction ?

iii) Draw a ray diagram showing refraction through a glass slab.

(OR)

iv) Give one example of refraction from our daily life experience other than the two examples given above.

4. While dealing with the reflection of light by spherical mirrors, we shall follow a set of sign conventions called the New Cartesian Sign Convention. In this convention, the pole (P) of the mirror is taken as the origin. The principal axis of the mirror is take as the x – axis of the coordinate system. In a spherical mirror, the distance of the object from its pole is called the object distance u. The distance of the image from the pole of the mirror is called the image distance v. Magnification produced by a spherical mirror gives the relative extent to which the image of an object is magnified with respect to the object size. It is expressed as the ratio of the height of the image to the height of the object. It is usually represented by the letter m .



i) How can you calculate the magnification of a spherical mirror ?

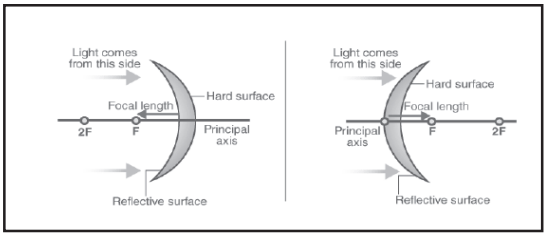
ii) What does a negative sign in the value of magnification indicates?

iii) Find the focal length of a convex mirror whose radius of curvature is 32 cm.

(OR)

iv) Why does the height of the object is taken to be positive?

5. Is there a relationship between the radius of curvature R, and focal length f , of a spherical mirror ? For spherical mirrors of small apertures, the radius of curvature is found to be equal to twice the focal length. We put this as R = 2f. This implies that the principal focus of a spherical mirror lies midway between the pole and centre of curvature.



i) Write relation between radius of curvature and focal length.

ii) For which type of mirrors above relation is verified?

iii) What should be size of the aperture ?

(OR)

iv) Where is the principle focus of a spherical mirror lies?

6. Study the following table for a convex lens for different positions of object and answer the following questions:

Position of object	Position of image	Relative size of image
At infinity	At focus F_2	Highly diminished point sized
Beyond $2F_1$	Between F_2 and $2F_2$	Diminished
At $2F_1$	At $2F_2$	Same size
Between F_1 and $2F_1$	Beyond $2F_2$	Enlarged
At focus F_1	At infinity	Infinitely large or highly enlarged
Between focus F_1 and optical centre O	On the same side of the lens as the object	Enlarged

i) What is the nature of the image, if an object is placed at infinity ?

ii) Identify the nature of the image for which the object is between focus and optical centre.

iii) What is position of image, when object is place at focus (f_1) ?

(OR)

iv) What is the focal length of a lens for an object placed 50 cm from the lens producing virtual image at a distance of 10 cm in front of the lens?

2. THE HUMAN EYE AND COLOURFUL WORLD

I. Multiple Choice Questions :

1. One pair of eyes gives vision up to [ ]
   a) Two corneal blind people b) Three corneal blind people
   c) One corneal blind person d) Four corneal blind people

2. A common type of bi-focal lens consist of [ ]
   a) A concave and convex lens b) Both concave lens
   c) Both convex lens d) None of these

3. The smallest distance, at which the eye can see objects without strain is called [ ]
   a) near point b) far point c) both a and b d) none of these

4. The part of eye responsible for shape of the eye. [ ]
   a) Aqueous humour b) vitreous humour c) cornea d) optic nerve

6. What happens when clliary muscles contract ? [ ]
   a) Focal lenght increases b) lens become thinner
   c) Curvature of eye increases d) None of these

7. Light sensitive screen in human eye is called [ ]
   a) Cornea b) Viterous humour c) Retina d) pupil

8. The diameter of eyeball is [ ]
   a) 2.5 cm b) 2.7 cm c) 2.3 cm d) 2.0cm

9. To seen an object it has to be placed_____cm away from eye [ ]
   a) 30 cm b) 25 cm c) 26 cm d) 25.7 cm

10. Retina of the eye is _____sensitive [ ]
    a) Light b) colour c) UV d) Numebr

11. Which one of the following statements is correct? [ ]
    a) The rainbow is produced by the reflection of white sun light by water drops in the atmosphere.
    b) The blue colour of the sky is due to scattering of light.
    c) The stars appear higher in the sky than actually are,due to scattering of light.
    d) The planets twinkle at night due to atmospheric refraction of light.

12. Which of the following are effects of atmospheric refraction? [ ]
    1) Twinkling of stars. 2) Tyndall effect.
    3) Advance sunrise and delayed sunset.
    Choose the correct option from the codes given below:
    a) 1 and 2 b) 2 and 3 c) 1 and 3 d) 1, 2 and 3

13. Which of the following phenomena of light are involved in the formation of a rainbow?
    a) Reflection, refraction and dispersion. [ ]
    b) Reflection, dispersion and total internal reflection.
    c) Refraction, dispersion and internal reflection.
    d) Dispersion, scattering and total internal reflection

14. Angle of deviation is depends on: [ ]
a) Angle of prism b) Nature of material of prism
c) Angle of incidence on the prism d) All of the above

15. Twinkling of stars is due to atmospheric [ ]
a) dispersion of light by water droplets
b) refraction of light by different layers of varying refractive indices
c) scattering of light by dust particles
d) internal reflection of light by clouds

16. Which of the following phenomena contributes significantly to the reddish appearance of sun at sunrise or sunset? [ ]
a) Dispersion of light b) Scattering of light
c) Total internal reflection of light d) Reflection of light from the earth

17. Advanced sunrise and delayed sunset are explained on the basis of [ ]
a) Tyndall effect b) scattering of light c) dispersion of light d) atmospheric refraction

18. The bluish colour of water in deep sea is due to [ ]
a) the presence of algae and other plants found in water
b) reflection of sky in water
c) scattering of light
d) absorption of light by the sea.

19. Order of colours from more wave length to less wave length. [ ]
a) VIBGYOR b) GXOOBORS d) SBORYS d) ROYGBIV

20. Who was the first to use a glass prism to obtain the spectrum of sunlight. [ ]
a) Hans Christian oersted b) Issac Newton
c) Albert Eanstein d) Galileo Galilei

II. Assertion and Reason Type Questions :

a) Both A and R are correct and R is the correct explanation of A
b) Both A and R are correct but R is not the correct explanation of A
c) A is correct, R is incorrect
d) A is incorrect, R is correct

21. **Assertion (A) :** Red light travels faster in glass than green light. [ ]
Reason (R) : The refractive index of glass is less for red light than for green light.

