

CHAPTER-WISE PREVIOUS YEARS' QUESTIONS

SCIENCE & MATHEMATICS

Class X (CBSE)



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Note: After attempting the questions, a student must refer to the stepwise solutions available on our website **www.aakash.ac.in** and compare his/her solutions with the solutions given on our website. To get the text solution, students are required to **sign in** their account with their log in credentials.

CHAPTER-WISE PREVIOUS YEARS' QUESTIONS

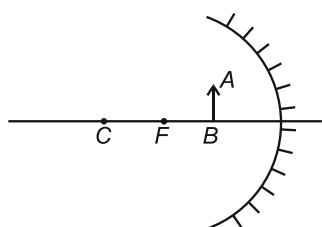
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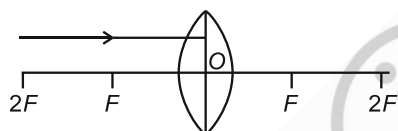
PHYSICS

1 : Light : Reflection and Refraction

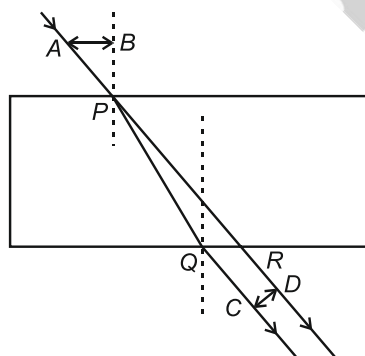
1. Draw the following diagram in your answer-book and show the formation of image of the object, AB with the help of suitable rays. [2008] ...[1M]



2. Draw the given diagram in your answer book and complete it for the path of ray of light beyond the lens. [2009] ...[1M]



3. Why does a ray of light bend when it travels from one medium into another? [2009] ...[1M]
4. Explain why a ray of light passing through the centre of curvature of a concave mirror gets reflected along the same path. [2010] ...[1M]
5. What is the nature of the image formed by a concave mirror if the magnification produced by the mirror is +3? [2010] ...[1M]
6. For a ray of light passing through a glass slab, the lateral displacement was correctly measured as : [2011] ...[1M]



- (a) AB
(b) PQ
(c) CD
(d) PR

7. To find the focal length of a concave mirror, Sita should choose which one of the following :

[2011] ...[1M]

- (a) A mirror holder and screen holder
(b) A screen holder and a scale
(c) A mirror holder, a screen holder and a scale
(d) A screen, a mirror, holders for them and a scale

8. By using a convex lens, a student obtained a sharp image of his classroom window grill on a screen. In which direction should he move the lens to focus a distant tree instead of the grill?

[2011, 2016, 2017] ...[1M]

- (a) Towards the screen
(b) Away from the screen
(c) Very far away from the screen
(d) Behind the screen

9. To determine the focal length of a convex lens by obtaining a sharp image of a distant object, the following steps were suggested which are not in proper sequence. [2011, 2012] ...[1M]

- I. Hold the lens between the object and the screen.
- II. Adjust the position of the lens to form a sharp image.
- III. Select a suitable distant object.
- IV. Measure the distance between the lens and the screen.

The correct sequence of steps to determine the focal length of the lens is

- (a) III, I, II, IV
(b) III, I, IV, II
(c) III, IV, II, I
(d) I, II, III, IV

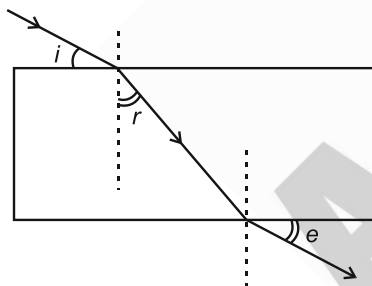
10. While tracing the path of a ray of light passing through a rectangular glass slab a student tabulated his observations as given below:

Sr. No.	$\angle i$	$\angle r$	$\angle e$
I	60°	40°	61°
II	50°	36°	51°
III	40°	28°	39°
IV	30°	20°	31°

The **correct** observation is [2012, 2013] ...[1M]

- (a) I
(b) II
(c) III
(d) IV
11. A student traces the path of a ray of white light through a rectangular glass slab and marks the angles of incidence ($\angle i$), refraction ($\angle r$) and emergence ($\angle e$) as shown.

[2012, 2014] ...[1M]



Which angle or angles have not been marked correctly?

- (a) $\angle i$ only
(b) $\angle i$ and $\angle r$
(c) $\angle r$ and $\angle e$
(d) $\angle i$ and $\angle e$
12. A student obtained a sharp image of the grills of a window on a screen using a concave mirror. His teacher remarked that for getting better results a well lit distant object (preferably the Sun) should be focused on the screen. What should be done for this purpose?

[2012, 2013] ...[1M]

- (a) Move the screen and the mirror towards the object
(b) Move the screen and the mirror away from the object
(c) Move the screen slightly away from the mirror
(d) Move the mirror slightly towards the screen

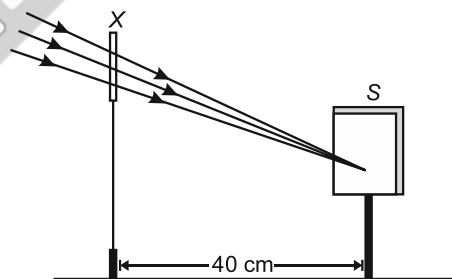
13. To determine focal length of a concave mirror a student obtains the image of a well lit distant object on a screen. To determine the focal length of the given concave mirror he needs to measure the distance between the

[2012]...[1M]

- (a) Cannot be determined
(b) Screen and the object
(c) Mirror and the object
(d) Mirror and the screen

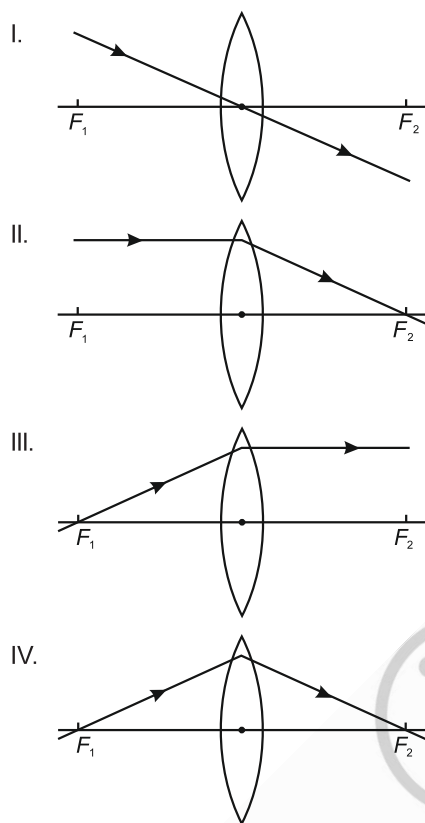
14. A student focussed the image of a distant object using a device 'X' on a white screen 'S' as shown in the figure. If the distance of the screen from the device is 40 cm, select the correct statement about the device.

[2013, 2014, 2015, 2017] ...[1M]



- (a) The device X is a convex lens of focal length 20 cm
(b) The device X is a concave mirror of focal length 40 cm
(c) The device X is a convex mirror of radius of curvature 40 cm
(d) The device X is a convex lens of focal length 40 cm.

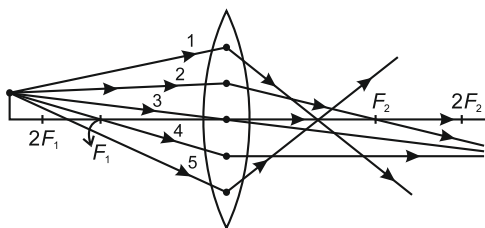
15. Study the following ray diagrams : [2013] ...[1M]



The diagrams showing the correct path of the ray after passing through the lens are :

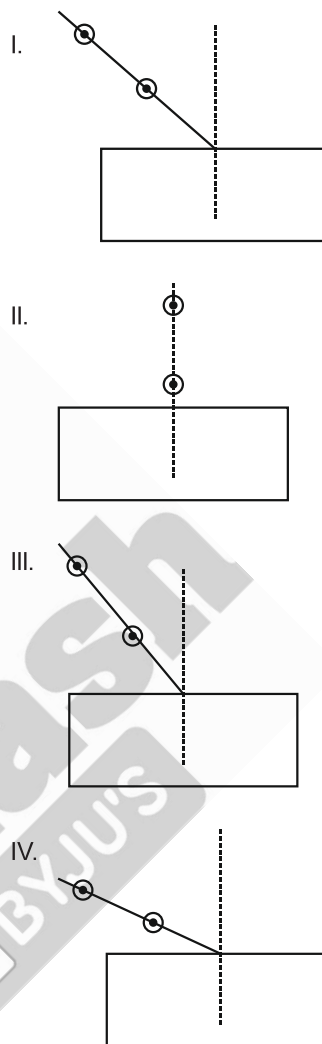
- (a) II and III only
 - (b) I and II only
 - (c) I, II and III
 - (d) I, II and IV
16. Out of the five incident rays shown in the figure find the three rays which are obeying the laws of refraction and may be used for locating the position of the image formed by a convex lens:

[2013, 2014] ...[1M]



- (a) 1, 2 and 3
- (b) 2, 3 and 4
- (c) 3, 4 and 5
- (d) 1, 2 and 4

17. Select from the following the best set-up for tracing the path of a ray of light through a rectangular glass slab: [2013] ...[1M]



- (a) I
 - (b) II
 - (c) III
 - (d) IV
18. In an experiment to trace the path of a ray of light through a glass prism for different values of angle of incidence a student would find that the emergent ray :

[2013] ...[1M]

- (a) Is parallel to the incident ray
- (b) Perpendicular to the incident ray
- (c) Is parallel to the refracted ray
- (d) Bends at an angle to the direction of the incident ray

19. A student has obtained an image of a well-illuminated distant object on a screen to determine the focal length, F_1 of the given spherical mirror. The teacher then gave him another mirror of focal length, F_2 and asked him to obtain a focussed image of the same object on the same screen. The student found that in order to focus the same object using the second mirror, he has to move the mirror away from the screen. From this observation, it may be concluded that both the spherical mirrors given to the student were (select the correct option)

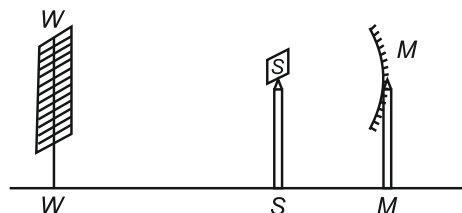
[2014] ...[1M]

- (A) Concave and $F_1 < F_2$
 (B) Concave and $F_1 > F_2$
 (C) Convex and $F_1 < F_2$
 (D) Convex and $F_1 > F_2$
20. A student is using a convex lens of focal length 10 cm to study the image formation by a convex lens for the various positions of the object. In one of his observations, he may observe that when the object is placed at a distance of 20 cm from the lens, its image is formed at (select the correct option)
- (A) 20 cm on the other side of the lens and is of the same size, real and erect.
 (B) 40 cm on the other side of the lens and is magnified, real and inverted.
 (C) 20 cm on the other side of the lens and is of the same size, real and inverted.
 (D) 20 cm on the other side of the lens and is of the same size, virtual and erect.
21. Draw a ray diagram to show the path of the reflected ray corresponding to an incident ray of light parallel to the principal axis of a convex mirror and show the angle of incidence and angle of reflection on it.
22. A student traces the path of a ray of light through a rectangular glass slab for the different values of angle of incidence. He observes all possible precautions at each step of the experiment. At the end of the experiment, on analyzing the measurements, which of the following conclusions is he likely to draw?

[2015] ...[1M]

- (A) $\angle i = \angle e < \angle r$ (B) $\angle i - \angle e < \angle r$
 (C) $\angle i > \angle e > \angle r$ (D) $\angle i = \angle e > \angle r$

23. A student obtains a sharp image of the distant window (W) of the school laboratory on the screen (S) using the given concave mirror (M) to determine its focal length. Which of the following distances should he measure to get the focal length of the mirror? [2015] ...[1M]



- (A) MW (B) MS
 (C) SW (D) MW – MS
24. A 4 cm tall object is placed on the principal axis of a convex lens. The distance of the object from the optical centre of the lens is 12 cm and its sharp image is formed at a distance of 24 cm from it on a screen on the other side of the lens. If the object is now moved a little away from the lens, in which way (towards the lens or away from the lens) will he have to move the screen to get a sharp image of the object on it again?
 How will the magnification of the image be affected? [2015] ...[1M]
25. To determine the approximate value of the focal length of a given concave mirror, you focus the image of a distant object formed by the mirror on a screen. The image obtained on the screen, as compared to the object is always. [2016] ...[1M]
- (A) Laterally inverted and diminished
 (B) Inverted and diminished
 (C) Erect and diminished
 (D) Erect and highly diminished
26. In your laboratory you trace the path of light rays through a glass slab for different values of angle of incidence ($\angle i$) and in each case measure the values of the corresponding angle of refraction ($\angle r$) and angle of emergence ($\angle e$). On the basis of your observations your correct conclusion is [2016] ...[1M]
- (a) $\angle i$ is more than $\angle r$, but nearly equal to $\angle e$
 (b) $\angle i$ is less than $\angle r$, but nearly equal to $\angle e$
 (c) $\angle i$ is more than $\angle e$, but nearly equal to $\angle r$
 (d) $\angle i$ is less than $\angle e$, but nearly equal to $\angle r$

27. An object is placed at a distance of 15 cm from a concave lens of focal length 30 cm. List four characteristic (nature, position, etc.) of the image formed by the lens. **[2017] ...[1M]**

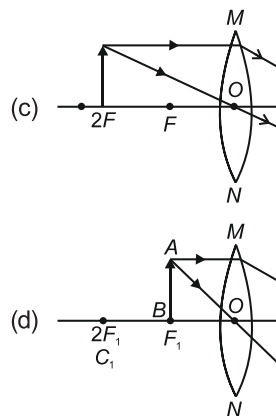
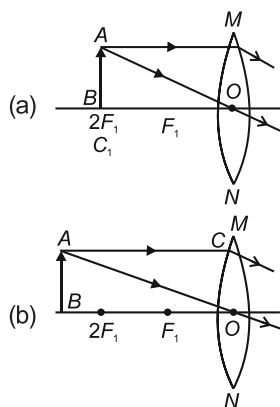
28. The laws of reflection hold true for :

[2020] ...[1M]

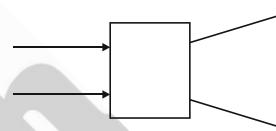
- (a) plane mirrors only
(b) concave mirrors only
(c) convex mirrors only
(d) all reflecting surfaces
29. When an object is kept within the focus of a concave mirror, an enlarged image is formed behind the mirror. This image is **[2020] ...[1M]**

- (a) real
(b) inverted
(c) virtual and inverted
(d) virtual and erect
30. In which of the following is a concave mirror used? **[2021] ...[1M]**

- (a) A solar cooker
(b) A rear view mirror in vehicles
(c) A safety mirror in shopping malls
(d) In viewing full size image of distant tall buildings
31. A student wants to obtain magnified image of an object AB as on a screen. Which one of the following arrangements shows the correct position of AB for him/her to be successful? **[2021] ...[1M]**

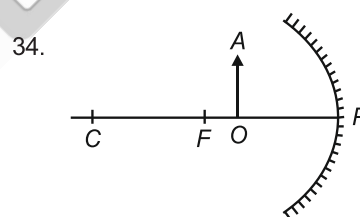


32. The following diagram shows the use of an optical device to perform an experiment of light. As per the arrangement shown, the optical device is likely to be a **[2021] ...[1M]**



- (a) Concave mirror (b) Concave lens
(c) Convex mirror (d) Convex lens
33. A ray of light starting from air passes through medium A of refractive index 1.50, enters medium B of refractive index 1.33 and finally enters medium C of refractive index 2.42. If this ray emerges out in air from C , then for which of the following pairs of media the bending of light is least? **[2021] ...[1M]**

- (a) air- A (b) A - B
(c) B - C (d) C -air

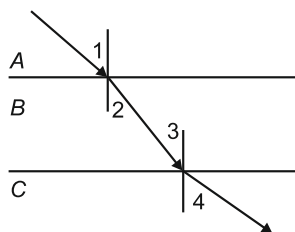


For the diagram shown, according to the new Cartesian sign convention the magnification of the image formed will have the following specifications:

[2021] ...[1M]

- (a) Sign - Positive, Value - Less than 1
(b) Sign - Positive, Value - More than 1
(c) Sign - Negative, Value - Less than 1
(d) Sign - Negative, Value - More than 1

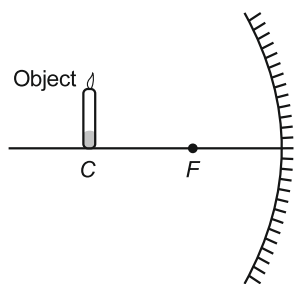
35.