22. **Assertion (A) :** As light travels from one medium to another, the frequency of light does not chane.
Reason (R) : Because frequency is the characteristic of source. [ ]

23. **Assertion (A) :** Blue color of sky appears due to scattering of blue colour. [ ]
Reason (R) : Blue color has shortest wave length in visible spectru.

24. **Assertion (A) :** The light of violet colour deviates the most and the light of red colour the least, while passing through a prism [ ]
Reason (R) : For a prism material, refractive index is highest for red light and lowest for the violet light

25. **Assertion (A) :** The stars twinke while the planet do not. [ ]
Reason (R) : The stars are much bigger in size than the planets.

26. **Assertion (A) :** Rainbow is an example of the dispersion of sunlight by the water droplets.
Reason (R) : Light of shorter wavelength is scattered much more than light of larger wavelength. [ ]

27. **Assertion (A) :** A rainbow is sometimes seen in the sky in rainy season only when observer's back is towards the sun. [ ]
Reason (R) : Internal reflection in the water droplets cause dispersion and the final rays are in backward direction.

28. **Assertion (A) :** The sky looks dark and black instead of blue in outer space. [ ]
Reason (R) : No atomsphere containing air in the outer space to scatter sunlight.

29. **Assertion (A) :** Danger signals are made of red colour. [ ]
Reason (R) : Velocity of red light in air is maximum, so signals are visible even in dark.

30. **Assertion(A) :** A normal eye can clearly see all the objects beyond certain minimum distance.
Reason (R) : The human eye has capacity of adjusting the focal length of eye lens. [ ]

31. **Assertion(A) :** Rainbow is an example of the dispersion of sunlight by the water droplets.
Reason (R) : Light of shorter wavelength is scattered much more than light of larger wavelength. [ ]

32. **Assertion(A) :** In bright light the size of the pupil is small [ ]
Reason (R) : Pupil controls the amount of light entering to the eye

33. **Assertion(A) :** Least distance of distinct vision for a normal human eye is about 25 cm.
Reason (R) : The range of vision of a normal eye is from infinity to 25 cm. [ ]

34. **Assertion(A) :** A person with myopia can not see far objects clearly [ ]
Reason (R) : The myopic eye power is greater than the normal eye.

35. **Assertion(A) :** Stars twinkle at night [ ]
Reason (R) : The apparent position of star is slightly different from actual position due to refraction.

III. Skill Based Questions :

1. A person is not able to see distinctly the objects placed beyond 90 cm from him. Giving reasons to identify the defect in his eye. Determine the nature of lens used to correct this defect.
2. A star appears on the horizon. What is the true position of the star ? Explain with the help of a diagram.
3. Why there is no dispersion of light refracted through a rectangular glass slab.
4. What is meant by near point and far point of an eye? State their values of the normal human eye.
5. Which component of white light deviates (i) the least and (ii) the most while passing through a glass prism? State the reason of this difference in deviation.
6. Name the part of eye where images formed in a normal human eye. State how the image position changes in myopia and hypermetropia.

7. Mention the factor on which scattering of light depends. Why does the sky appear dark in space ?
8. No rainbow could be observed from the surface of the moon by the astronauts. Give reason.
9. Why does the colour of the sky appear blue ? Explain in brief.
10 What type of spectacles should be worn by a person having the defects of myopia as well as hyper-metropia? How does it help ?
11. What would the sky look if the earth had no atmosphere ? Why ?
12. How do we see colours ?
13. What is meant by near point of a human eye ?
14. Write the role of the following parts of an eye

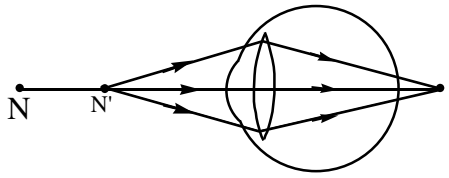
    a) Pupil b) Retina c) Optic nerve
15. Why does it take some time to see the objects in a dim-lit room when we enter the room from bright sunlight outside ?
16. Give reason

    a) Danger signals are red.

    b) We cannot see an object clearly if it is placed very close to the eyes.
17. What are the causes of the defect of vision 'cataract' and how can they be corrected ?
18. Trace the path of a white of light through a triangular glass prism. Also label the diagram.
19. How does the thickness of the eye lens change when we shift looking from a distant tree to reading a book ? Draw the corresponding diagrams.
20. State the phenomenon involved in the formation of a rainbow in the sky. Arrange these phenomenon in proper sequence.

IV. Case Based Questions :

1. A person is suffering from hypermetropia (long sightedness). It is a defect in which a human eye can see far off object clearly, but is unable to see nearby object distinctly. The near point of the person is 1.5m. Assume that the near point of the normal eye is 25 cm.



    i) What type of lens should be used in his spectacles?

    ii) What should be the focal length of the lens he used ?

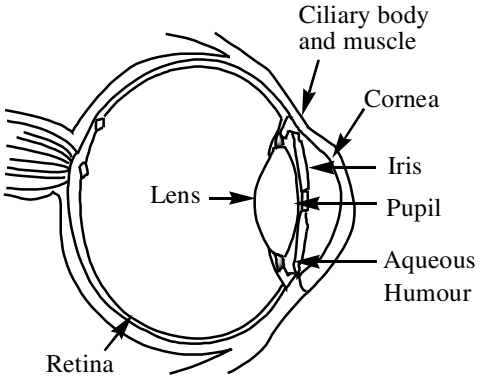
    iii) What will be the power of the lens ?

    (OR)

    iv) Write one possible cause of this defect.

2. The human eye is like a camera. Its lens system forms an image on a light-sensitive screen called the retina. Light enters the eye through a thin membrane called the cornea. It forms the transparent bulge

on the front surface of the eyeball as shown in the figure. The crystalline lens merely provides the finer adjustment of focal length required to focus objects at different distances on the retina. We find a structure called iris behind the cornea. Iris a dark muscular diaphragm that controls the size of the pupil. The pupil regulates and controls the amount of light entering the eye.



The human Eye

There are mainly three common refractive defects of vision. These are (i) myopia or near-sightedness, (ii) hypermetropia or far-sightedness, and (iii) Presbyopia. These defects can be corrected by the use of suitable spherical lenses.

i) What is the function of pupil in the human eye ?

ii) What is the far point and near point of human eye with normal vision ?

iii) A student has difficulty reading the blackboard while sitting in the last row. What could be the defect the child is suffering from ?

(OR)

iv) What is the function of iris in human eye ?

3. The interplay of light with objects around us gives rise to several spectacular phenomina in nature. The blue colour of sky, colour of water in deep sea, the reddening of sun at sunrise and the sunset are some of the wonderful phenomena we are familiar with.

a) What is tyndall effect ?

b) Which molecules present in air are responsible for blue colour of sky.

c) Draw diagram of an experimental arrangement for observing scattering of light in colloidal Solution. Name the two chemicals used in this activity.