A ray of light is incident as shown. If A, B and C are three different transparent media, then which among the following options is true for the given diagram? [2021] ...[1M]

- (a) $\angle 1 > \angle 4$ (b) $\angle 1 < \angle 2$
 (c) $\angle 3 = \angle 2$ (d) $\angle 3 > \angle 4$
36. If a lens can converge the sun rays at a point 20 cm. away from its optical centre, the power of this lens is [2021] ...[1M]
- (a) +2D (b) -2D
 (c) +5D (d) -5D
37. The radius of curvature of a converging mirror is 30 cm. At what distance from the mirror should an object be placed so as to obtain a virtual image? [2021] ...[1M]
- (a) Infinity
 (b) 30 cm
 (c) Between 15 cm and 30 cm
 (d) Between 0 cm and 15 cm
38. A converging lens forms a three times magnified image of an object, which can be take on a screen. If the focal length of the lens is 30 cm, then the distance of the object from the lens is [2021] ...[1M]
- (a) -55 cm (b) -50 cm
 (c) -45 cm (d) -40 cm

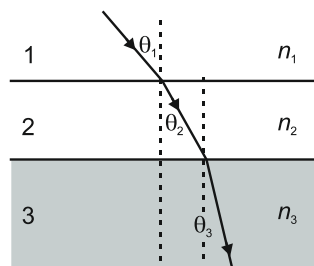
39.



Which of the following statements is **not** true in reference to the diagram shown above? [2021] ...[1M]

- (a) Image formed is real
 (b) Image formed is enlarged
 (c) Image is formed at a distance equal to double the focal length
 (d) Image formed is inverted

40.



In the diagram shown above n_1 , n_2 and n_3 are refractive indices of the media 1, 2 and 3 respectively. Which one of the following is true in this case? [2021] ...[1M]

- (a) $n_1 = n_2$ (b) $n_1 > n_2$
 (c) $n_2 > n_3$ (d) $n_3 > n_1$
41. The refractive index of medium A is 1.5 and that of medium B is 1.33. If the speed of light in air is 3×10^8 m/s, what is the speed of light in medium A and B respectively? [2021] ...[1M]
- (a) 2×10^8 m/s and 1.33×10^8 m/s
 (b) 1.33×10^8 m/s and 2×10^8 m/s
 (c) 2.25×10^8 m/s and 2×10^8 m/s
 (d) 2×10^8 m/s and 2.25×10^8 m/s
42. An object of height 4 cm is kept at a distance of 30 cm from the pole of a diverging mirror. If the focal length of the mirror is 10 cm, the height of the image formed is [2021] ...[1M]
- (a) +3.0 cm (b) +2.5 cm
 (c) +1.0 cm (d) +0.75 cm

Case Study Based Questions (Q.43 to Q.46) :

A compound microscope is an instrument which consists of two lenses L_1 and L_2 . The lens L_1 called objective, forms a real, inverted and magnified image of the given object. This serves as the object for the second lens L_2 ; the eye piece. The eye piece functions like a simple microscope or magnifier. It produces the final image, which is inverted with respect to the original object, enlarged and virtual.

43. What types of lenses must be L_1 and L_2 ?

[2021] ...[1M]

- (a) Both concave
 (b) Both convex
 (c) L_1 - concave and L_2 - convex
 (d) L_1 - convex and L_2 - concave

44. What is the value and sign of magnification (according to the new Cartesian sign convention) of the image formed by L_1 ? **[2021] ...[1M]**
 (a) Value = Less than 1 and Sign = Positive
 (b) Value = More than 1 and Sign = Positive
 (c) Value = Less than 1 and Sign = Negative
 (d) Value = More than 1 and Sign = Negative
45. What is the value and sign of (according to new Cartesian sign convention) magnification of the image formed by L_2 ? **[2021] ...[1M]**
 (a) Value = Less than 1 and Sign = Positive
 (b) Value = More than 1 and Sign = Positive
 (c) Value = Less than 1 and Sign = Negative
 (d) Value = More than 1 and Sign = Negative
46. If power of the eyepiece (L_2) is 5 diopters and it forms an image at a distance of 80 cm from its optical centre, at what distance should the object be? **[2021] ...[1M]**
 (a) 12 cm (b) 16 cm
 (c) 18 cm (d) 20 cm
47. Draw ray diagrams to represent the nature, position and relative size of the image formed by a convex lens for the object placed :
 (a) at $2F_1$.
 (b) Between F_1 and the optical centre O of lens. **[2008] ...[2M]**
48. What is the minimum number of rays required for locating the image formed by a concave mirror for an object? Draw a ray diagram to show the formation of a virtual image by a concave mirror. **[2009] ...[2M]**
49. State any four characteristics of the image of the objects formed by a plane mirror. **[2011] ...[2M]**
50. List four properties of the image formed by a concave mirror when an object is placed between the focus and pole of the mirror. **[2012] ...[2M]**
51. "A concave mirror of focal length 15 cm can form a magnified, erect as well as inverted image of an object placed in front of it." Justify this statement stating the position of the object with respect to the pole of the mirror in both the cases for obtaining the images. **[2014] ...[2M]**
52. An object of height 2.5 cm is placed at a distance of 15 cm from the optical centre 'O' of a convex lens of focal length 10 cm. Draw a ray diagram to find the position and size of the image formed. Mark optical 'O', principal focus F and height of the image on the diagram. **[2016, 2018] ...[2M]**
53. The refractive indices of glass and water with respect to air are $\frac{3}{2}$ and $\frac{4}{3}$ respectively. If speed of light in glass 2×10^8 m/s, find the speed of light in water. **[2016] ...[2M]**
54. If the image formed by a spherical mirror for all positions of the object placed in front of it is always erect and diminished, what type of mirror is it? Draw a labelled ray diagram to support your answer. **[2018] ...[2M]**
55. List four precautions which a student should observe while determining the focal length of a given convex lens by obtaining image of a distant object on a screen. **[2019] ...[2M]**
56. At what distance should an object be placed from a convex lens of focal length 18 cm to obtain an image at 24 cm from it on the other side. What will be magnifications produced in this case? **[2010] ...[3M]**
57. An object is placed between infinity and the pole of a convex mirror. Draw a ray diagram and also state the position, the relative size and the nature of the image formed. **[2011] ...[3M]**
58. What is the principle of reversibility of light? Show that the incident ray of light is parallel to the emergent ray of light when light falls obliquely on a side of a rectangular glass slab. **[2011, 2013] ...[3M]**
59. State the type of mirror preferred as
 (i) Rear view mirrors in vehicles
 (ii) Shaving mirrors. Justify your answer giving two reasons in each case **[2012, 2013] ...[3M]**
60. The image of a candle flame placed at a distance of 36 cm from a spherical lens is formed on a screen placed at a distance of 72 cm from the lens. Identify the type of lens and calculate its focal length. If the height of the flame is 2.5 cm, find the height of the image. **[2012] ...[3M]**

61. A student wants to project the image of a candle flame on a screen 90 cm in front of a mirror by keeping the flame at a distance of 15 cm from its pole. **[2014] ...[3M]**
- (a) Suggest the type of mirror he should use
 - (b) Determine the linear magnification in this case
 - (c) Find the distance between the object and its image
 - (d) Draw ray diagram to show the image formation in this case
62. Draw a ray diagram to show the path of the refracted ray in each of the following cases :
A ray of light incident on a concave lens is **[2014] ...[3M]**
- (i) Passing through its optical centre.
 - (ii) Parallel to its principal axis.
 - (iii) Directed towards its principal focus.
63. An object of height 5 cm is placed perpendicular to the principal axis of a concave lens of focal length 10 cm. If the distance of the object from the optical centre of the lens is 20 cm, determine the position, nature and size of the image formed using the lens formula. **[2015] ...[3M]**
64. 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. **[2016] ...[3M]**
65. "A lens can form a magnified erect image as well as magnified inverted image of an object placed in front of it". State the nature of this lens and draw ray diagrams to justify the above statement. Mark the positions of O , F and $2F$ in the diagram. **[2017] ...[3M]**
66. State the laws of refraction of light. Explain the term 'absolute refractive of a medium' and write an expression to relate it with the speed of light in vacuum. **[2018] ...[3M]**
67. (a) Draw a ray diagram to show the formation of image of an object placed between infinity and the optical centre of a concave lens.
(b) A concave lens of focal length 15 cm forms an image 10 cm from the lens. Calculate
- (i) The distance of the object from the lens.
 - (ii) The magnification for the image formed.
 - (iii) The nature of the image formed.
- [2011] ...[5M]**
68. List the sign conventions for reflection of light by spherical mirrors. Draw a diagram and apply these conventions in the determination of focal length of a spherical mirror which forms a three times magnified real image of an object placed 16 cm in front of it. **[2012] ...[5M]**
69. (a) Explain the following terms related to spherical lenses : **[2014] ...[5M]**
- (i) Optical centre
 - (ii) Centres of curvature
 - (iii) Principal axis
 - (iv) Aperture
 - (v) Principal focus
 - (vi) Focal length
- (b) A converging lens has focal length of 12 cm. Calculate at what distance the object should be placed from the lens so that it forms an image at 48 cm on the other side of the lens?
70. What is meant by power of a lens? Define its SI unit. You have two lenses A and B of focal lengths +10 cm and -10 cm, respectively. State the nature and power of each lens. Which of the two lenses will form a virtual and magnified image of an object placed 8 cm from the lens? Draw a ray diagram to justify your answer. **[2015, 2018] ...[5M]**
71. One half of a convex lens of focal length 10 cm is covered with a black paper. Can such a lens produce an image of a complete object placed at a distance of 30 cm from the lens? Draw a ray diagram to justify your answer. A 4 cm tall object is placed perpendicular to its principal axis of a convex lens of focal length 20 cm. The distance of the object from the lens is 15 cm. Find the nature, position and the size of the image. **[2015] ...[5M]**

72. It is desired to obtain an erect image of an object, using concave mirror of focal length of 12 cm.

- What should be the range of distance an object placed in front of the mirror?
- Will the image be smaller or larger than the object? Draw ray diagram to show the formation of image in this case.
- Where will the image of this object be, if it is placed 24 cm in front of the mirror? Draw ray diagram for this situation also justify your answer.

Show the positions of pole, principal focus and the centre of curvature in the above ray diagrams. **[2016] ...[5M]**

73. (a) Define focal length of a divergent lens.
- (b) A divergent lens of focal length 30 cm forms the image of an object of size 6 cm on the same side as the object at a distance of 15 cm from its optical center. Use lens formula to determine the distance of the object from the lens and the size of the image formed.
- (c) Draw a ray diagram to show the formation of image in the above situation. **[2016] ...[5M]**
74. Analyse the following observation table showing variation of image distance (v) with object distance (u) in case of convex lens and answer the questions that follow without doing any calculations:

S.No	Object Distance u (cm)	Image Distance v (cm)
1	- 100	+ 25
2	- 60	+ 30
3	- 40	+ 40
4	- 30	+ 60
5	- 25	+ 100
6	- 15	+ 120

- What is the focal length of the convex lens? Give reason to justify your answer.
- Write the serial number of the observation which is not correct. On what basis have you arrived at this conclusion?
- Select an appropriate scale and draw a ray diagram for the observation at S. No. 2. Also find the approximate value of magnification. **[2017] ...[5M]**

75. (a) If the image formed by a mirror for all position of the object placed in front of it is always diminished erect and virtual. State the type of the mirror and also draw a ray diagram to justify your answer. Write one use of such mirrors are put to and why.

- (b) Define the radius of curvature of spherical mirrors. Find the nature and focal length of a spherical mirror whose radius of curvature is +24 cm. **[2017] ...[5M]**

76. An object is placed at a distance of 60 cm from a concave lens of focal length 30 cm.

[2019] ...[5M]

- Use lens formula to find the distance of the image from the lens.
- List four characteristics of the image (nature, position, size, erect/inverted) formed by the lens in this case.
- Draw ray diagram to justify your answer of part (b).

77. Draw a ray diagram in each of the following cases to show the formation of image, when the object is placed: **[2020] ...[5M]**

- Between optical centre and principal focus of a convex lens.
- Anywhere in front of a concave lens.
- At $2F$ of a convex lens.

State the signs and values of magnifications in the above mentioned cases (i) and (ii).

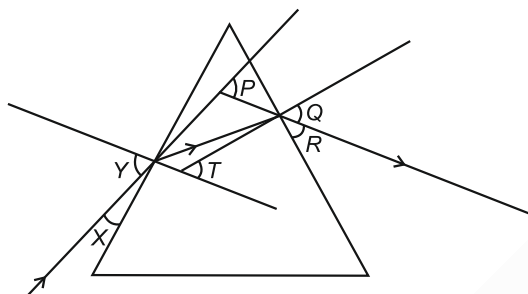
78. An object 4.0 cm in size, is placed 25.0 cm in front of a concave mirror of focal length 15.0 cm.

[2020] ...[5M]

- At what distance from the mirror should a screen be placed in order to obtain a sharp image?
- Find the size of the image.
- Draw a ray diagram to show the formation of image in this case.

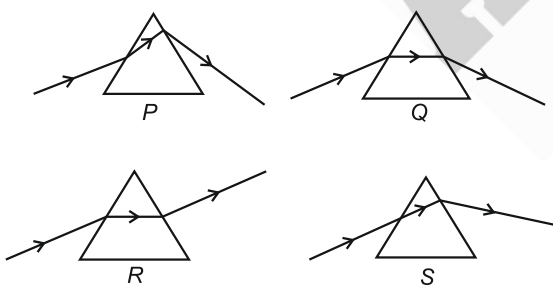
2 : Human Eye and Colourful World

1. Why does sky look blue on a clear day?
[2009] ...[1M]
2. In the following diagram, the path of a ray of light passing through a glass prism is shown:
[2014] ...[1M]



In this diagram the angle of incidence, the angle of emergence and the angle of deviation respectively are (select the correct option) :

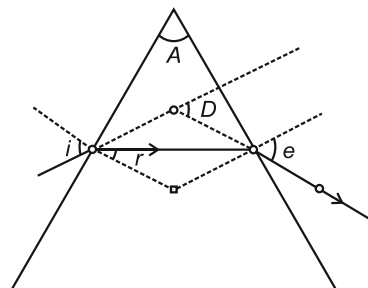
- (A) X, R and T
(B) Y, Q and T
(C) X, Q and P
(D) Y, Q and P
3. Study the following diagrams in which the path of a ray of light passing through a glass prism as traced by four students P, Q, R and S is shown:
[2014] ...[1M]



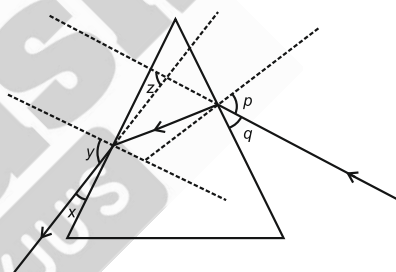
The student who has traced the path correctly is

- (A) P
(B) Q
(C) R
(D) S

4. In the following ray diagram the correctly marked angles are:
[2016] ...[1M]



- (A) $\angle i$ and $\angle e$
(B) $\angle A$ and $\angle D$
(C) $\angle i$, $\angle e$ and $\angle D$
(D) $\angle r$, $\angle A$ and $\angle D$
5. Study the following ray diagram:



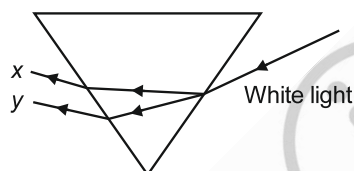
In this diagram, the angle of incidence, the angle of emergence and the angle of deviation respectively have been represented by

- [2017] ...[1M]
- (A) y, p, z
(B) x, q, z
(C) p, y, z
(D) p, z, y
6. A student very cautiously traces the path of a ray through a glass slab for different values of the angle of incidence ($\angle i$). He then measures the corresponding values of the angle of refraction ($\angle r$) and the angle of emergence ($\angle e$) for every value of the angle of incidence. On analysing these measurement of angles, his conclusion would be.
[2017] ...[1M]
- (A) $\angle i > \angle r > \angle e$ (B) $\angle i = \angle e > \angle r$
(C) $\angle i < \angle r < \angle e$ (D) $\angle i = \angle e < \angle r$

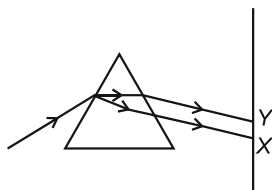
7. Which of the following statements is not true for scattering of light? **[2021] ...[1M]**

- (a) Colour of the scattered light depends on the size of particles of the atmosphere
- (b) Red light is least scattered in the atmosphere.
- (c) Scattering of light takes place as various colours of white light travel with different speed in air.
- (d) The fine particles in the atmospheric air scatter the blue light more strongly than red. So the scattered blue light enters our eyes.

8. In the diagram given below, x and y are the end colours of the spectrum of white light. The colour of 'y' represents the **[2021] ...[1M]**



- (a) Colour of sky as seen from earth during the day
 - (b) Colour of the sky as seen from the moon
 - (c) Colour used to paint the danger signals
 - (d) Colour of sun at the time of noon
9. A triangular glass prism. After passing through the prism it produces a spectrum XY on a screen. **[2010] ...[2M]**



- (a) State the colour seen at X and Y.
 - (b) Why do different colours of white light bend through different angles with respect to the incident beam of light?
10. Explain with the help of a diagram, how we are able to observe the sunrise about two minutes before the Sun gets above the horizon. **[2011] ...[2M]**

11. Draw a diagram to show dispersion of white light by a glass prism. What is the cause of this dispersion? **[2011] ...[2M]**

12. When we place a glass prism in the path of a narrow beam of white light, a spectrum is obtained. What happens when a second identical prism is placed in an inverted position with respect to the first prism? Draw a labelled ray diagram to illustrate it. **[2012] ...[2M]**

13. A star at times appears bright and at times fainter. What is this effect called? State the reason for this effect. **[2012] ...[2M]**

14. Define the term power of accommodation. Write the modification in the curvature of the eye lens which enables us to see the nearby objects clearly? **[2019] ...[2M]**

15. What is hypermetropia? State the two causes of hypermetropia. With the help of ray diagrams, show :

- (i) The eye-defect hypermetropia
- (ii) Correction of hypermetropia by using a lens

[2009] ...[3M]

16. At what distance should an object be placed from a convex lens of focal length 18 cm to obtain an image at 24 cm from it on the other side. What will be magnification produced in this case? **[2010] ...[3M]**

17. (a) What is meant by the power of accommodation of an eye?

- (b) A person with a myopic eye cannot see objects beyond 1.2 m directly. What should be the type of the corrective lens used? What would be its power? **[2011] ...[3M]**

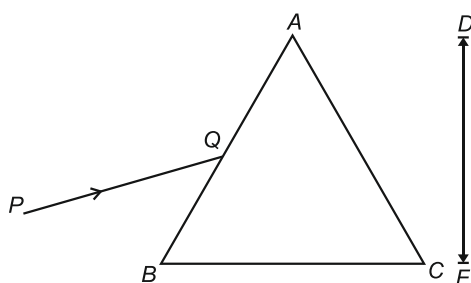
18. State the difference in colours of the Sun observed during sunrise/sunset and noon. Give explanation for each. **[2013] ...[3M]**

OR

With the help of scattering of light, explain the reason for the difference in colours of the Sun as it appears during sunset/sunrise and noon.

[2015] ...[3M]

19. A narrow beam PQ of white light is passing through a glass prism ABC as shown in the diagram. [2014] ...[3M]



Trace it on your answer sheet and show the path of the emergent beam as observed on the screen DE .

- Write the name and cause of the phenomenon observed.
 - Where else in nature is this phenomenon observed?
 - Based on this observation, state the conclusion which can be drawn about the constituents of white light.
20. Write the importance of ciliary muscles in the human eye. Name the defect of vision that arises due to gradual weakening of the ciliary muscles. What types of lenses are required by the person suffering from this defect to see the objects clearly?

Akshay, sitting in the last row in his class, could not see clearly the words written on the blackboard. When the teacher noticed it, he announced if any student sitting in the front row could volunteer to exchange his seat with Akshay. Salman immediately agreed to exchange his seat with Akshay. He could now see the words written on the blackboard clearly. The teacher thought it fit to send the message to Akshay's parents advising them to get his eyesight checked. In the context of the above event, answer the following questions:

- Which defect of vision is Akshay suffering from? Which type of lens is used to correct this defect?
- State the values displayed by the teacher and Salman.
- In your opinion, in what way can Akshay express his gratitude towards the teacher and Salman?

[2015] ...[3M]

- Describe an activity to show that colours of white light splitted by a glass prism can be recombined to get white light by another identical glass prism. Also draw ray diagram to show the recombination of the spectrum of white light. [2016] ...[3M]
- What is "dispersion of white light"? Draw a labelled diagram to illustrate the recombination of the spectrum of white light. Why it is essential that the two prisms used for the purpose should be identical and placed in an inverted position with respect to each other? [2017] ...[3M]
- Trace the sequence of events which occur when a bright light is focussed on your eyes. [2019] ...[3M]
- What is a rainbow? Draw a labelled diagram to show the formation of a rainbow. [2019] ...[3M]
- Why is Tyndall effect shown by colloidal particles? State four instances of observing the Tyndall effect. [2020]...[3M]
- Differentiate between a glass slab and a glass prism. What happens when a narrow beam of (i) a monochromatic light, and (ii) white light passes through (a) glass slab and (b) glass prism? [2020]...[3M]
- Draw a labelled diagram to show
 - reddish appearance of the sun at the sunrise or the sunset and
 - white appearance of the sun at noon when it is overhead
 [2020]...[3M]
- (a) Give reasons for the following :
 - Colour of the clear sky is blue.
 - The sun can be seen about two minutes before actual sunrise.
 - We cannot see an object clearly if it is placed very close to the eyes.
 (b) What is Presbyopia? Write two causes of this defect. [2008] ...[5M]
- (a) What is meant by dispersion of white light? Describe the formation of rainbow in the sky with the help of a diagram.
 (b) What is hypermetropia? Draw ray diagrams to show the image formation of an object by :
 - Hypermetropic eye
 - Correction made with a suitable lens for hypermetropic eye. [2008] ...[5M]

30. What is atmospheric refraction? Use this phenomenon to explain the following natural events:

- (a) Twinkling of stars
(b) Advanced sunrise and delayed sunset.

Draw diagrams to illustrate your answers.

[2016] ...[5M]

31. (a) A student suffering from myopia is not able to see distinctly the object placed beyond 5 m. List two possible reasons due to which this defect of vision may have arisen. With the help of ray diagrams explain.

- (i) Why the student is unable to see distinctly the objects placed beyond 5 cm from his eyes.
(ii) The type of the corrective lens used to restore proper vision and how this defect is corrected by the use of this lens.

- (b) If in this case, the numerical value of the focal length of the corrective lens is 5 m. Find the power of the lens as per the new Cartesian sign convention. [2017] ...[5M]

32. (a) A student is unable to see clearly the words written on the black board placed at a distance of approximately 3 m from him. Name the defect of vision of the boy is suffering from. State the possible causes of this defect and explain the method of correcting it.

- (b) Why do stars twinkle? Explain. [2018]...[5M]

33. (a) Write the function of each of the following parts of human eye:

- (i) Cornea (ii) Iris
(iii) Crystalline lens (iv) Ciliary muscles

- (b) Why does the Sun appear reddish early in the morning? Will this phenomenon be observed by an astronaut on the Moon? Give reason to justify your answer.

[2018] ...[5M]

3 : Electricity

1. Out of 60 W and 40 W lamps, which one has a higher electrical resistance when in use?

[2008] ...[1M]

2. What is the function of a galvanometer in a circuit?

[2019] ...[1M]

3. At the time of short circuit, the electric current in the circuit :

[2020] ...[1M]

- (a) vary continuously (b) does not change
(c) reduces substantially (d) increases heavily

4. Two bulbs of 100 W and 40 W are connected in series. The current through the 100 W bulb is 1 A. The current through the 40 W bulb will be:

[2020] ...[1M]

- (a) 0.4 A (b) 0.6 A
(c) 0.8 A (d) 1 A

5. Why are the coils of electric toasters made of an alloy rather than a pure metal?

[2008] ...[2M]

6. A piece of wire of resistance $20\ \Omega$ is drawn out so that its length is increased to twice its original length. Calculate the resistance of the wire in the new situation.

[2009] ...[2M]

7. The values of current (I) flowing through a given resistor of resistance (R), for the corresponding values of potential difference (V) across the resistor are as given below :

V (volts)	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0
I (amperes)	0.1	0.2	0.3	0.4	0.5	0.6	0.8	1.0

Plot a graph between current (I) and potential difference (V) and determine the resistance (R) of the resistor.

[2018] ...[2M]

8. While studying the dependence of potential difference (V) across a resistor on the current (I) passing through it, in order to determine the resistance of the resistor, a student took 5 readings for different values of current and plotted a graph between V and I . He got a straight line graph passing through the origin. What does the straight line signify? Write the method of determining resistance of the resistor using this graph.

[2019] ...[2M]

9. What would you suggest to a student if while performing an experiment he finds that the pointer/needle of the ammeter and voltmeter do not coincide with the zero marks on the scales when circuit is open? No extra ammeter/voltmeter is available in the laboratory

[2019] ...[2M]

10. Two lamps, one rated 60 W at 220 V and the other 40 W at 220 V, are connected in parallel to the electric supply at 220 V. **[2008] ...[3M]**
- Draw a circuit diagram to show the connections
 - Calculate the current drawn from the electric supply.
 - Calculate the total energy consumed by the two lamps together when they operate for one hour.
11. Two resistor, with resistances $5\ \Omega$ and $10\ \Omega$ respectively are to be connected to a battery of emf 6 V so as to obtain:
- How will you connect the resistances in each case?
 - Minimum current flowing
 - Maximum current flowing
 - Calculate the strength of the total current in the circuit in the two cases. **[2009] ...[3M]**
12. (a) Write Joule's law of heating.
- Two lamps, one rated 100 W ; 220 V, and the other 60 W; 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. **[2018] ...[3M]**
13. (a) List the factors on which the resistance of a conductor in the shape of a wire depends.
- Why are metals good conductors of electricity whereas glass is a bad conductor of electricity? Give reason.
 - Why are alloys commonly used in electrical heating devices? Give reason. **[2018]...[3M]**
14. Show how would you join three resistors, each of resistance $9\ \Omega$ so that the equivalent resistance of the combination is **[2018]...[3M]**
- $13\ \Omega$
 - $6\ \Omega$
15. (a) State the relation correlating the electric current flowing in a conductor and the voltage applied across it. Also draw a graph to show this relationship.
- Find the resistance of a conductor if the electric current flowing through it is 0.35 A when the potential difference across it is 1.4 V. **[2020] ...[3M]**
16. (a) Write the mathematical expression for Joule's law of heating.
- Compute the heat generated while transferring 96000 coulomb of charge in two hours through a potential difference of 40 V. **[2020] ...[3M]**
17. (a) State Ohm's Law. Represent it mathematically.
- Define 1 ohm.
 - What is the resistance of a conductor through which a current of 0.5 A flows when a potential difference of 2 V is applied across its ends? **[2022] ...[3M]**
18. (a) List the factors on which the resistance of a uniform cylindrical conductor of a given material depends.
- The resistance of a wire of 0.01 cm radius is $10\ \Omega$. If the resistivity of the wire is $50 \times 10^{-8}\ \Omega\ \text{m}$, find the length of this wire. **[2022] ...[3M]**
19. (a) What is the meaning of electric power of an electrical device? Write its SI unit.
- An electric kettle of 2 kW is used for 2h. Calculate the energy consumed in
 - kilowatt hour, and
 - joules. **[2022] ...[3M]**
20. Derive the expression for the heat produced due to a current ' I ' flowing for a time interval ' t ' through a resistor ' R ' having a potential difference ' V ' across it ends. With which name is the relation known? How much heat will an instrument of 12 W produce in one minute if it is connected to a battery of 12 V? **[2010]...[5M]**
21. Explain with the help of a labelled circuit diagram how you will find the resistance of a combination of three resistor, of resistance R_1 , R_2 and R_3 joined in parallel. Also mention how you will connect the ammeter and the voltmeter in the circuit when measuring the current in the circuit and the potential difference across one of the three resistors of the combination. **[2010] ...[5M]**

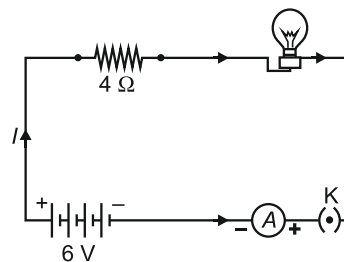
22. (a) With the help of a suitable circuit diagram prove that the reciprocal of the equivalent resistance of a group of resistances joined in parallel is equal to the sum of the reciprocals of the individual resistances.

- (b) In an electric circuit two resistors of $12\ \Omega$ each are joined in parallel to a 6 V battery. Find the current drawn from the battery.

[2019] ...[5M]

23. An electric lamp of resistance $20\ \Omega$ and a conductor of resistance $4\ \Omega$ are connected to a 6 V battery as shown in the circuit. Calculate :

[2019] ...[5M]

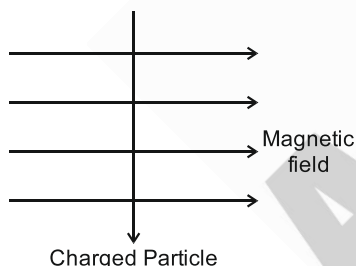


- (a) the total resistance of the circuit,
 (b) the current through the circuit,
 (c) the potential difference across the (i) electric lamp and (ii) conductor, and
 (d) power of the lamp.

4 : Magnetic Effects of Electric Current

1. Why is a series arrangement not used for connecting domestic electrical appliances in a circuit? [2008] ...[1M]

2. A charged particle enters at right angles into a uniform magnetic field is shown. What should be the nature of charge on the particle if it begins to move in a direction pointing vertically out of the page due to its interaction with the magnetic field? [2010] ...[1M]



3. What is the function of a galvanometer in a circuit? [2019] ...[1M]
4. The change in magnetic field lines in a coil is the cause of induced electric current in it. Name the underlying phenomenon. [2020] ...[1M]
5. What is meant by the term, 'magnetic field'? Why does a compass needle show deflection when brought near a bar magnet? [2008] ...[2M]
6. A coil of insulated wire is connected to a galvanometer. What would be seen if a bar magnet with its north pole towards one face of the coil is
- Moved quickly towards it,
 - Moved quickly away from the coil and
 - Placed near its one face?

Name the phenomena involved. [2010] ...[2M]

7. (a) Name the poles P, Q, R and S of the magnets in the following figures 'a' and 'b':

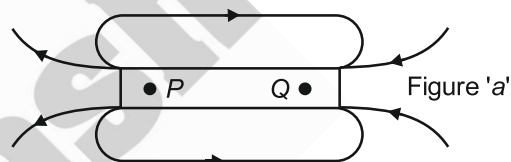


Figure 'a'

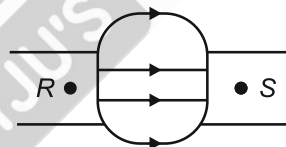


Figure 'b'

- (b) State the inference drawn about the direction of the magnetic field lines on the basis of these diagrams. [2022] ...[2M]

OR

When is the force experienced by a current - carrying straight conductor placed in a uniform magnetic field. [2022] ...[2M]

- Maximum ;
- Minimum ?

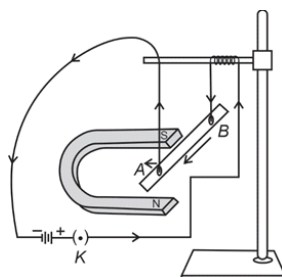
8. (a) Distinguish between the terms 'overloading' and 'short-circuiting' as used in domestic circuits.

- (b) Why are the coils of electric toasters made of any alloy rather than a pure metal?

[2008] ...[3M]

9. Case Study Based Questions :

A student was asked to perform an experiment to study the force on a current carrying conductor in a magnetic field. He took a small aluminium rod AB, a strong horse shoe magnet, some connecting wires, a battery and a switch and connected them as shown. He observed that on passing current, the rod gets displaced. On reversing the direction of current, the direction of displacement also gets reversed. On the basis of your understanding of this phenomenon, answer the following questions: [2022] ...[4M]



- Why does the rod get displaced on passing current through it?
- State the rule that determines the direction of the force on the conductor AB.
- If the U shaped magnet is held vertically and the aluminium rod is suspended horizontally with its end B towards due north, then on passing current through the rod from B to A as shown, in which direction will the rod be displaced?
 - Name any two devices that use current carrying conductors and magnetic field.

OR

Draw the pattern of magnetic field lines produced around a current carrying straight conductor held vertically on a horizontal cardboard. Indicate the direction of the field lines as well as the direction of current flowing through the conductor.