(OR)

What happens when a beam of sunlight enters a dusty room through a window ? Explain your answer.

4. The human eye is most valuable and sensitive sense organs. It enables us to see the wonderful world and the colours around us. The human eye acts like a camera, it can focus near object as well as far object. The eye lens forms an inverted, real image of an object on the retina and this information send to brain so that we perceive objects as they are.

a) What is the role of iris and pupil of human eye
b) What is the range of vision of normal human eye
c) Difine power of accommodation

5. The eye lens forms an inverted real image of the object on the retina. The retina is a delicate memberance having enormous number of light -sensitive cells. The light sensitive cells get activated upon illumination and generate electrical 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 objects as they are.

a) Name the cells which is responsible for
i) the colour determination.
ii) the intensity of light with degree of brightness.

b) What is blind spot and yellow spot

(OR)

What is persistance of vision ? Explain

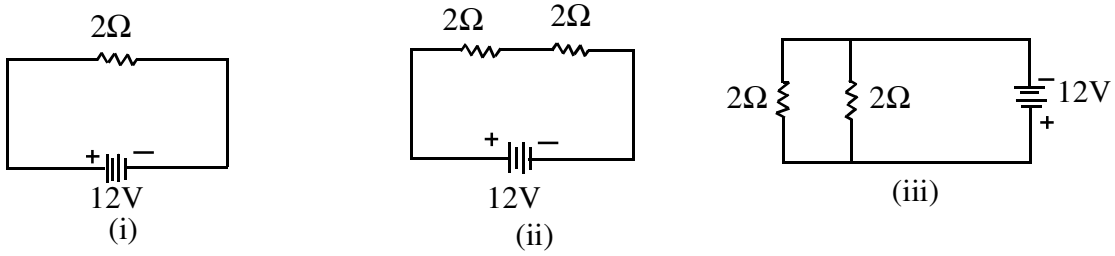
3. ELECTRICITY

I. Multiple Choice Questions :

1. Electrical resistivity of a given metallic wire depends upon [ ]
a) its length b) its thickness c) its shape d) nature of the material

2. An electric kettle consumes 1 kW of electric power when operated at 220 V. A fuse wire of what rating must be used for it ? [ ]
a) 1 A b) 2 A c) 4 A d) 5 A

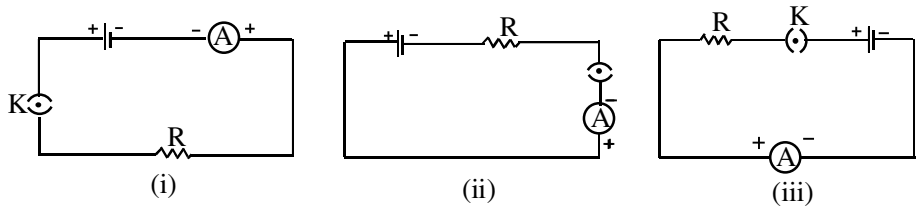
3. In the following circuits (Figure), heat produced in the resistor or combination of resistors connected to a 12 V battery will be [ ]



a) same in all the cases b) minimum in case (i)
c) maximum in case (ii) d) maximum in case (iii)

4. The resistivity does not change if [ ]
a) the material is changed
b) the temperature is changed
c) the shape of the resistor is changed
d) both material and temperature are changed

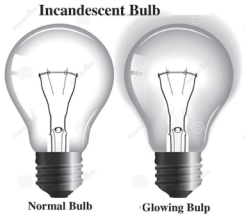
5. A cell, a resistor, a key and ammeter are arranged as shown in the circuit diagrams of Figure. The current recorded in the ammeter will be [ ]



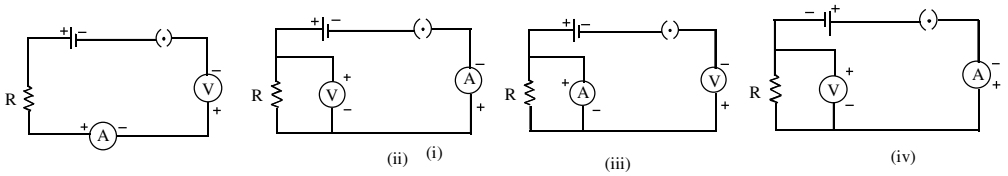
a) maximum in (i) b) maximum in (ii)
c) maximum in (iii) d) the same in all the cases

6. A current of 1 A is drawn by a filament of an electric bulb shown in the figure. Number of electrons passing through a cross section of the filament in 16 seconds would be roughly [ ]

a) 10^{20}
b) 10^{16}
c) 10^{18}
d) 10^{23}



7. Identify the circuit (Figure) in which the electrical components have been properly connected.



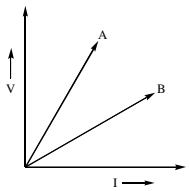
a) (i) b) (ii) c) (iii) d) (iv) [ ]

8. What is the maximum resistance which can be made using five resistors each of 1/5 Ω ? [ ]

a) 1/5 Ω b) 10 Ω c) 5 Ω d) 1 Ω

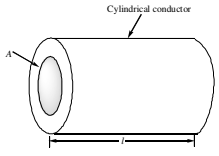
9. V – I graph for the two wires A and B are shown in the figure. If we connect both the wires one by one to the same battery which of the two will produce more heat per unit time ? [ ]

a) A
b) B
c) Both A and B
d) None of these



10. A cylindrical conductor of length *l* and uniform area of cross-section A has resistance R. Another conductor of length 2*l* and resistance R of the same material has area of cross section [ ]

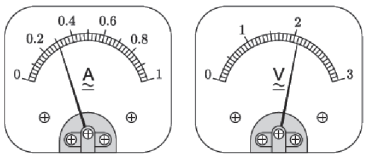
a) A/2
b) 3A/2
c) 2 A
d) 3 A



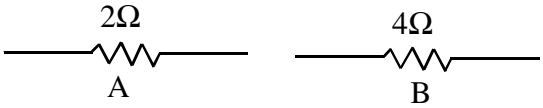
11. If the current I through a resistor is increased by 100% (assume that temperature remains unchanged), the increase in power dissipated will be [ ]
a) 100% b) 200% c) 300% d) 400%