- What is a magnetic field? How can the direction of magnetic field lines at a place be determined?
 - State the rule for the direction of the magnetic field produced around a current carrying conductor. Draw sketch of the pattern of field lines due to a current flowing through a straight conductor. [2009] ...[5M]
- What is a solenoid? Draw a sketch of the pattern of field lines of the magnetic field through and around a current carrying solenoid.
 - Consider a circular loop of wire lying in the plane of the table. Let the current pass through the loop clockwise. Apply the right hand rule to find out the direction of the magnetic field inside and outside the loop. [2009, 2010] ...[5M]
- State Fleming's left hand rule.
 - Write the principle of working of an electric motor.
 - Explain the function of the following parts of an electric motor. [2018] ...[5M]
 - Armature
 - Brushes
 - Split ring
- What is a solenoid? Draw the pattern of magnetic field lines of [2019] ...[5M]
 - A current carrying solenoid and
 - A bar magnet.

List two distinguishing features between the two fields.
- What is an electromagnet? List any two uses.
 - Draw a labelled diagram to show how an electromagnet is made.
 - State the purpose of soft iron core used in making an electromagnet.
 - List two ways of increasing the strength of an electromagnet if the material of the electromagnet is fixed. [2020] ...[5M]

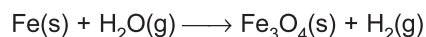
5 : Sources of Energy

- Which one of the following is a renewable resource? [2008] ...[1M]
Natural gas, Petroleum, Ground water, Coal
- Write the energy conversion that takes place in a hydropower plant. [2018] ...[1M]
- Why is biogas considered an excellent fuel? [2019] ...[1M]
- List any four characteristics of biogas on account of which it is considered an ideal fuel. [2008] ...[2M]
- Discuss one limitation each for the extracting of energy from : [2008] ...[2M]
 - Winds
 - Tides
- What is biogas? Why is biogas considered an ideal fuel for domestic use? [2009, 2010] ...[2M]
- Mention any four limitations in harnessing wind energy on a large scale. [2010] ...[2M]
- List any four disadvantages of using fossil fuels for the production of energy. [2011] ...[2M]
- Give two examples for each of the following :
 - Renewable sources or energy
 - Non-renewable sources of energy
 [2011]...[2M]
- "Burning fossil fuels is a cause of global warming". Justify this statement. [2012] ...[2M]

CHEMISTRY

1 : Chemical Reactions and Equations

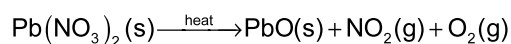
1. Balance the following chemical equation:



[2008]...[1M]

2. Why is respiration considered an exothermic process? [2008]...[1M]

3. Balance the following chemical equation:



[2009]...[1M]

4. Name a reducing agent that may be used to obtain manganese from manganese dioxide.

[2009]...[1M]

5. What change in the colour of iron nails and copper sulphate solution you observe after keeping the iron nails dipped in copper sulphate solution for about 30 minutes? [2010]...[1M]

6. In a double displacement reaction such as the reaction between sodium sulphate solution and barium chloride solution :

(A) exchange of atoms takes place

(B) exchange of ions takes place

(C) a precipitate is produced

(D) an insoluble salt is produced

The correct option is :

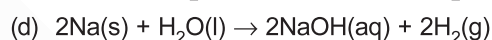
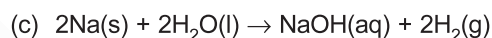
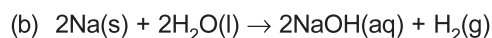
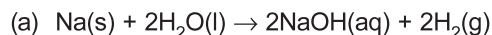
[2020]...[1M]

- (a) (B) and (D) (b) (A) and (C)
(c) Only (B) (d) (B), (C) and (D)

7. A student took sodium sulphate solution in a test tube and added barium chloride solution to it. He observed that an insoluble substance has formed. The colour and molecular formula of the insoluble substance is [2021]...[1M]

- (a) Grey, Ba_2SO_4 (b) Yellow, $\text{Ba(SO}_4)_2$
(c) White, BaSO_4 (d) Pink, BaSO_4

8. Sodium reacts with water to form sodium hydroxide and hydrogen gas. The balanced equation which represents the above reaction is [2021]...[1M]



9. $\text{C}_6\text{H}_{12}\text{O}_6\text{(aq)} + 6\text{O}_2\text{(aq)} \rightarrow 6\text{CO}_2\text{(aq)} + 6\text{H}_2\text{O(l)}$

The above reaction is a/an

[2021]...[1M]

(a) displacement reaction

(b) endothermic reaction

(c) exothermic reaction

(d) neutralisation reaction

10. Which of the following statements about the reaction given below are correct?



(i) HCl is oxidized to Cl_2

(ii) MnO_2 is reduced to MnCl_2

(iii) MnCl_2 acts as an oxidizing agent

(iv) HCl acts as an oxidizing agent

[2021]...[1M]

(a) (ii), (iii) and (iv) (b) (i), (ii) and (iii)

(c) (i) and (ii) only (d) (iii) and (iv) only

11. It is important to balance the chemical equations to satisfy the law of conservation of mass. Which of the following statements of the law is incorrect? [2021]...[1M]

(a) The total mass of the elements present in the reactants is equal to the total mass of the elements presents in the products.

(b) The number of atoms of each element remains the same, before and after a chemical reaction.

(c) The chemical composition of the reactants is the same before and after the reaction.

(d) Mass can neither be created nor can it be destroyed in a chemical reaction.

12. Which one of the following reactions is categorised as thermal decomposition reaction?
[2021]...[1M]
- (a) $2\text{H}_2\text{O(l)} \rightarrow 2\text{H}_2\text{(g)} + \text{O}_2\text{(g)}$
 (b) $2\text{AgBr(s)} \rightarrow 2\text{Ag(s)} + \text{Br}_2\text{(g)}$
 (c) $2\text{AgCl(s)} \rightarrow 2\text{Ag(s)} + \text{Cl}_2\text{(g)}$
 (d) $\text{CaCO}_3\text{(s)} \rightarrow \text{CaO(s)} + \text{CO}_2\text{(g)}$
13. **Assertion (A)** : Burning of natural gas is an endothermic process.
Reason (R) : Methane gas combines with oxygen to produce carbon dioxide and water.
 [2021]...[1M]
- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
 (c) (A) is true, but (R) is false.
 (d) (A) is false, but (R) is true.
14. Give an example of a decomposition reaction. Describe an activity to illustrate such a reaction by heating.
[2008]...[2M]
15. (i) What is the colour of ferrous sulphate crystals? How does this colour change after heating?
 (ii) Name the products formed on strongly heating ferrous sulphate crystals. What type of chemical reaction occurs in this change?
 [2009]...[2M]
16. What happens when an aqueous solution of sodium sulphate reacts with an aqueous solution of barium chloride? State the physical conditions of reactants in which the reaction between them will not take place. Write the balanced chemical equation for the reaction and name the type of reaction.
[2010]...[2M]
17. No chemical reaction takes place when granules of a solid, A, are mixed with the powder of another solid, B. However, when the mixture is heated, a reaction takes place between its components. One of the products, C, is a metal and settles down in the molten state while the other product, D floats over it. It was observed that the reaction is highly exothermic.
 (i) Based on the given information make an assumption about A and B and write a chemical equation for the chemical reaction indicating the conditions of reaction, physical state of reactants and products and thermal status of reaction.
 (ii) Mention any two types of reaction under which above chemical reaction can be classified.
 [2010]...[3M]
18. Decomposition reactions require energy either in the form of heat or light or electricity for breaking down the reactants. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light and electricity.
[2018]...[3M]
19. 2 g of silver chloride is taken in a china dish and the china dish is placed in sunlight for sometime. What will be your observation in this case? Write the chemical reaction involved in the form of a balanced chemical equation. Identify the type of chemical reaction.
[2019]...[3M]
20. Identify the type of reactions taking place in each of the following cases and write the balanced chemical equation for the reactions.
 (i) Zinc reacts with silver nitrate to produce zinc nitrate and silver.
 (ii) Potassium iodide reacts with lead nitrate to produce potassium nitrate and lead iodide.
 [2019]...[3M]

2 : Acids, Bases and Salts

1. How does the flow of acid rain water into a river make the survival of aquatic life in the river difficult?
[2008] ...[1M]
2. Fresh milk has a pH of 6. When it changes into curd (yogurt), will its pH value increase or decrease? Why?
[2009] ...[1M]
3. Which of the following observations is true about dilute solution of acetic acid? [2012] ...[1M]
- (a) It smells like vinegar and turns red litmus blue
 (b) It smells like onion and turns blue litmus blue
 (c) It smells like orange and turns red litmus blue
 (d) It smells like vinegar and turns blue litmus red

4. A student adds 4 ml of acetic acid to a test tube containing 4 ml of distilled water. He then shakes the test tube and leaves it to settle. After about 10 minutes he observes: [2012] ...[1M]

(a) A layer of water over the layer of acetic acid
 (b) A layer of acetic acid over the layer of water
 (c) A precipitate settling at the bottom of the test tube
 (d) A clear colourless solution

5. A student prepared 20% sodium hydroxide solution in a beaker containing water. The observations noted by him are given below.

[2013] ...[1M]

(I) Sodium hydroxide is in the form of pellets.
 (II) It dissolves in water readily.
 (III) The beaker appears cold when touched from outside.
 (IV) Red litmus paper turns blue when dipped into the solution.

The correct observations are:

(a) (I), (II), and (III) (b) (II), (III) and (IV)
 (c) (III), (IV) and (I) (d) (I), (II) and (IV)

6. In an experiment to study the properties of acetic acid, a student takes about 2 ml of acetic acid in a dry test tube. He adds about 2 ml of water to it and shakes the test tube well. He is likely to observe that: [2013] ...[1M]

(a) The acetic acid dissolves readily in water.
 (b) The solution becomes light orange.
 (c) Water floats over the surface of acetic acid.
 (d) Acetic acid floats over the surface of water.

7. The chemical formula for plaster of Paris is :

[2020] ...[1M]

(a) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ (b) $\text{CaSO}_4 \cdot \text{H}_2\text{O}$
 (c) $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ (d) $2\text{CaSO}_4 \cdot \text{H}_2\text{O}$

8. Baking soda is a mixture of :

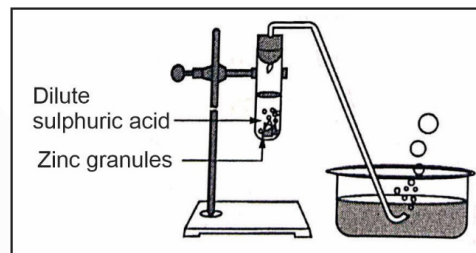
[2020] ...[1M]

(a) Sodium carbonate and acetic acid
 (b) Sodium carbonate and tartaric acid
 (c) Sodium hydrogen carbonate and tartaric acid
 (d) Sodium hydrogen carbonate and acetic acid

9. Which of the following oxide(s) is/are soluble in water to form alkalies? [2021] ...[1M]

(i) Na_2O (ii) SO_2
 (iii) K_2O (iv) NO_2
 (a) (i) and (iii) (b) (i) only
 (c) (ii) and (iv) (d) (iii) only

10. Study the diagram given below and identify the gas formed in the reaction.



[2021] ...[1M]

(a) Carbon di-oxide which extinguishes the burning candle
 (b) Oxygen due to which the candle burns more brightly
 (c) Sulphur dioxide which produces a suffocating smell
 (d) Hydrogen which while burning produces a popping sound

11. Which of the options in the given table are correct?

Option	Natural Source	Acid Present
(i)	Orange	Oxalic acid
(ii)	Sour milk	Lactic acid
(iii)	Ant sting	Methanoic acid
(iv)	Tamarind	Acetic acid

[2021] ...[1M]

(a) (i) and (ii) (b) (i) and (iv)
 (c) (ii) and (iii) (d) (iii) and (iv)

12. Select from the following the statement which is true for bases. [2021] ...[1M]

(a) Bases are bitter and turn blue litmus red.
 (b) Bases have a pH less than 7.
 (c) Bases are sour and change red litmus to blue.
 (d) Bases turn pink when a drop of phenolphthalein is added to them.

13. Study the following table and choose the correct option :

	Salt	Parent Acid	Parent Base	Nature of Salt
(a)	Sodium Chloride	HCl	NaOH	Basic
(b)	Sodium Carbonate	H ₂ CO ₃	NaOH	Neutral
(c)	Sodium Sulphate	H ₂ SO ₄	NaOH	Acidic
(d)	Sodium Acetate	CH ₃ COOH	NaOH	Basic

[2021] ...[1M]

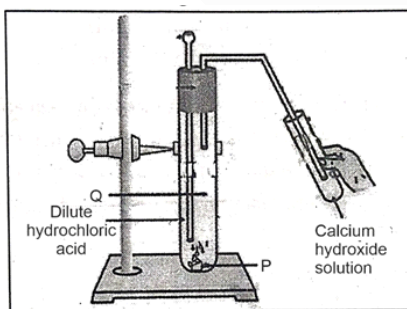
14. Consider the pH value of the following acidic samples :

S.No.	Sample	pH value
1.	Lemon juice	2.2
2.	Gastric juice	1.2
3.	Vinegar	3.76
4.	Dil. Acetic acid	3.0

The decreasing order of their H⁺ ion concentration is

[2021] ...[1M]

- (a) 3 > 4 > 1 > 2 (b) 2 > 1 > 3 > 4
 (c) 2 > 1 > 4 > 3 (d) 3 > 4 > 2 > 1
15. Study the experimental set up shown in given figure and choose the correct option from the following :



[2021] ...[1M]

P	Q	Change observed in calcium hydroxide solution
(a) K ₂ CO ₃	Cl ₂ gas	No change
(b) KHCO ₃	CO ₂ gas	No change
(c) KHCO ₃	H ₂ gas	Turns milky
(d) K ₂ CO ₃	CO ₂ gas	Turns milky

16. Which of the following salts do not have the water of crystallisation?

- (i) Bleaching Powder (ii) Plaster of Paris
 (iii) Washing soda (iv) Baking soda

[2021] ...[1M]

- (a) (ii) and (iv) (b) (i) and (iii)
 (c) (ii) and (iii) (d) (i) and (iv)

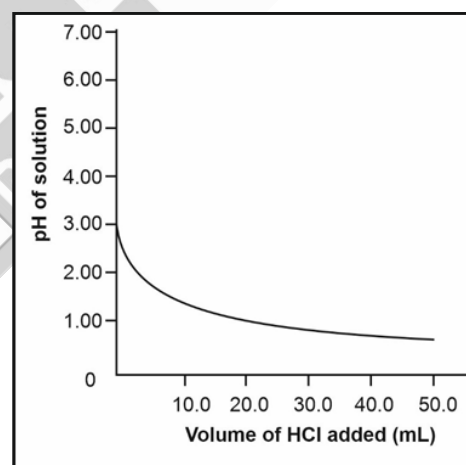
17. **Assertion (A)** : Sodium hydrogen carbonate is used as an ingredient in antacids.

Reason (R) : NaHCO₃ is a mild non-corrosive basic salt.

[2021] ...[1M]

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true, but (R) is false
 (d) (A) is false, but (R) is true

18. 50.0 mL of tap water was taken in a beaker. Hydrochloric acid was added drop by drop to water. The temperature and pH of the solution was noted. The following graph was obtained. Choose the correct statements related to this activity.



- (i) The process of dissolving an acid in water is highly endothermic.
 (ii) The pH of the solution increases rapidly on addition of acid.
 (iii) The pH of the solution decreases rapidly on addition of acid.
 (iv) The pH of tap water was around 7.0.

[2021] ...[1M]

- (a) (i) and (ii) (b) (i) and (iii)
 (c) (iii) and (iv) (d) (ii) and (iv)

19. Write the chemical formula for washing soda. How may it be obtained from baking soda? Name an industrial use of washing soda other than washing clothes. **[2008] ...[2M]**
20. A compound which is prepared from gypsum has the property of hardening when mixed with a proper quantity of water. Identify the compound. Write the chemical equation for its preparation. For what purpose is it used in hospitals? **[2009] ...[2M]**
21. Blue litmus solution is added to two test tubes A and B containing dilute HCl and NaOH solution respectively. In which test tube a colour change will be observed? State the colour change and give its reason. **[2019] ...[2M]**
22. What is observed when 2 mL of dilute hydrochloric acid is added to 1 g of sodium carbonate taken in a clean and dry test tube? Write chemical equation for the reaction involved. **[2019] ...[2M]**
23. 2 mL of sodium hydroxide solution is added to a few pieces of granulated zinc metal taken in a test tube. When the contents are warmed, a gas evolves which is bubbled through a soap solution before testing. Write the equation of the chemical reaction involved and the test to detect the gas. Name the gas which will be evolved when the same metal reacts with dilute solution of a strong acid. **[2018] ...[3M]**
24. The pH of a salt used to make tasty and crispy pakoras is 14. Identify the salt and write a chemical equation for its formation. List its two uses. **[2018] ...[3M]**
25. Identify the acid and the base from which sodium chloride is obtained. Which type of salt is it? When is it called rock salt? How is rock salt formed? **[2019] ...[3M]**
26. List the important products of the Chlor-alkali process. Write one important use of each. **[2020] ...[3M]**
27. How is washing soda prepared from sodium carbonate? Give its chemical equation. State the type of this salt. Name the type of hardness of water which can be removed by it. **[2020] ...[3M]**

3 : Metals and Non-metals

1. A clean aluminium foil was placed in an aqueous solution of zinc sulphate. When the aluminium foil was taken out of the zinc sulphate solution after 15 minutes, its surface was found to be coated with a silvery grey deposit. From the above observation it can be concluded that: **[2011] ...[1M]**
- (a) Aluminium is more reactive than zinc
(b) Zinc is more reactive than aluminium
(c) Zinc and aluminium both are equally reactive
(d) Zinc and aluminium both are non-reactive
2. Iron nails were dipped in an aqueous solution of copper sulphate. After about 30 minutes, it was observed that the colour of the solution changed from **[2011] ...[1M]**
- (a) Colorless to light green
(b) Blue to light green
(c) Blue to colourless
(d) Green to blue
3. The colours of aqueous solutions of CuSO_4 and FeSO_4 as observed in the laboratory are : **[2012] ...[1M]**
- (a) Pale green and light blue respectively
(b) Light blue and dark green respectively
(c) Dark blue and dark green respectively
(d) Dark blue and pale green respectively
4. A student prepared an aqueous solution of CuSO_4 in beaker X and an aqueous solution of FeSO_4 in beaker Y. He then dropped some iron pieces in beaker X and some zinc pieces in beaker Y. After about 10 hours, he observed that the solution in X and Y respectively appears: **[2012] ...[1M]**
- (a) Blue and green
(b) Colourless and pale green
(c) Colourless and light blue
(d) Greenish and colourless

5. The compound obtained on reaction of iron with steam is/are : **[2020] ...[1M]**
 (a) Fe_2O_3 (b) Fe_3O_4
 (c) FeO (d) Fe_2O_3 and Fe_3O_4
6. An element 'X' reacts with O_2 to give a compound with a high melting point. This compound is also soluble in water. The element 'X' is likely to be : **[2020] ...[1M]**
 (a) iron (b) calcium
 (c) carbon (d) silicon
7. Which one of the following structures correctly depicts the compound CaCl_2 ? **[2021] ...[1M]**
 (a) $\text{Ca}^{2+} \left[\begin{array}{c} \cdot\cdot \\ \times \text{Cl} \times \\ \cdot\cdot \end{array} \right]^{2-}$ (b) $\left[\begin{array}{c} \times \times \\ \times \text{Ca} \times \\ \times \times \end{array} \right]^{2+} \left[\begin{array}{c} \cdot\cdot \\ \times \text{Cl} \times \\ \cdot\cdot \end{array} \right]_2$
 (c) $\text{Ca}^{2+} \left[\begin{array}{c} \cdot\cdot \\ \times \text{Cl} \times \\ \cdot\cdot \end{array} \right]_2$ (d) $\left[\begin{array}{c} \times \times \\ \times \text{Ca} \times \\ \times \times \end{array} \right]^+ \left[\begin{array}{c} \cdot\cdot \\ \times \text{Cl} \times \\ \cdot\cdot \end{array} \right]_2^-$
8. The pair(s) which will show displacement reaction is/are
 (i) NaCl solution and copper metal
 (ii) AgNO_3 solution and copper metal
 (iii) $\text{Al}_2(\text{SO}_4)_3$ solution and magnesium metal
 (iv) ZnSO_4 solution and iron metal **[2021] ...[1M]**
 (a) (ii) only (b) (ii) and (iii)
 (c) (iii) and (iv) (d) (i) and (ii)

Case Study Based Questions (Q.9 to Q.12) :

A student, took four metals P, Q, R and S and carried out different experiments to study the properties of metals. Some of the observations were:

- All metals could not be cut with knife except metal R.
- Metal P combined with oxygen to form an oxide M_2O_3 which reacted with both acids and bases.
- Reaction with water.
 P - Did not react either with cold or hot water but reacted with steam
 Q - Reacted with hot water and the metal started floating
 R - Reacted violently with cold water.
 S - Did not react with water at all

Based on the above observations answer the following questions:

9. Out of the given metals, the one which needs to be stored under kerosene is **[2021] ...[1M]**
 (a) P (b) R
 (c) S (d) Q
10. Out of the given metals, the metal Q is **[2021] ...[1M]**
 (a) Iron (b) Zinc
 (c) Potassium (d) Magnesium
11. Metal which forms amphoteric oxides is **[2021] ...[1M]**
 (a) P (b) Q
 (c) R (d) S
12. The increasing order of the reactivity of the four metals is: **[2021] ...[1M]**
 (a) $\text{P} < \text{Q} < \text{R} < \text{S}$ (b) $\text{S} < \text{R} < \text{Q} < \text{P}$
 (c) $\text{S} < \text{P} < \text{Q} < \text{R}$ (d) $\text{P} < \text{R} < \text{Q} < \text{S}$
13. (a) What are amphoteric oxides? Choose the amphoteric oxides from amongst the following oxides :
 Na_2O , ZnO , Al_2O_3 , CO_2 , H_2O
 (b) Why is it that non-metals do not displace hydrogen from dilute acids? **[2008] ...[3M]**
14. What is meant by 'rusting'? With labelled diagrams, describe an activity to find out the conditions under which iron rusts? **[2009] ...[3M]**
15. Write the electronic configuration of two elements X and Y whose atomic numbers are 20 and 17 respectively. Write the molecular formula of the compound formed when element X reacts with element Y. Draw electron-dot structure of the product and also state the nature of the bond formed between both the elements. **[2017] ...[3M]**
16. What is 'rusting'? Describe with a labelled diagram an activity to investigate the conditions under which iron rusts. **[2020] ...[3M]**
17. Write the name and symbols of two most reactive metals belonging to group-I of the periodic table. Explain by drawing electronic structure how either one of the two metals reacts with a halogen. With which name is the bond formed between these elements known and what is the class of the compound so formed known? State any four physical properties of such compounds. **[2010] ...[5M]**

18. What is meant by refining of metals? Name the most widely used method of refining impure metals produced by various reduction processes. Describe with the help of a labelled diagram how this method may be used for refining of copper.

[2010] ...[5M]

19. (i) Write the steps involved in the extraction of pure metals in the middle of the activity series from their carbonate ores.

- (ii) How is copper extracted from its sulphide ore? Explain the various steps supported by chemical equations. Draw labelled diagram for the electrolytic refining of copper.

[2018] ...[5M]

20. (i) List in tabular form three chemical properties on the basis of which we can differentiate between a metal and a non-metal.

- (ii) Give reasons for the following :

- (a) Most metals conduct electricity well.
(b) The reaction of iron (III) oxide $[\text{Fe}_2\text{O}_3]$ with heated aluminium is used to join cracked machine parts. [2019] ...[5M]

21. (a) What is thermit process? Where is this process used? Write balanced chemical equation for the reaction involved.

- (b) Where does the metal aluminium, used in the process, occurs in the reactivity series of metals?

- (c) Name the substances that are getting oxidised and reduced in the process.

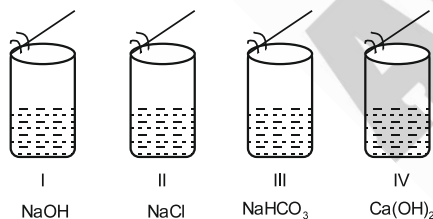
[2020] ...[5M]

4 : Carbons and its Compounds

1. State two characteristic features of carbon which when put together give rise to large number of carbon compounds. [2010] ...[1M]

2. Draw the structure of Butanone molecule, $\text{CH}_3\text{COC}_2\text{H}_5$ [2011] ...[1M]

3. A student added acetic acid to test tubes I, II, III and IV containing the labelled substances and then brought a burning splinter near the mouth of each test tube.



The splinter would be extinguished when brought near the mouth of test tube. [2011] ...[1M]

- (a) I (b) II
(c) III (d) IV

4. Acetic acid reacts with solid sodium hydrogen carbonate, [2011] ...[1M]

- (a) Slowly forming no gas
(b) Vigorously with effervescence
(c) Slowly without effervescence
(d) Vigorously without gas formation

5. Vapours of acetic acid smell: [2011] ...[1M]

- (a) Pungent like vinegar
(b) Sweet like rose
(c) Suffocating like sulphur dioxide
(d) Odorless like water

6. A student takes Na_2CO_3 powder in a test tube and pours some drops of acetic acid in it.

He observes:

[2012] ...[1M]

- (a) No reaction in the test tube
(b) Colourless gas with pungent smell
(c) Bubbles of a colourless and odourless gas
(d) White fumes with smell of vinegar

7. Hard water required for an experiment is not available in a school laboratory. However, following salts are available in the laboratory. Select the salts which may be dissolved in water to make it hard for the experiment.

1. Calcium Sulphate
2. Sodium Sulphate
3. Calcium Chloride
4. Potassium Sulphate
5. Sodium Hydrogen Carbonate

6. Magnesium Chloride [2013] ...[1M]

- (a) 1, 2 and 4 (b) 1, 3 and 6
(c) 3, 5 and 6 (d) 2, 4 and 5

8. A student takes 2 ml acetic acid in a dry test tube and adds a pinch of sodium hydrogen carbonate to it. He makes the following observations:
- (I) A colourless and odourless gas evolves with a brisk effervescence.
 - (II) The gas turns lime water milky when passed through it.
 - (III) The gas burns with an explosion when a burning splinter is brought near it.
 - (IV) The gas extinguishes the burning splinter which is brought near it.

The correct observations are : **[2013] ...[1M]**

- (a) (I), (II) and (III) (b) (II), (III) and (IV)
 - (c) (III), (IV) and (I) (d) (IV), (I) and (II)
9. In an experiment to study the properties of ethanoic acid, a student takes about 3 mL of ethanoic acid in a dry test tube. He adds an equal amount of distilled water to it and shakes the test tube well. After some time he is likely to observe that **[2014] ...[1M]**
- (A) a colloid is formed in the test tube
 - (B) the ethanoic acid dissolves readily in water
 - (C) the solution becomes light orange
 - (D) water floats over the surface of ethanoic acid
10. We need 20% aqueous solution of sodium hydroxide for the study of saponification reaction. When we open the lid of the bottle containing solid sodium hydroxide we observe it in which form? **[2014] ...[1M]**

- (A) Colourless transparent beads
 - (B) Small white beads
 - (C) White pellets/flakes
 - (D) Fine white powder
11. While studying saponification reaction, a student measures the temperature of the reaction mixture and also finds its nature using blue/red litmus paper. On the basis of his observations the correct conclusion would be **[2014] ...[1M]**
- (A) the reaction is exothermic and the reaction mixture is acidic
 - (B) the reaction is endothermic and the reaction mixture is acidic
 - (C) the reaction is endothermic and the reaction mixture is basic
 - (D) the reaction is exothermic and the reaction mixture is basic

12. In a locality, hard water, required for an experiment, is not available. However, the following salts are available in the school laboratory :

- 1. Sodium sulphate
- 2. Calcium sulphate
- 3. Magnesium chloride
- 4. Sodium chloride
- 5. Calcium chloride
- 6. Potassium sulphate

Which of the above salts may be dissolved in water to obtain hard water for the experiment?

[2014] ...[1M]

- (A) 2, 3 and 5
 - (B) 1, 2 and 5
 - (C) 1, 2, 4 and 6
 - (D) 3 and 5 only
13. Write the number of covalent bonds in the molecule of butane, C_4H_{10} . **[2015] ...[1M]**
14. While preparing soap a small quantity of common salt is generally added to the reaction mixture of vegetable oil and sodium hydroxide. Which one of the following may be the purpose of adding common salt? **[2015] ...[1M]**
- (A) To reduce the basic nature of the soap
 - (B) To make the soap neutral
 - (C) To enhance the cleansing power of the soap
 - (D) To favour the precipitation of the soap
15. A student takes about 4 ml of distilled water in four test tubes marked P, Q, R and S. He then dissolves in each test tube an equal amount of one salt in one test tube, namely sodium sulphate in P, potassium sulphate in Q, calcium sulphate in R and magnesium sulphate in S. After that he adds an equal amount of soap solution in each test tube. On shaking each of these test tubes well, he observes a good amount of lather (foam) in the test tube marked. **[2015] ...[1M]**

- (A) P and Q (B) Q and R
- (C) P, Q and S (D) P, R and S

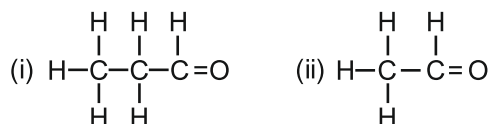
16. When you add sodium hydrogen carbonate to acetic acid in a test tube, a gas liberates immediately with brisk effervescence. Name this gas. Describe the method of testing this gas.

[2015] ...[1M]

17. Write the name and structure of an aldehyde with four carbon atoms in its molecule. **[2016] ...[1M]**
18. Write the molecular formula of the 2nd and 3rd member of the homologous series where the first member is ethyne. **[2017] ...[1M]**
19. A student requires hard water for an experiment in his laboratory which is not available in the neighbouring area. In the laboratory there are some salts, which when dissolved in distilled water can convert it into hard water. Select from the following groups of salts, a group, each salt of which when dissolved in distilled water will make it hard. **[2017] ...[1M]**
- (A) Sodium chloride, Potassium chloride
(B) Sodium sulphate, Potassium sulphate
(C) Sodium sulphate, Calcium sulphate
(D) Calcium sulphate, Calcium chloride
20. Name the functional group present in propanone. **[2020] ...[1M]**
21. **Assertion (A) :** In a homologous series of alcohols, the formula for the second member is C_2H_5OH and the third member is C_3H_7OH .
Reason (R) : The difference between the molecular masses of the two consecutive members of a homologous series is 144. **[2020] ...[1M]**
- (a) Both A and R are true and R is the correct explanation of the Assertion.
(b) Both A and R are true but R is not the correct explanation of the Assertion.
(c) A is true but R is false.
(d) A is false but R is true.
22. Write the name and general formula of a chain of hydrocarbons in which an addition reaction with hydrogen is possible. State the essential condition for an addition reaction. Stating this condition, write a chemical equation giving the name of the reactant and the product of the reaction. **[2015] ...[2M]**
23. A student adds a spoon full of powdered sodium hydrogen carbonate to a flask containing ethanoic acid. List two main observations, he must note in his note book, about the reaction that takes place. Also write chemical equation for the reaction. **[2016] ...[2M]**
24. Mention the essential material (chemicals) to prepare soap in the laboratory. Describe in brief the test of determining the nature (acidic/alkaline) of the reaction mixture of saponification reaction. **[2017] ...[2M]**
25. A compound 'X' on heating with excess conc. sulphuric acid at 443 K gives an unsaturated compound 'Y'. 'X' also reacts with sodium metal to evolve a colourless gas 'Z'. Identify 'X', 'Y' and 'Z'. Write the equation of the chemical reaction of formation of 'Y' and also write the role of sulphuric acid in the reaction. **[2018] ...[2M]**
26. In three test tubes A, B and C, three different liquids namely, distilled water, underground water and distilled water in which a pinch of calcium sulphate is dissolved, respectively are taken. Equal amount of soap solution is added to each test tube and the contents are shaken. In which test tube will the length of the foam (lather) be longest? Justify your answer. **[2019] ...[2M]**
27. "Carbon prefers to share its valence electrons with other atoms of carbon or with atoms of other elements rather than gaining or losing the valence electrons in order to attain noble gas configuration." Give reasons to justify this statement. **[2022] ...[2M]**
28. The atomic number of an element 'X' is 11.
(i) Write the electronic configurations of X and find its valency.
(ii) Write the formula and nature of its oxide. **[2022] ...[2M]**
29. (i) Why are covalent compounds generally poor conductors of electricity?
(ii) Name the following compound:
- $$\begin{array}{c}
 \text{H} & & \text{H} \\
 | & & | \\
 \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\
 | & || & | \\
 \text{H} & \text{O} & \text{H}
 \end{array}$$
- (iii) Name the gas evolved when ethanoic acid is added to sodium carbonate. How would you prove the presence of this gas? **[2008] ...[3M]**