12. The current flowing through a resistor connected in an electrical circuit and the potential difference developed across its ends are shown in the given ammeter and voltmeter. The voltage and the current across the given resistor are respectively: [ ]

a) 2.1 V, 0.3 A
b) 3.1 V, 1.3 A
c) 1.1 V, 0.6 A
d) 0.1 V, 0.2 A



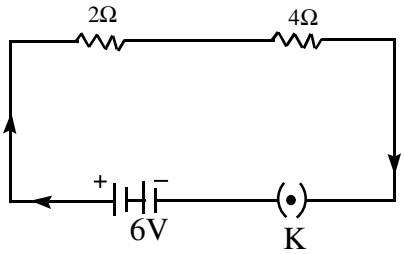
13. Two resistors are shown in the above figure when it connected to a battery will have [ ]



a) same current flowing through them when connected in parallel
b) same current flowing through them when connected in series
c) same potential difference across them when connected in series
d) different potential difference across them when connected in parallel

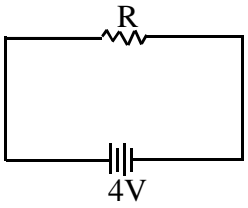
14. In an electrical circuit two resistors of $2\,\Omega$ and $4\,\Omega$ respectively are connected in series to a 6 V battery as shown in the figure. The heat dissipated by the $4\,\Omega$ resistor in 5 s will be

a) 5 J [ ]
b) 10 J
c) 20 J
d) 30 J



15. When a 4 V battery is connected across an unknown resistor, there is a current of 100 mA in the circuit. The value of the resistance of the resister is [ ]

a) 4Ω
b) 40Ω
c) 400Ω
d) 0.4Ω



16. If the length of the wire is increased its Resistivity [ ]
a) Increases b) Decreases
c) Remians same d) may increases (or) may decreases

17. The current in a wire depends [ ]
a) Only on the potential difference applied b) Only on the resistance of wire
c) Both a and b d) Volume of conductor

18. As temparature increases the ratio of resistivity to conductivity [ ]
a) increases b) decreases c) remains constant
d) may increase or decrease depending on temperature.

19. The product of resistivity and conductivity of a cylindrical conductor depends on [ ]
a) temperature b) material c) area of cross-section d) None of these

20. The graph of I (on y - axis) vs V (on x - axis) is found to be a straight line. The slope of the straight line gives, [ ]
a) potential difference b) resistance
c) reciprocal of resistance d) current

II. Assertion and Reason Type Questions :

a) Both A and R are correct and R is the correct explanation of A
b) Both A and R are correct but R is not the correct explanation of A
c) A is correct, R is incorrect d) A is incorrect, R is correct

21. **Assertion (A) :** The connecting wires are made of copper. [ ]
Reason (R) : The electrical conductivity of copper is high.

22. **Assertion (A) :** When the length of a wire is doubled, then its resistance also gets doubled.
Reason (R) : The resistance of a wire is directly proportional to its length. [ ]

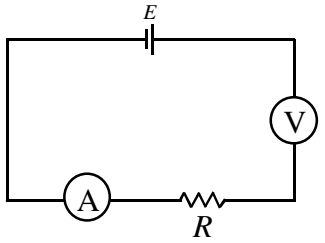
23. **Assertion (A) :** The 200 W bulbs glow with more brightness than 100 W bulbs parallel.
Reason (R) : A 100 W bulb has more resistance than 200 W bulb. [ ]

24. **Assertion (A) :** Heater wire must have high resistance will be high melting point. [ ]
Reason (R) : If resistance is high, the electric conductivity will be less.

25. **Assertion (A) :** A fuse wire is always connected in parallel with the mainline. [ ]
Reason (R) : If a current larger than the specified value flows through the circuit, fuse wire melts.

26. **Assertion (A) :** When a battery is short-circuited, the terminal voltage is zero. [ ]
Reason (R) : In the situation of a short-circuit, the current is zero

27. **Assertion (A) :** All electric devices shown in the circuit are ideal. The reading of ammeter (A) is zero and voltmeter (V) is E [ ]



Reason (R) : An ideal voltmeter draws almost no current due to very large resistance, and hence (V) and (A) will read zero.

28. **Assertion (A) :** If ρ_1 and ρ_2 be the resistivity of the materials of two resistors has same dinensions of resistances R_1 and R_2 respectively and if $R_1 > R_2$. then $\rho_1 > \rho_2$ [ ]
Reason (R) : The resistance $R \propto \rho$.

29. **Assertion (A) :** The product of resistivity and conductivity of a conductor depends on the material of the conductor. [ ]
Reason (R) : Because each of resistivity and conductivity depends on the material of the conductor.

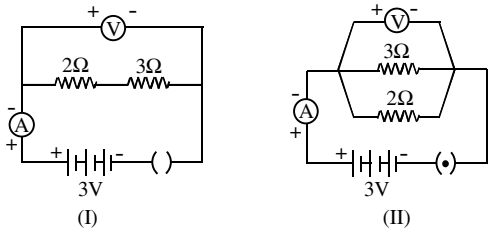
30. **Assertion (A) :** Fuse wire must have high resistance. [ ]
Reason (R) : Melting point of fuse wire is less

III. Skill Based Questions :

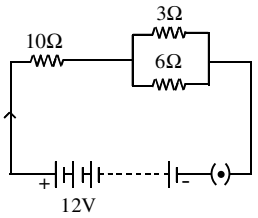
1. Why don't we use series arrangement of electrical appliances like bulb, Television, fan and other domestic circuits ?
2. Why should we connect the electric appliances in parallel to house hold circuit ? What happens if they are connected in series ?
3. Why do we consider tungsten as a suitable material for making the filament of a bulb ?
4. How do you verify that resistance of a conductor is inversely proportional to the cross sectional area of the conductor at constant temperature and length of the conductor ?
5. How do you verify that resistance of a conductor is proportional to the length of the conductor for constant cross section area and temperature ?
6. Suppose that you have three resistors each of value 30Ω. How many resistors can you obtain by various combinations of there three resistors ? Draw diagrams in support of your predictions.
7. A uniform wire of resistance 100Ω is melted and recast into wire of length double that of the original. What would be the resistance of the new wire formed ?
8. If the resistance of your body is 100000Ω what would be the current that flows in your body when you touch the terminals of a 12 v battery ?
9. What is the lowest resistance that can be obtained by combining four coils of resistances $4\Omega, 8\Omega, 12\Omega$ and 24Ω ?
10. How much current will an electric bulb of resistance 1100Ω draw from a 220 V source ? If a heater of resistance 100Ω is connected to the same source instead of the bulb, calculate the current drawn by the heater.
11. Two bulbs A and B are rated as 90W-120V and 60W-120V respectively. They are connected in parallel across a 120V source. Find the current in each bulb. Which bulb will consume more energy?
12. An electric iron consume energy at a rate of 840 W when heating is at the maximum rate and 360 W when the heating is at the minimum. The voltage is 220 V. What are the current and the resistance in each case ?

13. Two lamps, one rated 100 W; 220 V, and the other 60W; 220 V, are connected in parallel to electric mains supply. Find the current drawn by two bulbs from the line, if the supply voltage is 220 V.

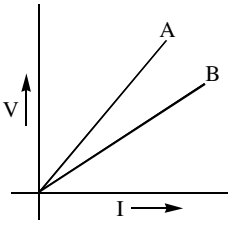
14. Find the voltmeter readings for the circuits I and II shown.



15. Consider the circuit shown in the diagram. Find the current in 3Ω resistor.

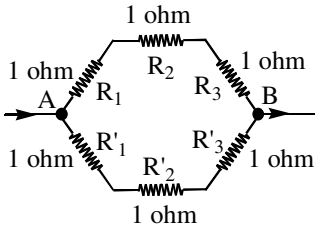


16. V-I graph for two wires A and B are shown in the figure. If both wires are of same length and same thickness, which of the two is made of a material of high resistivity?

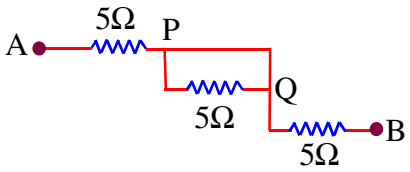


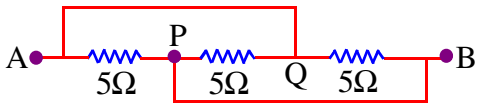
17. A current of 1 ampere flows in a series circuit having an electric lamp and a conductor of 5Ω when connected to a 10 V battery. Calculate the resistance of the electric lamp. Now if a resistance of 10Ω is connected in parallel with this series combination, what change (if any) in current flowing through 5Ω conductor and potential difference across the lamp will take place? Give reason.

18. Six 1 ohm resistances are connected to form a regular hexagon as shown in the figure alongside. Calculate the resistance offered by the combination if the current enters at the point A, and leaves from point B.



19. Find the equivalent resistance between the points A and B.

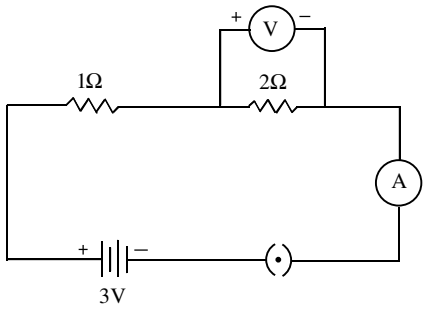




Figure

20. Two identical resistors each of resistance **12Ω** are connected (i) in series (ii) in parallel, inturn to a battery of 6 V. Calculate the ratio of power consumed in the combination of resistors in the two cases.

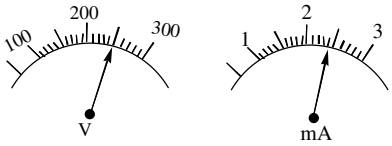
21. What would be the reading of ammeter and voltmeter in the given circuit?



22. Two resistors with resistances 10Ω and 15Ω are to be connected to emf 12 V so as to obtain (i) minimum current (ii) maximum current. How will you connect the resistance in each case? Calculate the strength of the total current in the circuit in the two cases.

23. a) What is meant by the statement, "The resistance of a conductor is one ohm"?
    b) Define electric power. Write an expression relating electric power, potential difference and resistance.
    c) How many 132 Ω resistors in parallel are required to carry 5 A on a 220 V line?

24. The current flowing through a resistor connected in a circuit and the potential difference developed across its ends are as shown in the diagram by milliammeter and voltmeter readings respectively
    a) What are the least counts of these meters? b) What is the resistance of the resistor?



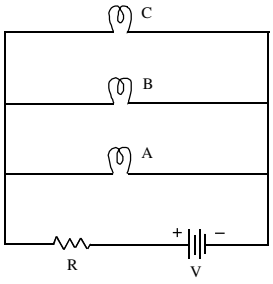
25. In an electrical circuit three incandescent bulbs A, B and C of rating 40 W, 60 W and 100 W respectively are connected in parallel to an electric source. Which of the following is likely to happen regarding their brightness ?

    a) Brightness of all the bulbs will be the same

    b) Brightness of bulb A will be the maximum

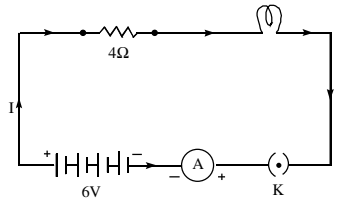
    c) Brightness of bulb B will be more than that of A

    d) Brightness of bulb C will be less than that of B



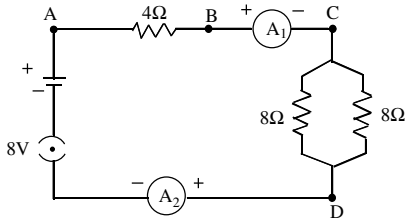
IV. Case Based Questions :

1. An electric lamp of resistance 20 Ω and a conductor of resistance 4 Ω are connected to a 6 V battery as shown in the circuit. Calculate



a) the total resistance of the circuit
b) the current through the circuit
c) the potential difference across the (i) electric lamp and (ii) conductor, and
d) power of the lamp.

2. Find out the following in the electric circuit given in figure.



a) Effective resistance of two 8 Ω resistors in the combination.
b) Current flowing through 4 Ω resistor.
c) Potential difference across 4 Ω resistance.
d) Power dissipated in 4 Ω resistor.
e) Difference in ammeter readings, if any.

3. Three heaters each rated ‘250 W, 100 V, are connected in parallel to a 100 V supply.

Calculate :

i) The total current taken from the supply
ii) The resistance of each heater
iii) The energy supplied in kWh to the three heaters in 5 hours.

(OR)

Define the commercial unit of electrical energy and How it is related with joule.

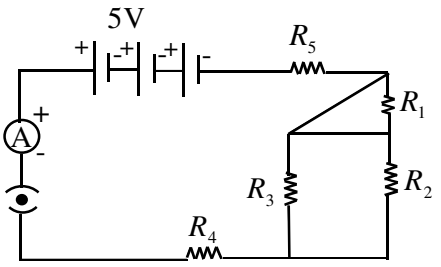
4. The generation of heat in a conductor is an inevitable consequence of electric current. In many cases, it is undesirable as it converts useful electrical energy into heat. However, heating effect of electric current has many useful applications

a) Write any two characteristics of material, which can be used to make the element of electric heater.
b) State Joule’s law of heat
c) Why alloys are commonly used in electrical heating devices?

(OR)

Why does connecting cord of an electrical heater not glow while the heating element does?

5. Consider the following circuit



i) Which two resistors are connected in series?

ii) Which two resistors are connected in parallel ?

iii) If every resistor of the circuit is $2\,\Omega$, what current will flow in the circuit?