30. Give reasons for the following observations :
- The element carbon forms a very large number of compounds.
 - Air holes of a gas burner have to be adjusted when the heated vessels get blackened by the flame.
 - Use of synthetic detergents causes pollution of water. **[2009] ...[3M]**
31. Name the functional group of organic compounds that can be hydrogenated. With the help of suitable example, explain the process of hydrogenation mentioning the conditions of the reaction any one change in physical property with the formation of the product. Name any one natural source of organic compounds that are hydrogenated. **[2010] ...[3M]**
32. Write chemical equations to show what happens when:
- Ethanol is heated with concentrated sulphuric acid at 443 K.
 - Ethanol reacts with ethanoic acid in the presence of an acid acting as a catalyst.
 - An ester reacts with a base **[2011] ...[3M]**
33. Complete the following equations:
- $\text{CH}_4 + \text{O}_2 \longrightarrow$
 - $\text{C}_2\text{H}_5\text{OH} \xrightarrow{\text{Hot conc. H}_2\text{SO}_4}$
 - $\text{CH}_3\text{COOH} + \text{NaOH} \longrightarrow$ **[2012] ...[3M]**
34. Name the oxidising agent used for the conversion of ethanol to ethanoic acid. Distinguish between ethanol and ethanoic acid on the basis of
- Litmus test
 - Reaction with sodium carbonate **[2013] ...[3M]**
35. (i) Differentiate between alkanes and alkenes. Name and draw the structure of one member of each.
- (ii) Alkanes generally burn with clean flame. Why? **[2013] ...[3M]**
36. A carboxylic acid (molecular formula $\text{C}_2\text{H}_4\text{O}_2$) reacts with an alcohol in the presence of an acid catalyst to form a compound 'X'. The alcohol on oxidation with alkaline KMnO_4 followed by acidification gives the same carboxylic acid $\text{C}_2\text{H}_4\text{O}_2$. Write the name and structure of
- carboxylic acid,
 - alcohol and
 - the compound 'X'. **[2014] ...[3M]**
37. Define the term 'structural' isomerism'. Explain why propane cannot exhibit this property. Draw the structures of possible isomers of butane, C_4H_{10} **[2014] ...[3M]**
38. List two tests for experimentally distinguishing between an alcohol and a carboxylic acid and describe how these tests are performed. **[2015] ...[3M]**
39. Write three different chemical reactions showing the conversion of ethanoic acid to sodium ethanoate. Write balanced chemical equation in each case. Write the name of the reactants and the products other than ethanoic acid and sodium ethanoate in each case. **[2016] ...[3M]**
40. Distinguish between esterification and saponification reactions with the help of the chemical equations for each. State one use of each (i) Esters, and (ii) Saponification process. **[2017] ...[3M]**
41. Write the structural formula of ethanol. What happens when it is heated with excess of conc. H_2SO_4 at 443 K? Write the chemical equation for the reaction stating the role of conc. H_2SO_4 in this reaction. **[2017] ...[3M]**
42. (i) Why are most carbon compounds poor conductors of electricity?
- (ii) Write the name and structure of a saturated compound in which the carbon atoms are arranged in a ring. Give the number of single bonds present in this compound. **[2018] ...[3M]**
43. 3 mL of ethanol is taken in a test tube and warmed gently in a water bath. A 5% solution of alkaline potassium permanganate is added first drop by drop to this solution, then in excess.
- How is 5% solution of KMnO_4 prepared?
 - State the role of alkaline potassium permanganate in this reaction. What happens on adding it in excess?
 - Write chemical equation of this reaction. **[2020] ...[3M]**

44. Consider the following organic compounds:



- (a) Name the functional group present in their compounds.
- (b) Write the general formula for the compounds of this functional group.
- (c) State the relationship between these compounds and draw the structure of any other compound having similar functional group. **[2022] ...[3M]**
45. (a) Draw the electron dot structure for ethyne.
- (b) List two differences between the properties exhibited by covalent compounds and ionic compounds. **[2022] ...[1+2=3M]**
46. (i) State two properties of carbon which lead to a very large number of carbon compounds.
- (ii) Why does micelle formation take place when soap is added to water? Why are micelles not formed when soap is added to ethanol? **[2011] ...[5M]**
47. Explain isomerism. State any four characteristics of isomers. Draw the structures of possible isomers of butane, C_4H_{10} . **[2011] ...[5M]**
48. List in tabular form three physical and two chemical properties on the basis of which ethanol and ethanoic acid can be differentiated. **[2012] ...[5M]**
49. (i) Define the term 'isomers'
- (ii) Draw two possible isomers of the compound with molecular formula $\text{C}_3\text{H}_6\text{O}$ and write their names.
- (iii) Give the electron dot structures of the above two compounds **[2013] ...[5M]**

50. Both soap and detergent are some type of salts. What is the difference between them? Describe in brief the cleansing action of soap. Why do soaps not form lather in hard water? List two problems that arise due to the use of detergents instead of soaps. **[2015] ...[5M]**
51. A carbon compound 'P' on heating with excess conc. H_2SO_4 forms another carbon compound 'Q' which on addition of hydrogen in the presence of nickel catalyst forms a saturated carbon compound 'R'. One molecule of 'R' on combustion forms two molecules of carbon dioxide and three molecules of water. Identify P, Q and R and write chemical equations for the reactions involved. **[2016] ...[5M]**
52. Why certain compounds are called hydrocarbons? Write the general formula for homologous series of alkanes, alkenes and alkynes and also draw the structure of the first member of each series. Write the name of the reaction that converts alkenes into alkanes and also write a chemical equation to show the necessary conditions for the reaction to occur. **[2017] ...[5M]**
53. Write the chemical formula and name of the compound which is the active ingredient of all alcoholic drinks. List its two uses. Write chemical equation and name of the product formed when this compound reacts with
- (i) Sodium metal
- (ii) Hot concentrated sulphuric acid **[2019] ...[5M]**
54. What is methane? Draw its electron dot structure. Name the type of bonds formed in this compound. Why are such compounds :
- (i) Poor conductors of electricity? and
- (ii) Have low melting and boiling points? What happens when this compound burns in oxygen? **[2019] ...[5M]**

5 : Periodic Classification of Elements

1. How many horizontal rows are there in the Modern Periodic Table and what are they called? **[2013] ...[1M]**
2. The atomic numbers of three elements A, B and C are 12, 18 and 20 respectively. State, giving reason, which two elements will show similar properties. **[2014] ...[1M]**
3. The electronic configuration of an element is 2, 8, 4. State its:
- (i) group and period in the Modern Periodic Table.
- (ii) name and write its one physical property. **[2019]..[1M]**
4. How does the metallic character of elements change along a period of the periodic table from the left to the right and why? **[2011] ...[2M]**

5. In the Modern Periodic Table, the element calcium (atomic number = 20) is surrounded by elements with atomic numbers 12, 19, 21 and 38. Which of these elements has physical and chemical properties resembling those of calcium and why? **[2011] ...[2M]**
6. An element 'M' has atomic number 12.
 (i) Write its electronic configuration.
 (ii) State the group to which 'M' belongs.
 (iii) Is 'M' a metal or a non-metal?
 (iv) Write the formula of its oxide. **[2012] ...[2M]**
7. How can the valency of an element be determined if its electronic configuration is known? What will be the valency of an element of atomic number 9? **[2012] ...[2M]**
8. How it can be proved that the basic structure of the Modern Periodic Table is based on the electronic configuration of atoms of different elements? **[2019] ...[2M]**
9. Atoms of eight elements A, B, C, D, E, F, G and H have the same number of electronic shells but different number of electrons in their outermost shell. It was found that elements A and G combine to form an ionic compound. This compound is added in a small amount to almost all vegetable dishes during cooking. Oxides of elements A and B are basic in nature while those of E and F are acidic. The oxide of D is almost neutral.
 Based on the above information answer the following questions: **[2010] ...[3M]**
 (i) To which group or period of the periodic table, do the listed elements belong?
 (ii) What would be the nature of compound formed by a combination of elements B and F?
 (iii) Which two of these elements could definitely be metals?
 (iv) Which one of the eight elements is most likely to be found in gaseous state at room temperature?
 (v) If the number of electrons in the outermost shell of element C and G be 3 and 7 respectively, write the formula of the compound formed by the combination of C and G.
10. The atomic number of an element is 16. Predict
 (i) the number of valence electrons in its atom
 (ii) its valency
 (iii) its group number
 (iv) whether it is a metal or a non-metal
 (v) the nature of oxide formed by it
 (vi) the formula of its chloride **[2011] ...[3M]**

11. F, Cl and Br are elements each having seven valence electrons. Which of these:
 (i) has the largest atomic radius
 (ii) is most reactive?
 Justify your answer stating reason for each. **[2012] ...[3M]**
12. Given below are some elements of the modern periodic table:
 ${}_4\text{Be}$, ${}_9\text{F}$, ${}_{14}\text{Si}$, ${}_{19}\text{K}$, ${}_{20}\text{Ca}$
 (i) Select the element that has one electron in the outermost shell and write its electronic configuration.
 (ii) Select two elements that belong to the same group. Give reasons for your answer.
 (iii) Select two elements that belong to the same period. Which one of the two has bigger atomic size? **[2013] ...[3M]**
13. An element X (atomic number 17) reacts with an element Y (atomic number 20) to form a compound.
 (i) Write the position of these elements in the modern periodic table.
 (ii) Write the formula of the compound formed.
 Justify your answer in each case. **[2013] ...[3M]**
14. Study the following table in which positions of six elements A, B, C, D, E, and F are shown as they are in the Modern Periodic Table :

Group \ Period	1	2	3-12	13	14	15	16	17	18
2	A					B			C
3				D	E				F

On the basis of the above table, answer the following questions:

- (i) Name the element which forms only covalent compounds.
 (ii) Name the element which is a metal with valency three.
 (iii) Name the element which is a non-metal with valency three.
 (iv) Out of D and E, which is bigger in size and why?
 (v) Write the common name for the family to which the elements C and F belong.

[2014] ...[3M]

15. The elements Be, Mg and Ca each having two electrons in their outermost shells are in periods 2, 3, and 4 respectively of the modern periodic table. Answer the following questions, giving justification in each case:
- Write the group to which these elements belong.
 - Name the least reactive element.
 - Which of these elements has the largest atomic radius. **[2014] ...[3M]**
16. Given below are some elements of the Modern Periodic Table. Atomic number of the element is given in parentheses.
- A (4), B (9), C (14), D (19), E (20)
- Select the element that has one electron in the outermost shell. Also, write the electronic configuration of this element.
 - Which two elements amongst these belong to the same group? Give reasons for your answer.
 - Which two elements amongst these belong to the same period? Which one of the two has bigger atomic radius? **[2015] ...[3M]**
17. Taking the example of an element of atomic number 16, explain how the electronic configuration of the atom of an element relates to its position in the Modern Periodic Table and how valency of an element is calculated on the basis of its atomic number. **[2015] ...[3M]**
18. The position of eight elements in the Modern Periodic Table is given below where atomic numbers of elements are given in the parenthesis.

Period No.		
2	Li(3)	Be(4)
3	Na(11)	Mg(12)
4	K(19)	Ca(20)
5	Rb(37)	Sr(38)

- Write the electronic configuration of Ca.
- Predict the number of valence electrons in Rb.
- What is the number of shells in Sr?
- Predict whether K is a metal or a non-metal.
- Which one of these elements has the largest atom in size?
- Arrange Be, Ca, Mg and Rb in the increasing order of the size of their respective atoms. **[2016] ...[3M]**

19. An element 'X' belong to 3rd period and group 13 of the Modern Periodic Table.
- Determine the valence electrons and the valency of 'X'.
 - Molecular formula of the compound formed when 'X' reacts with an element 'Y' (atomic number = 8).
 - Write the name and formula of the compound formed when 'X' combines with chlorine. **[2016] ...[3M]**
20. An element 'X' has mass number 35 and number of neutrons 18. Write atomic number and electronic configuration of 'X'. Also write group number, period number and valency of 'X'. **[2016] ...[3M]**
21. What is periodicity in properties of elements with reference to the Modern Periodic Table? Why do all the elements of the same group have similar properties? How does the tendency of elements to gain electrons change as we move from left to right in a period? State the reason of this change? **[2017] ...[3M]**
22. Based on the group valency of elements write the molecular formula of the following compounds giving justification for each :
- Oxide of first group elements.
 - Halide of the elements of group thirteen, and
 - Compound formed when an element, A of group 2 combines with an element, B of group seventeen. **[2019] ...[3M]**
23. (a) State Newland Law of Octaves.
- (b) With an example, explain Dobereiner's Triads.
- (c) List one limitation each of both the attempts mentioned in 'a' and 'b'. **[2022] ...[1+1+½+½=3M]**
24. On the basis of Mendeleev's Periodic Table given below, answer the questions that follow the table :

Group →	I	II	III	IV	V	VI	VII	VIII		
Oxide	R ₂ O	RO	R ₂ O ₃	RO ₂	R ₂ O ₃	RO ₂	R ₂ O ₃	RO ₃		
Hydride	RH	RH ₂	RH ₃	RH ₄	RH ₃	RH ₂	RH			
Group ↓	A	BA	BA	BA	BA	BA	BA	B	Transition series	
1	H 1.008									
2	Li 6.939	Be 9.012	B 10.81	C 12.011	N 14.007	O 15.999	F 18.998			
3	Na 22.99	Mg 24.31	Al 29.98	Si 28.09	P 30.974	S 32.06	Cl 35.453			
4 First series:	K 39.102	Ca 40.08	Sc 44.96	Ti 47.90	V 50.94	Cr 52.20	Mn 54.94	Fe 55.85	Co 58.93	Ni 58.71
Second series:	Cu 63.54	Zn 65.37	Ga 69.72	Ge 72.59	As 74.92	Se 78.96	Br 79.909			
5 First series:	Rb 85.47	Sr 87.62	Y 88.91	Zr 91.22	Nb 92.91	Mo 95.94	Tc 98.91	Ru 101.07	Rh 102.91	Pd 106.4
Second series:	Ag 107.87	Cd 112.40	In 114.82	Sn 118.69	Sb 121.75	Te 127.60	I 126.90			
6 First series:	Cs 132.91	Ba 137.33	La 138.91	Hf 178.49	Ta 180.95	W 183.85		Os 190.2	Ir 192.2	Pt 195.09
Second series:	Au 196.97	Hg 200.59	Tl 204.38	Pb 207.19	Bi 208.98					

- (i) Name the element which is in
(a) 1st group and 3rd period.
(b) 7th group and 2nd period.
- (ii) Suggest the formula for the following
(a) Oxide of nitrogen
(b) Hydride of oxygen
- (iii) In group VIII of the Periodic Table, why does cobalt with atomic mass 58.93 appear before nickel having atomic mass 58.71?
- (iv) Besides gallium, which two other elements have since been discovered for which Mendeleev had left gaps in his Periodic Table?
- (v) Using atomic masses of Li, Na and K, find the average atomic mass of Li and K and compare it with the atomic mass of Na. State the conclusion drawn from this activity.
[2008] ...[5M]
25. (i) Why do we classify elements?
(ii) What were the two criteria used by Mendeleev in creating his Periodic Table?
(iii) Why did Mendeleev leave some gaps in his Periodic Table?
(iv) In Mendeleev's Periodic Table, why was there no mention of Noble gases like Helium, Neon and Argon?
(v) Would you place the two isotopes of chlorine, Cl-35 and Cl-37 in different slots because of their different atomic masses or in the same slot because their chemical properties are the same? Justify your answer.
[2008] ...[5M]
26. (i) Which two criteria did Mendeleev use to classify the elements in his periodic table?
(ii) State Mendeleev's periodic law.
(iii) Why could no fixed position be given to hydrogen in Mendeleev's periodic table?
(iv) How and why does the atomic size vary as you go:
(a) From left to right along a period?
(b) Down a group?
[2009] ...[5M]

27. (i) Why did Mendeleev leave gaps in his periodic table?
(ii) State any three limitations of Mendeleev's classification.
(iii) How do electronic configuration of atoms change in a period with increase in atomic number?
[2009] ...[5M]
28. (i) The Modern Periodic Table has been evolved through the early attempts of Dobereiner, Newland and Mendeleev. List one advantage and one limitation of all the three attempts.
(ii) Name the scientist who first of all showed that atomic number of an element is a more fundamental property than its atomic mass.
(iii) State Modern Periodic law. [2018] ...[5M]
29. The position of certain elements in the Modern Periodic Table are shown below.

Group ↓ Period	1	2	3 to 12	13	14	15	16	17	18
1	G								H
2	A			I			B		C
3		D			E				F

Using the above table answer the following questions giving reasons in each case:

- (i) Which element will form only covalent compounds?
(ii) Which element is a non-metal with valency 2 ?
(iii) Which element is a metal with valency 2 ?
(iv) Out of H, C and F which has largest atomic size?
(v) To which family does H, C and F belong?
[2020] ...[5M]

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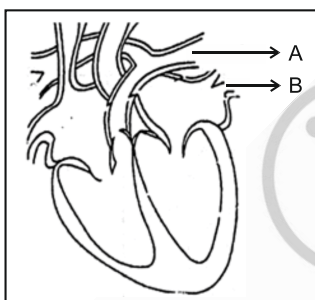
Define atomic size. Give its unit of measurement. In the modern periodic table what trend is observed in the atomic radius in a group and a period and why is it so?