(OR)

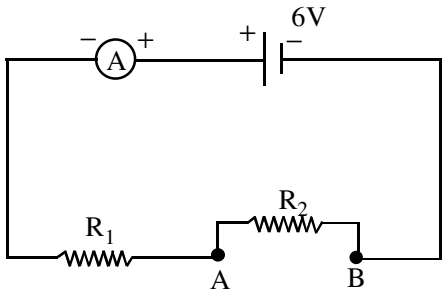
Write any two reasons, for a series arrangement not used for connecting domestic electrical appliances

6. The circuit diagram shown in figure include 6V battery, an ammeter A, a fixed resistor R_1, of $2\,\Omega$ and a resistance of wire R_2 connected between the two terminals A and B. Calculate the ammeter reading A when wire of R_2 is of

a) 0.2 m length and resistance of 4Ω

b) 0.4 m length and same thickness and material as in (a)

c) 0.2 m length and the area of cross section double than in (a)



(OR)

Write any two factors other than dimensions on which resistance of the wire depends ?

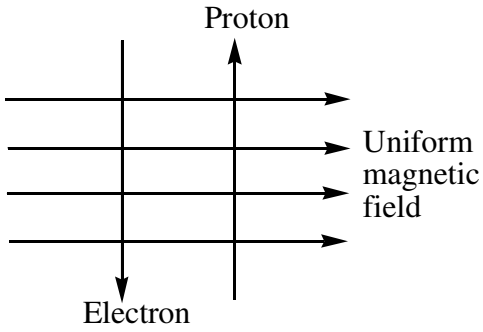
4. MAGNETIC EFFECTS OF ELECTRIC CURRENT

I. Multiple Choice Questions :

1. At the time of short circuit, the electric current in the circuit is [ ]
   a) vary continuously b) does not change c) reduces substantially d) increases heavily

2. Which of the following statement is not correct about the magnetic field? [ ]
   a) Magnetic field lines form a continuous closed curve.
   b) Magnetic field line do not interest each other.
   c) Direction of tangent at any point on the magnetic field line curve gives the direction of magnetic field at that point.
   d) Outside the magnet, magnetic field lines go from South to North pole of the magnet

3. Figure. In the field an electron and a proton move as shown. The electron and the proton experience. [ ]



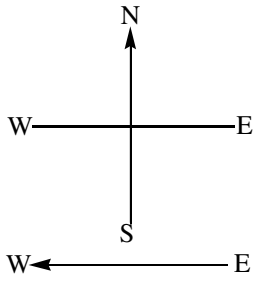
   a) forces both pointing into the plane of paper
   b) forces both pointing out of the plane of paper
   c) forces pointing into the plane of paper and out of the plane of paper, respectively.
   d) force pointing opposite and along the direction of the uniform magnetic field respectively.

4. The most important safety method used for protecting home appliances from short circuiting or overloading is [ ]
   a) earthing b) use of fuse
   c) use of stabilizers d) use of electric meter

5. Which of the following factors affect the strength of force experience by a current carrying conductor in a uniform magnetic field? [ ]
   a) magnetic field strength b) magnitude of current in a conductor
   c) length of the conductor within magnetic field d) All of above.

6. Choose the incorrect statement from the following regarding magnetic lines of field
   a) The direction of magnetic field at a point is taken to be the direction in which the north pole of a magnetic compass needle points. [ ]
   b) Magnetic field lines are closed curves.
   c) If magnetic field lines are parallel and equidistant, they represent zero field strength.
   d) Relative strength of magnetic field is shown by the degree of closeness of the field lines.

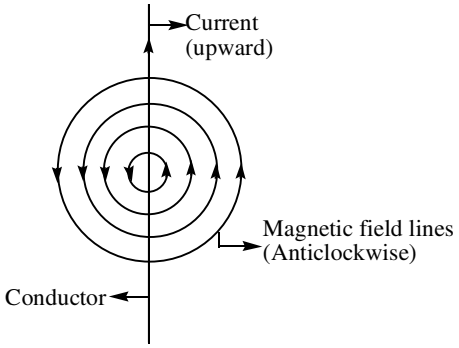
7. A constant current flows in a horizontal wire in the plane of the paper from east to west as shown in Figure. The direction of magnetic field at a point will be North to South [ ]



a) directly above the wire
b) directly below the wire
c) at a point located in the plane of the paper, on the north side of the wire
d) at a point located in the plane of the paper, on the south side of the wire

8. Which of the following correctly describes the magnetic field near long straight wire ?
a) the field consists of straight lines perpendicular to the wire. [ ]
b) the field consists of straight lines parallel to the wire.
c) the field consists of radial lines originating from the wire
d) the field consits of concentric circles centered on the wire

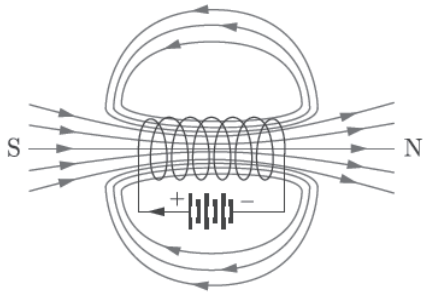
9. The strength of magnetic field around a current carrying conductor is [ ]



a) inversely proportional to the current but directly proportional to the square of the distance from wire.
b) directly proportional to the current and inversely proportional to the distance from wire.
c) directly proportional to the distance and inversely proportional to the current
d) directly proportional to the current but inversely proportional the square of the distance from wire.

10. The pattern of the magnetic field produced by the straight current carrying conducting wire is
a) in the direction opposite to the current [ ]
b) in the direction parallel to the wire
c) circular around the wire
d) in the same direction of current

11. The strength of magnetic field inside a long current carrying straight solenoid is [ ]

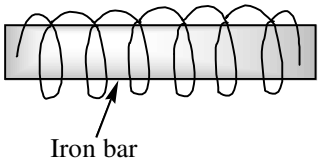


a) more at the ends than at the centre
b) minimum in the middle
c) same at all points
d) found to increase from one end to the other

12. The nature of magnetic field line passing through the centre of current carrying circular loop is

a) circular b) ellipse c) parabolic d) straight line [ ]

13. A soft iron bar is introduced inside the current carrying solenoid as shown in the figure. The magnetic field inside the solenoid [ ]



a) will decrease b) will remains same c) will increase d) will become zero

14. For a current in a long straight solenoid N and S – poles are created at the two ends. Among the following statements, the incorrect statement is [ ]
    a) The field lines inside the solenoid are in the form of straight lines which indicates that the magnetic field is the same at all points inside the solenoid.
    b) The strong magnetic field produced inside the solenoid can be used to magnetise a piece of magnetic material like soft iron, when placed inside the coil.
    c) The pattern of the magnetic field associated with the solenoid is different from the pattern of the magnetic field around a bar magnet.
    d) The N and S – poles exchange position when the direction of current through the solenoid is reversed.

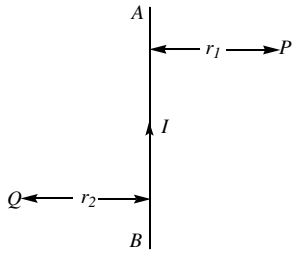
15. AB is a current carrying conductor in the plane of the paper as shown in figure. The directions of magnetic fields produced by it at points P and Q [ ]

a) Inwards, Outwards

b) Outwards, Inwards

c) Inwards, Inwards

d) Outwards, Outwards



16. The potential difference between the live wire and the neutral wire in India is [ ]
a) 110 V b) 50 V c) 220 V d) none of these

17. An electric fuse works on the _____ effect of current. [ ]
a) heating b) magnetic c) chemical d) none of these

18. Magnetic field cannot exert any force on a [ ]
a) movings Magnet b) stationary Magnet c) stationary charge d) none of these

19. A compass needle just above a wire in which electrons are moving towards east, will point
a) east b) west c) north d) south [ ]

20. By inserting a soft iron piece into a solenoid the strength of the magnetic field [ ]
a) Increase b) decreases
c) remains unchaned d) first increase then decreases

II. Assertion and Reason Type Questions :

a) Both A and R are correct and R is the correct explanation of A
b) Both A and R are correct but R is not the correct explanation of A
c) A is correct, R is incorrect d) A is incorrect, R is correct

21. **Assertion (A) :** The magnetic field produced by a current carrying solenoid is independent of its length and crosssection area. [ ]
Reason (R) : The magnetic field inside the solenoid is uniform.

22. **Assertion (A) :** A solenoid tends to expand, when a current passes through it. [ ]
Reason (R) : Two straight parallel metallic wires carrying current in same direction attract each other.

23. **Assertion (A) :** In a conductor, free electrons keep on moving but no magnetic force acts on a conductor in a magnetic field. [ ]
Reason (R) : Force on free electrons due to magnetic field always acts perpendicular to its direction of motion.

24. **Assertion (A) :** Electric appliances with metallic body have three connections, whereas an electric bulb has two pin connections. [ ]
Reason (R) : Three pin connections reduce heating of connecting wires.

25. **Assertion (A) :** Force experienced by moving charge will be maximum if direction of velocity of charge is perpendicular to applied magnetic field. [ ]
Reason (R) : Force on moving charge is independent of direction of applied magnetic field

26. **Assertion (A) :** The magnetic field is stronger at a point which is nearer to the conductor and goes on decreasing on moving away from the conductor. [ ]
Reason (R) : The magnetic field B produced by a straight current carrying wire is inversely proportional to the distance from the wire.

27. **Assertion (A) :** There is no change in the energy of a charged particle moving in a magnetic field although a magnetic force is acting on it. [ ]
Reason (R) : Work done by centripetal force is always zero.

28. **Assertion (A) :** A neutral body may experience a net non-zero magnetic force. [ ]
Reason (R) : The net charge on a current carrying wire is zero, but it can experience a force in a magnetic field.

29. **Assertion (A) :** By increasing number of turns in the current carrying coil, the strength of the magnetic field increases. [ ]
Reason (R) : The magnetic field produced in each loop of coil lies along the same direction.

30. **Assertion (A) :** The magnetic lines do not intersect one another [ ]
Reason (R) : Magnetic field can possess two different directions at a single point

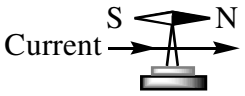
III. Skill Based Questions :

1. Meena draws magnetic field lines of field close to the axis of a current - carring circular loop. As she moves away from the center of the circular loop she observes that the lines keep on diverging. How will you Explain her observation.

2. Why does a magnetic compass needle pointing North and South in the absence of a nearby magnet get deflected when a bar magnet or a current - carrying loop is brought near it. Describe some salient features of the magnetic lines of field concept.

3. Describe the activity that shows that a current - carrying conductor experiences a force perpendicular to its lenght and the external magnetic field. How does Fleming's left- hand rule help us to find the direction of force on the current- carrying conductor ?

4. A wire is held parallel below a magnetic needle and the current flows from S to N. In which direction will the N - pole of the magnetic needle get deflected?



5. A number of bulbs are to be connected to a single source. Will they provide more illumination if connected in parallel or in series ?

6. A current-carrying wire is placed in a magnetic field. How does the displacement of the wire get affected when
   a) Current flowing through the wire is increased ?
   b) A stronger horseshoe magnet is used ?
   c) Length of the wire is increased ?

7. How can you show that the magnetic field produced by a given electric current in the wire decreases as the distance from the wire decreases ?

8. A uniform magnetic field in directed vertically upwards. In which direction in this field should an $\alpha-$ particle (which are positively charged particles) be projectd so that it is deflected south ward? Name and state the rule you have used to find the direction in this case.

9. The flow of a current in a circular loop of a wire creates a magnetic field at its centre. How can existance of this field be detected ? State the rule which helps to predict the direction of this magnetic field.

10. The magnetic field lines (or magnetic lines of force) around a current - carrying staright conductor are concentric circles with the conductor at its center.. The magnetic field lines are clockwise.
    a) What is the direction of flow of current?
    b) How does the spacing between the magnetic field lines vary wiht the distance from the conductor?

11. When a current carrying wire is placed in a magnetic field, it moves.
    a) What causes this motion?
    b) Which law is used to predict the direction of motion of the conductor?
    c) State the law mentioned in b.

12. Describe an activity to demonstrate magnetic field due to solenoid.

13. What is the magnitude of force experienced by the wire if current carrying wire is kept parallel to the magnetic field ?

14. When an electron and a neutron are moving through uniform magnetic field with velocity 'v' perpendicular to the direction of magnetic field 'B' Which particle deflects ? Why ?

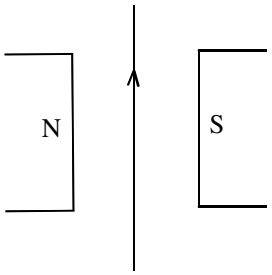
15. A straight wire lying in a horizontal plane carries a current from north to south.
    a) What will be the direction of magnetic field at a point just underneath it?
    b) Name the law used to arrive at the answer in part (a)

16. A straight conductor passes vertically through a cardboard having some iron fillings sprinkled on it.
    a) A current is passed in the conductor in downward direction and the cardboard is gently tapped. Show the setting of iron fillings on the card board and draw arrows to represent the direction of magnetic field lines.
    b) What changes occurr in the arrangement of iron fillings in part (a) if
        i) the strength of current is increased ?
        ii) the single conductor is replaced by several parallel conductors each carrying the same current flowing in the same direction ?
    c) Name the law used by you to find the direction of magnnetic field lines.