[2020] ...[5M]

BIOLOGY

1 : Life Processes

- How do autotrophs obtain CO_2 and N_2 to make their food? **[2008] ...[1M]**
- What will happen to a plant if its xylem is removed? **[2009] ...[1M]**
- Name the green dot like structures in some cells observed by a student when a leaf peel was viewed under a microscope. What is this green colour due to? **[2010] ...[1M]**
- Consider the following statements in connection with the functions of the blood vessels marked A and B in the diagram of a human heart as shown.



- Blood vessel A - It carries carbon dioxide rich blood to the lungs.
- Blood vessel B - It carries oxygen rich blood from the lungs.
- Blood vessel B - Left atrium relaxes as it receives blood from this blood vessel.
- Blood vessel A - Right atrium has thick muscular wall as it has to pump blood to this blood vessel.

The correct statements are **[2021]...[1M]**

- (i) and (ii) only
 - (ii) and (iii) only
 - (ii), (iii) and (iv)
 - (i), (ii) and (iii)
- In living organisms during respiration which of the following products are not formed if oxygen is not available? **[2021]...[1M]**
 - Carbon dioxide + Water
 - Carbon dioxide + Alcohol
 - Lactic acid + Alcohol
 - Carbon dioxide + Lactic Acid

- The correct statements with reference to single celled organisms are

- Complex substances are not broken down into simpler substances.
- Simple diffusion is sufficient to meet the requirement of exchange of gases.
- Specialised tissues perform different functions in the organism.
- Entire surface of the organism is in contact with the environment for taking in food.

[2021]...[1M]

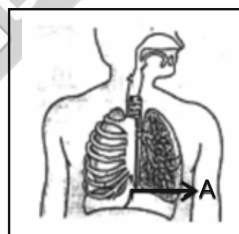
- (i) and (iii)
- (ii) and (iii)
- (ii) and (iv)
- (i) and (iv)

- Which one among the following is not removed as a waste product from the body of a plant?

[2021]...[1M]

- Resins and Gums
- Urea
- Dry Leaves
- Excess Water

- Which of the following statements are correct in reference to the role of A (shown in the given diagram) during a breathing cycle in human beings?

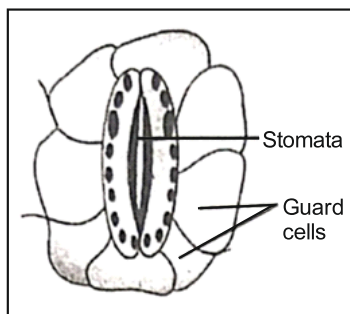


- It helps to decrease the residual volume of air in lungs.
- It flattens as we inhale.
- It gets raised as we inhale.
- It helps the chest cavity to become larger.

[2021]...[1M]

- (ii) and (iv)
- (iii) and (iv)
- (i) and (ii)
- (i), (ii) and (iv)

9. Which one of the following conditions is true for the state of stomata of a green leaf shown in the given diagram? [2021]...[1M]



- (a) Large amount of water flows into the guard cells.
 (b) Gaseous exchange is occurring in large amount.
 (c) Large amount of water flows out from the guard cells.
 (d) Large amount of sugar collects in the guard cells.
10. **Assertion (A)** : Nitrogen is an essential element for plant growth and is taken up by plants in the form of inorganic nitrates or nitrites.

Reason (R) : The soil is the nearest and richest source of raw materials like Nitrogen, Phosphorus and other minerals for the plants. [2021]...[1M]

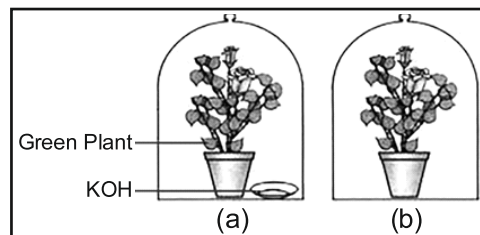
- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
 (c) (A) is true, but (R) is false.
 (d) (A) is false, but (R) is true.
11. **Assertion (A)** : Hydrochloric acid helps in the digestion of food in the stomach.

Reason (R) : Hydrochloric acid creates an acidic medium to activate protein digesting enzymes.

[2021]...[1M]

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
 (c) (A) is true, but (R) is false.
 (d) (A) is false, but (R) is true.

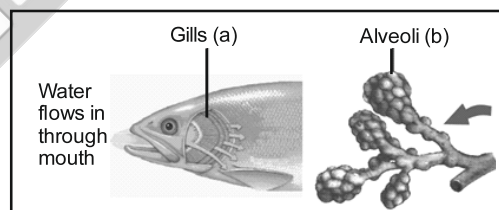
12. A student was asked to write a stepwise procedure to demonstrate that carbon dioxide is necessary for photosynthesis. He wrote the following steps. The wrongly worded step is



[2021]...[1M]

- (a) Both potted plants are kept in dark room for at least three days.
 (b) Bottom of the bell jars is sealed to make them air tight.
 (c) Both potted plants are kept in sunlight after the starch test.
 (d) A leaf from both the plants is taken to test the presence of starch.
13. Respiratory structures of two different animals-a fish and a human being are as shown.

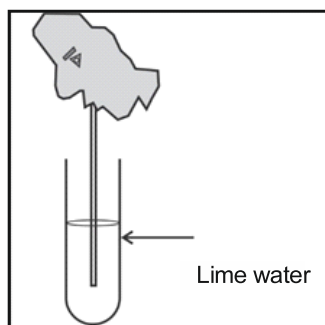
Observe (a) and (b) and select one characteristics that holds true for both of them.



[2021]...[1M]

- (a) Both are placed internally in the body of animal.
 (b) Both have thin and moist surface for gaseous exchange.
 (c) Both are poorly supplied with blood vessels to conserve energy
 (d) In both the blood returns to the heart after being oxygenated.

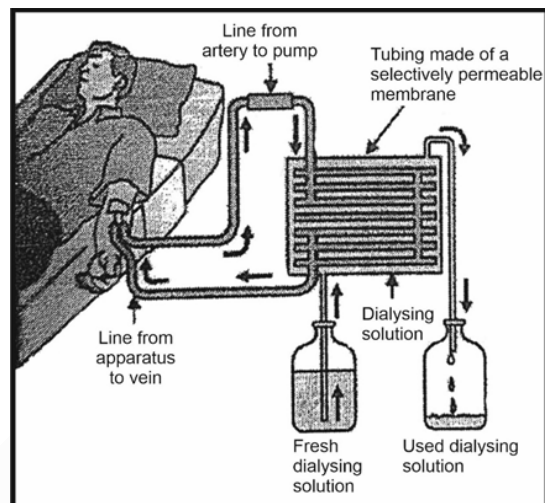
14. Observe the diagram of an activity given below. What does it help to conclude, when the person exhales into the test-tube? [2021]...[1M]



- (a) Percentage of carbon dioxide is more in inhaled air.
 (b) Fermentation occurs in the presence of oxygen.
 (c) Percentage of carbon dioxide is more in the exhaled air.
 (d) Fermentation occurs in the presence of carbon dioxide.
15. The length of small intestine in a deer is more as compared to the length of small intestine of a tiger. The reason for this is [2021]...[1M]
- (a) Mode of intake of food.
 (b) Type of food consumed.
 (c) Presence or absence of villi in intestines.
 (d) Presence or absence of digestive enzymes.
16. Identify the two components of Phloem tissue that help in transportation of food in plants. [2021]...[1M]
- (a) Phloem parenchyma & sieve tubes
 (b) Sieve tubes & companion cells
 (c) Phloem parenchyma & companion cells
 (d) Phloem fibres and sieve tubes

Case Study Based Questions (Q.17 to Q.20) :

The figure shown below represents a common type of dialysis called as Haemodialysis. It removes waste products from the blood such as excess salts and urea which are insufficiently removed by the kidney in patients with kidney failure. During the procedure, the patient's blood is cleaned by filtration through a series of semi-permeable membranes before being returned to the blood of the patient. On the basis of this, answer the following questions:



17. The haemodialyzer has semi-permeable lining of tubes which help [2021]...[1M]
- (a) To maintain osmotic pressure of blood
 (b) To filter nitrogenous wastes from the dialyzing solution
 (c) In passing the waste products in the dialyzing solution
 (d) To pump purified blood back into the body of the patient
18. Which one of the following is not a function of Artificial Kidney? [2021]...[1M]
- (a) To remove nitrogenous wastes from the blood.
 (b) To remove excess fluids from the blood.
 (c) To reabsorb essential nutrients from the blood.
 (d) To filter and purify the blood.
19. The 'used dialysing' solution is rich in: [2021]...[1M]
- (a) Urea and excess salts
 (b) Blood cells
 (c) Lymph
 (d) Proteins
20. Which part of the nephron in human kidney, serves the function of reabsorption of certain substances? [2021]...[1M]
- (a) Glomerulus
 (b) Bowman's capsule
 (c) Tubules
 (d) Collecting duct

21. Write one function each of the following components of the transport system in human beings: **[2008] ...[2M]**
 (a) Blood vessels (b) Blood platelets
 (c) Lymph (d) Heart
22. Write two different ways in which glucose is oxidized to provide energy in human body. Write the products formed in each case. **[2019]...[2M]**
23. In the experimental set up to show that " CO_2 is given out during respiration", name the substance taken in the small test tube kept in the conical flask. State its function and the consequence of its use. **[2019] ...[2M]**
24. How are oxygen and carbon dioxide transported in human beings? How are lungs designed to maximize the area for exchange of gases? **[2008] ...[3M]**
25. Write three types of blood vessels. Give one important feature of each. **[2019] ...[3M]**
26. (a) Draw a diagram of human alimentary canal and label on it :
 Oesophagus, Gall bladder, Liver and Pancreas
 (b) Explain the statement, 'Bile does not contain any enzyme but it is essential for digestion'. **[2009] ...[5M]**
27. (a) Draw a diagram of excretory system in human beings and label on it:
 Aorta, vena cava, urinary bladder, urethra
 (b) List two vital functions of the kidney. **[2009] ...[5M]**
28. Explain the process of digestion of food in mouth, stomach and small intestine in human body. **[2010] ...[5M]**
29. (a) List the three events that occur during the process of photosynthesis. Explain the role of stomata in this process.
 (b) Describe an experiment to show that "sunlight is essential for photosynthesis." **[2010] ...[5M]**
30. (a) Mention any two components of blood.
 (b) Trace the movement of oxygenated blood in the body.
 (c) Write the function of valves present in between atria and ventricles.
 (d) Write one structural difference between the composition of artery and veins. **[2018]...[5M]**
31. (a) Define excretion.
 (b) Name the basic filtration unit present in the kidney.
 (c) Draw excretory system in human beings and label the following organs of excretory system which perform following functions:
 (i) Form urine
 (ii) Is a long tube which collects urine from kidney
 (iii) Store urine until it is passed out. **[2018] ...[5M]**
32. (a) Why is there a difference in the rate of breathing between aquatic organisms and terrestrial organisms? Explain.
 (b) Draw a diagram of human respiratory system and label – pharynx, trachea, lungs, diaphragm and alveolar sac on it. **[2020]...[5M]**

OR

- (a) Name the organs that form the excretory system in human beings.
 (b) Describe in brief how urine is produced in human body. **[2020]...[5M]**

2 : Control and Coordination

1. Name two tissues that provide control and coordination in multicellular animals. **[2009]...[1M]**
2. How is the spinal cord protected in the human body? **[2010] ...[1M]**
3. What are 'nastic' and 'curvature' movements? Give one example of each. **[2009] ...[2M]**
4. What are hormones? Name the hormone secreted by thyroid gland and state its function? **[2010] ...[2M]**
5. (a) Name one gustatory receptor and one olfactory receptor present in human beings.
 (b) Write a and b in the given flow chart of neuron through which information travels as an electrical impulse.

Dendrite → a → b → End point of Neuron

[2018] ...[2M]

6. Name the hormones secreted by the following endocrine glands and specify one function of each:

(a) Thyroid (b) Pituitary
(c) Pancreas **[2018] ...[3M]**

7. What are plant hormones? Name the plant hormones responsible for the following ?

(i) Growth of stem
(ii) Promotion of cell division
(iii) Inhibition of growth
(iv) Elongation of cells **[2019] ...[3M]**

8. A squirrel is in a scary situation. Its body has to prepare for either fighting or running away. State the immediate changes that take place in its body so that the squirrel is able to either fight or run **[2020] ...[3M]**

OR

Why is chemical communication better than electrical impulses as a means of communication between cells in a multi-cellular organism? **[2020] ...[3M]**

9. (a) Draw the structure of a neuron and label the following on it :

Nucleus, Dendrite, Cell body and Axon

- (b) Name the part of neuron:

(i) Where information is acquired.
(ii) Through which information travels as an electrical impulse. **[2008] ...[5M]**

10. (a) What is

(i) Phototropism and
(ii) Geotropism?

With labelled diagrams describe an activity to show that light and gravity change the direction that plant parts grow in.

- (b) Mention the role of each of the following plant hormones:

(i) Auxin
(ii) Absciscic acid **[2008] ...[5M]**

3 : How do Organisms Reproduce?

1. What is the effect of DNA copying which is not perfectly accurate on the reproduction process? **[2008] ...[1M]**

2. After observing the prepared slides of binary fission in *Amoeba* and budding in yeast, the following observations were reported :

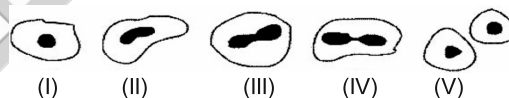
- Single cells of *Amoeba* and Yeast were undergoing binary fission and budding respectively.
- Cytokinesis was observed in the Yeast cell.
- Elongated nucleus was dividing to form two daughter nuclei in *Amoeba*.
- A chain of buds were observed due to reproduction in *Amoeba*.

The correct observation(s) is/are:

[2012] ...[1M]

- d, a and c
- c and d
- b only
- a and c

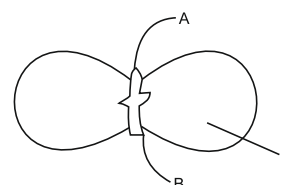
3. A student after observing a slide showing different stages of binary fission in *Amoeba* draws the following diagrams. However these diagrams are not in proper sequence.



The correct sequence is: **[2011, 2013] ...[1M]**

- I, V, IV, III, II
- I, V, III, IV, II
- I, III, IV, V, II
- None of these

4. In the figure, the parts marked A, B and C are sequentially **[2013, 2014] ...[1]**



- Plumule, Cotyledon and Radicle
- Radicle, Cotyledon and Plumule
- Radicle, Plumule and Cotyledon
- Plumule, Radicle and Cotyledon

5. Select the correct statements for the process of budding in yeast:
- A bud arises from a particular region on a parent body.
 - A parent cell divides into two daughter cells; here the parental identity is lost.
 - Before detaching from the parent body a bud may form another bud.
 - A bud when detached from the parent body grows into a new individual. **[2013] ...[1M]**
- (a) II, III and IV (b) I, II and III
(c) III, IV and I (d) None of the above

OR

When you study a slide showing different stages of budding in yeast, you observe the following stages:

- The bud may get separated from the parent body and develop into a new individual.
 - The body of the bud develops and gives rise to another baby bud.
 - A bud comes out in any direction from the body of the parent cell.
 - Thus they may form a colony.
- The proper sequence of the above stages is **[2014] ...[1M]**
- (A) II, I, III, IV (B) II, III, I, IV
(C) III, II, I, IV (D) III, I, II, IV
6. Name two simple organisms having the ability of regeneration. **[2015] ...[1M]**
7. Students were asked to observe the permanent slides showing different stages of budding in yeast under high power of a microscope. **[2015] ...[1M]**
- Which adjustment screw (coarse/fine) were you asked to move to focus the slides?
 - Draw three diagrams in correct sequence showing budding in yeast.
8. A student was asked to observe and identify the various parts of an embryo of a red kidney bean seed. He identified the parts and listed them as under :
- | | |
|----------------|-------------|
| I. Tegmen | II. Testa |
| III. Cotyledon | IV. Radicle |
| V. Plumule | |
- [2015] ...[1M]**
- The correctly identified parts among these are :
- (A) I, II and III (B) II, III and IV
(C) III, IV and V (D) I, III, IV and V

9. List two functions of ovary of human female reproductive system. **[2016] ...[1M]**

10. A student while observing an embryo of a pea seed in the laboratory listed various parts of the embryo as given below:

Testa, Tegmen, Radicle, Plumule, Micropyle, Cotyledon.