17. What is lighting circuit and power circuit? Explain the difference between them.

18. Draw a schematic labelled diagram of a domestic wiring circuit which includes
    i) main fuse ii) a power meter iii) distribution box.

19. When the current carrying conductor is placed in magnetic field as shown figure.



Where should be the total magnetic field is larger (above / below the wire) Explain.

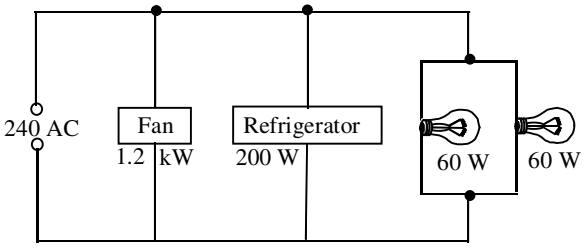
20. Answer the following questions :
    i) What is the direction of magnetic field lines outside a bar-magnet ?
    ii) The magnetic field lines in a given region are getting crowded. What does it indicate ?
    iii State one advantage of AC over DC.

21. i) What is the function of earth wire in electrical instruments?
    ii) Explain what is short circuiting an electric supply.
    iii) What is the usual current rating of the fuse wire in the line to feed
    a) Lights and fans? b) Appliances of 2kW or more power?

22. a) Which effect of the electric current is utilised in the working of an electrical fuse ?
    b) Is a fuse connected in series or in parallel in household circuit ?
    c) Draw a schematic labelled diagram of a domestic circuit which has a provision of a main fuse, meter, one light bulb and a switch/socket.

23. Inside the house, connections to all the devices are made in parallel, each having independent switch and fuse (if necessary). Thus, when ever some fault occurs in circuit of one particular device in one room, devices in other rooms do not suffer.

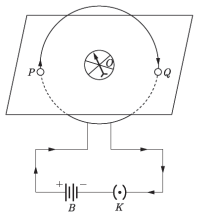
    Figure shows a 240V AC mains circuit to which a number of appliances are connected and switched on.



Calculate resistance of the filament of one lamp

24. Answer the following questions :
    i) What is the direction of magnetic field lines outside a bar-magnet ?
    ii) What is the SI unit of magnetic field ?
    iii) What does crowding of magnetic field lines indicate ?

25. The flow of current in a circular loop of wire creates a magnetic field at its center. How may existence of this field be detected ? State the rule which helps to predict the direction of this magnetic field.

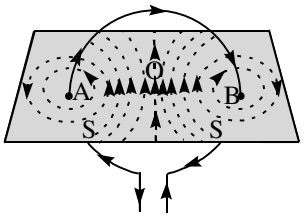


IV. Case Based Questions :

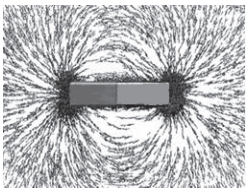
1. When a current is passed through the circular loop of wire, a magnetic field lines near the coil are nearly circular and concentric. At the centre of the circular loop, the magnetic field lines are straight.

   The strength of the magnetic field produced by a current-carrying circular coil (or circular wire) depends on :
   i) current flowing through the coil.
   ii) radius of the circular coil.
   iii) number of turns of wire in the circular coil.

   The direction of the field lines can be found by applying Right-Hand Thumb Rule
   i) State Right-hand Thumb rule.
   ii) A long horizontal power line is carrying a current of 100 A in the east-west direction. What is the direction of magnetic field at a point 1.0 m below it ?
   iii) What type of curve we get, between magnetic field and distance along the axis of a current carrying circular coil ?
   iv) If a current carrying straight conductor is placed in east-west direction, then find the direction of the force experienced by the conductor due to earth's magnetic field.

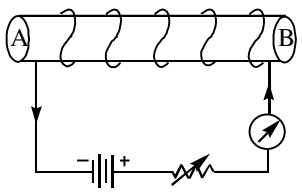


2. Study the diagram given below and answer the questions that follow :
   a) Why do the iron filings arrange in such a pattern?
   b) What does this pattern demonstrate ?
   c) Why do the iron filings near the bar magnet seem to align in the shape of closed curves?



3. Although electric kettle and electric toaster were used simultaneously in the kitchen to prepare breakfast for the family, yet the two devices could work efficiently due to 'fuse' used in the electric circuit.
   i) What is a fuse? Write the material used in fuse wires.
   How is a fuse connected in an electric circuit ?
   ii) State the ratings of fuse used in electric circuits.
   iii) What is the function of a fuse ? How does it perform its function ?
   iv) A device uses 1 kW electric power when operated at 220 V.
   Calculate the rating of the fuse to be used.

4. Diagram below shows a circuit containing a coil wound over a long and thin hollow cardboard tube. Copy the diagram.



i) Show the polarity acquired by each face of the solenoid.

ii) Draw the magnetic field lines of force inside the coil and also show their direction.

iii) Mention two methods to increase the strength of the magnetic field inside the coil.

(OR)

State the factors on which the resistance of a cylindrical conductor depends. How will resistance of a conductor change if it is stretched so that its length is doubled ?

5. We have already described oersted's experiment which shows that a current - carrying wire exerts a force on a compass needle and deflects it from its usual north - south position. Since a compass needle is actually a small freely pivoted magnet, we can also say that a current - carrying wire exerts a mechanical force on a magnet, and if the magnet is free to move, this force can produce a motion in the magnet. The reverse of this is also true, that is, a magnet exerts a mechanical force on a current - carrying wire, and if the wire is free to move, this force can produce a motion in the wire.

a) How should we place current carrying conductor in magnetic field to get

i) maximum force

ii) minimum force

b) State the rule, which is used to find the direction of force on conductor

c) Explain any three ways to increase the force acting on current carrying conductor when it is placed in magnetic field.

(OR)

Draw the experimental set up to show the force acting on current carrying conductor when it is placed in magnetic field

6. When a wire carries more current than it can carry without over heating, it is said to be overloaded. An event in which a large current passes through the wires when the neutral wires touch accidentally is called a short circuit. An overload or a short circuit causes excess heating of the wires, which may even cause a fire. To prevent this, fuses or circuit breakers are used. To prevent electric shocks in the event of the live wire touching the metallic body of an appliance, the body is connected to the earth wire.

a) What is meant by overloading of an electric circuit?

b) What is short circuiting ?

c) What precautions should be taken to avoid overloading of domestic electric circuits?

(OR)

Explain the functioning of earth wire