On examining the list the teacher remarked that only three parts are correct.

Select three correct parts from the above list:

[2016] ...[1M]

- Testa, Radicle, Cotyledon
- Tegmen, Radicle, Micropyle
- Cotyledon, Plumule, Testa
- Radicle, Cotyledon, Plumule

11. **Answer question numbers 11(a) to 11(d) on the basis of your understanding of the following paragraphs and the related studied concepts.**

The growing size of the human population is a cause of concern for all people. The rate of birth and death in a given population will determine its size. Reproduction is the process by which organisms increase their population. The process of sexual maturation for reproduction is gradual and takes place while general body growth is still going on. Some degree of sexual maturation does not necessarily mean that the mind or body is ready for sexual acts or for having and bringing up children. Various contraceptive devices are being used by human beings to control the size of population.

- List two common signs of sexual maturation in boys and girls. **[2020] ...[1M]**
 - What is the result of reckless female foeticide? **[2020] ...[1M]**
 - Which contraceptive method changes the hormonal balance of the body? **[2020] ...[1M]**
 - Write two factors that determine the size of a population. **[2020] ...[1M]**
12. With the help of diagrams show the different stages of binary fission in *Amoeba*. **[2010, 2017, 2018] ...[2M]**
13. List any four reasons for vegetative propagation being practised in the growth of some type of plants. **[2011] ...[2M]**
14. State the role of
- Seminal vesicle
 - Prostate gland in the human body. **[2011] ...[2M]**

15. Define the term puberty. List two changes observed in girls at the time of puberty.

[2012] ...[2M]

16. What is meant by asexual reproduction? List any two of its different forms.

[2012] ...[2]

17. A student is observing a permanent slide showing sequentially the different stages of asexual reproduction taking place in yeast. Name this process and draw diagrams, of what he observes, in a proper sequence.

[2012, 2016] ...[2M]

18. Mention two functions of the human testis.

[2013] ...[2M]

19. Draw labelled diagrams to illustrate budding in *Hydra*.

[2014] ...[2M]

OR

Draw a labelled diagram in proper sequence to show budding in *Hydra*.

[2019] ...[2M]

20. Give reasons:

- Placenta is extremely essential for foetal development.
- Uterine lining becomes thick and spongy after fertilisation.

[2022] ...[2M]

21. (a) Name the reproductive and non-reproductive parts of bread mould (*Rhizopus*).

- (b) List any two advantages of vegetative propagation.

[2022] ...[2M]

22. Name the reproductive parts of an angiosperm. Where are these parts located? Explain the structure of its male reproductive part.

[2022] ...[2M]

OR

What is puberty? Mention any two changes that are common to both boys and girls in early teenage years.

23. (a) Explain the terms :

- Implantation
- Placenta

- (b) What is the average duration of human pregnancy?

[2009] ...[3M]

24. Write the full form of DNA. Name the part of the cell where it is located. Explain its role in the process of reproduction of the cell.

[2010]...[3M]

25. What does HIV stand for? Is AIDS an infectious disease? List any four modes of spreading AIDS.

[2011] ...[3M]

26. Explain the meaning of sexually transmitted diseases (STD's). Give two examples of STD's each, caused due to

- bacterial infection
- viral infection.

State in brief how the spread of such diseases may be prevented.

[2008, 2012, 2013] ...[3M]

27. (a) Explain the process of regeneration in *Planaria*.

- (b) How is regeneration different from reproduction?

[2013] ...[3M]

28. Write one difference between asexual and sexual mode of reproduction. Which species is likely to have better chances of survival - the one reproducing asexually or the one reproducing sexually? Justify your answer.

[2014] ...[3M]

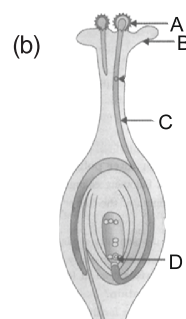
29. What is the effect of DNA copying, which is not perfectly accurate, on the reproduction process? How does the amount of DNA remain constant though each new generation is a combination of DNA copies of two individuals?

[2014, 2018] ...[3M]

30. List any four methods of contraception used by humans. State in brief two advantages of adopting such preventive methods.

[2015]...[3M]

31. (a) List two reasons for the appearance of variations among the progeny formed by sexual reproduction.



- Name the part marked 'A' in the diagram.
- How does 'A' reaches part 'B'?
- State the importance of the part 'C'
- What happens to the part marked 'D' after fertilization is over?

[2016] ...[3M]

32. Define reproduction. How does it help in providing stability to the population of species?

[2016] ...[3M]

33. Explain the term "Regeneration" as used in relation to reproduction of organisms. Describe briefly how regeneration is carried out in multicellular organisms like *Hydra*. [2016]...[3M]

34. List the two types of reproduction. Which one of the two is responsible for bringing in more variations in its progeny and how? [2017]...[3M]

35. List three techniques that have been developed to prevent pregnancy. Which one of these techniques is not meant for males? How does the use of these techniques have a direct impact on the health and prosperity of a family?

[2017] ...[3M]

36. What is vegetative propagation? State two advantages and two disadvantages of this method. [2017] ...[3M]

37. (a) List in tabular form two differences between binary fission and multiple fission.

- (b) What happens when a mature *Spirogyra* filament attains considerable length?

[2020]...[3M]

38. With the help of suitable diagrams, explain the various steps of budding in *Hydra*.

OR

What is binary fission in organisms? With the help of suitable diagrams, describe the mode of reproduction in *Amoeba*. [2011] ...[5M]

39. Define the terms pollination and fertilisation. Draw a diagram of a pistil showing pollen tube growth into the ovule and label the following: pollen grain, male gamete, female gamete and ovary.

OR

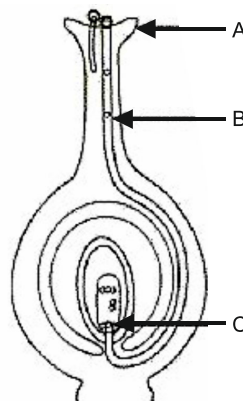
Describe in brief the role of :

- (i) Testis, (ii) Seminal vesicle, (iii) Vas deferens, (iv) Ureter, (v) Prostate gland in human male reproductive system. [2012] ...[5M]
40. (a) Write the function of placenta in females.
- (b) List four ways of preventing pregnancy. State two advantages of using such preventive methods. [2013] ...[5M]

41. (a) Identify A, B and C in the given diagram and write their functions.

- (b) Mention the role of gamete and zygote in sexually reproducing organisms.

[2013, 2015] ...[5M]



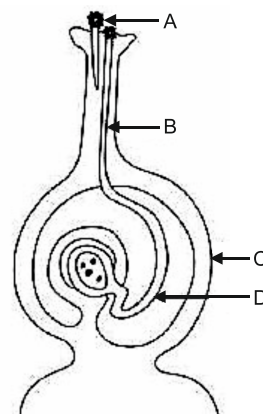
42. (a) Draw a sectional view of human female reproductive system and label the part where
- eggs develop.
 - fertilisation takes place.
 - fertilised egg gets implanted.

- (b) Describe, in brief, the changes the uterus undergoes

- to receive the zygote.
- if zygote is not formed.

[2014] ...[5M]

43. (a) Name the parts labelled as A, B, C and D in the diagram given below:



- (b) What is pollination? State its significance.
- (c) How does fertilisation occur in flowers? Name the parts of the flower that develop into (i) seed, and (ii) fruit after fertilisation.

[2014] ...[5M]

44. (a) Name the human male reproductive organ that produces sperm and also secretes a hormone. Write the functions of the secreted hormone.

- (b) Name the parts of the human female reproductive system where

- (i) Fertilization takes place
(ii) Implantation of the fertilized egg occurs.
Explain how the embryo gets nourishment inside the mother's body.

[2015] ...[5M]

45. What is placenta? Describe its structure. State its functions in case of a pregnant human female.

[2016] ...[5M]

46. (a) Write the functions of each of the following parts in a human female reproductive system:

- (i) Ovary (ii) Uterus
(iii) Fallopian tube

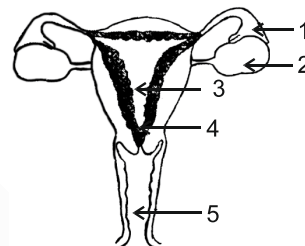
- (b) Write the structure and functions of placenta in a human female. [2017, 2018] ...[5M]

47. Define pollination. Explain the different types of pollination. List two agents of pollination? How does suitable pollination lead to fertilization?

[2019] ...[5M]

OR

- (a) Identify the given diagram. Name the parts 1 to 5.



- (b) What is contraception? List three advantages of adopting contraceptive measures.

[2019] ...[5M]

4 : Heredity and Evolution

1. Study the different conclusions drawn by students of a class on the basis of observations of preserved/available specimens of plants and animals.

- I. Potato and sweet potato are analogous organs in plants and animals.
II. Wings of insects and wings of birds are homologous organs in animals.
III. Wings of insects and wings of bats are analogous organs in animals.
IV. Thorns of *Citrus* and tendrils of *Cucurbita* are analogous organs in plants

The correct conclusions are: [2013] ...[1M]

- (A) I and II (B) II and IV
(C) III and IV (D) I and III

2. Study the following statements:

- I. Wings of birds and wings of bats are homologous organs.
II. Wings of birds and wings of insects are modified forelimbs.
III. Wings of birds and wings of insects are analogous organs.
IV. Wings of birds and forelimbs of horse are homologous organs.

The correct statements are [2014] ...[1M]

- (A) I and II
(B) II and III
(C) III and IV
(D) I and IV

3. Which of the following pairs of two vegetables represent the correct homologous structures?

[2014] ...[1M]

- (A) Sweet potato and potato
(B) Sweet potato and tomato
(C) Carrot and potato
(D) Radish and carrot

4. Given below is the list of vegetables available in the market. Select from these the two vegetables having homologous structures: Potato, sweet potato, ginger, radish, tomato, carrot, okra (Lady's finger).

[2015] ...[1M]

- (A) Potato and sweet potato
(B) Radish and carrot
(C) Okra and sweet potato
(D) Potato and tomato

5. If you are asked to select a group of two vegetables, out of the following, having homologous structures which one would you select? **[2016] ...[1M]**
 - (a) Carrot and radish
 - (b) Potato and sweet potato
 - (c) Potato and tomato
 - (d) Lady finger and potato
6. Why is variation important for a species? **[2017] ...[1M]**
7. What are fossils? What do they tell about the process of evolution? **[2008] ...[2M]**
8. Give one example each of characters that are inherited and the ones that are acquired in humans. Mention the difference between the inherited and the acquired characters. **[2010] ...[2M]**
9. A Mendelian experiment consisted of breeding pea plants bearing violet flowers with pea plants bearing white flowers. What will be the result in F_1 progeny? **[2018] ...[2M]**
10. Explain analogous organs and homologous organs. Identify the analogous and homologous organs amongst the following :
Wings of an insect, wings of a bat, forelimbs of frog, forelimbs of a human **[2009] ...[3M]**
11. Describe any three ways in which individuals with a particular trait may increase in population. **[2011] ...[3M]**
12. State the evidence we have for the origin of life from inanimate matter. **[2011] ...[3M]**
13. Give an example of body characteristics used to determine how close two species are in terms of evolution and explain it. **[2011] ...[3M]**
14. Distinguish between homologous organs and analogous organs. In which category would you place wings of a bird and wings of bat? Justify your answer giving a suitable reason. **[2012] ...[3M]**
15. Define the term 'evolution'. 'Evolution cannot be equated with progress'. Justify this statement. **[2012] ...[3M]**
16. A blue colour flower plant denoted by BB is crossbred with a white colour flower plant denoted by bb.
 - (a) State the colour of flower you expect in their F_1 generation plants.
 - (b) What must be the percentage of white flower plants in F_2 generation if flowers of F_1 plants are self-pollinated?
 - (c) State the expected ratio of the genotypes BB and Bb in the F_2 progeny. **[2012]...[3M]**
17. List three main factors responsible for the speciation and briefly describe each one of them. **[2014] ...[3M]**
18. "A trait may be inherited, but may not be expressed." Justify this statement with the help of a suitable example. **[2014] ...[3M]**
19. What are chromosomes? Explain how in sexually reproducing organisms the number of chromosomes in the progeny is maintained. **[2015] ...[3M]**
20. Explain the following:
 - (a) Speciation
 - (b) Natural Selection **[2015] ...[3M]**
21. Explain with an example for each, how the following provides evidences in favour of evolution in organisms:
 - (a) Homologous organs
 - (b) Analogous organs
 - (c) Fossils **[2015] ...[3M]**
22. "Two areas of study namely 'Evolution' and 'Classification' are inter-linked". Justify this statement. **[2016] ...[3M]**
23. How do Mendel's experiment show that traits are inherited independently? **[2016] ...[3M]**
24. How did Mendel's explain that it is possible that a trait is inherited but not expressed in an organism? **[2017] ...[3M]**
25. What is an organic evolution? It cannot be equated with progress. Explain with the help of a suitable example. **[2017] ...[3M]**
26. Name the plant Mendel used for his experiment. What type of progeny was obtained by Mendel in F_1 and F_2 generations when he crossed the tall and short plants? Write the ratio he obtained in F_2 generation plants. **[2019] ...[3M]**

27. List two differences between acquired traits and inherited traits by giving an example of each.

[2019] ...[3M]

28. (a) Name the two types of gametes produced by men.
 (b) Does a male child inherit X chromosome from his father? Justify.
 (c) How many types of gametes are produced by a human female? [2022] ...[3M]

29. **Case Study Based Questions :**

Mendel blended his knowledge of Science and mathematics to keep the count of the individuals exhibiting a particular trait in each generation. He observed a number of contrasting visible characters controlled in pea plants in a field. He conducted many experiments to arrive at the laws of inheritance.

- (a) What do the F_1 progeny of tall plants with round seeds and short plants with wrinkled seeds look like?
 (b) Name the recessive traits in above case.
 (c) Mention the type of the new combinations of plants obtained in F_2 progeny along with their ration, if F_1 progeny was allowed to self pollinate. [2022] ...[4M]

OR

If 1600 plants were obtained in F_2 progeny, write the number of plants having traits:

- (i) Tall with round seeds
 (ii) Short with wrinkled seeds

Write the conclusion of the above experiment.

30. 'The sex of a newborn child is a matter of chance and none of the parents may be considered responsible for it.' Justify this statement with the help of flow chart showing determination of sex of a newborn. [2012]...[5M]

31. How do Mendel's experiments show that the

- (a) Traits may be dominant or recessive
 (b) Traits are inherited independently

[2015] ...[5M]

32. Define evolution. How does it occur? Describe how fossils provide us evidences in support of evolution. [2016] ...[5M]

33. With the help of one example for each, distinguish between the acquired traits and the inherited traits. Why are the traits/experiences acquired during the entire lifetime of an individual not inherited in the next generation? Explain the reason of this fact with an example.

[2017] ...[5M]

34. (a) What is genetics?

- (b) What are genes? Where are the genes located?

- (c) State and define three factors responsible for the rise of a new species.

[2020][...5M]

5 : Our Environment

1. How is the increasing demand for energy adversely affecting our environment?

[2010] ...[1M]

2. Select two non-biodegradable substances from the following waste generated in a kitchen: Spoilt food, paper bags, milk bags, vegetable peels, tin cans, used tea leaves solution [2012] ...[1M]

3. Mention one negative effect of our affluent life style on the environment. [2013, 2014] ...[1M]

4. In a food chain of frog, grass, insect and snake, assign trophic level to frog. [2016] ...[1M]

5. In the following food chain, 20,000 J of energy was available to the plants. How much energy would be available to man in this chain?

Plants → Sheep → Man

[2017] ...[1M]

6. **Answer question numbers 6(a) to 6(d) on the basis of your understanding of the following paragraphs and the related studied concepts.**

Human body is made up of five important components, of which water is the main component. Food as well as potable water are essential for every human being. The food is obtained from plants through agriculture. Pesticides are being used extensively for a high yield in the fields. These pesticides are absorbed by the plants from the soil along with water and minerals and from the water bodies these pesticides are taken up by the aquatic animals and plants. As these chemicals are not

biodegradable, they get accumulated progressively at each trophic level. The maximum concentration of these chemicals gets accumulated in our bodies and greatly affects the health of our mind and body.

- (a) Why is the maximum concentration of pesticides found in human beings?

[2020] ...[1M]

- (b) Give one method which could be applied to reduce our intake of pesticides through food to some extent.

[2020] ...[1M]

- (c) Various steps in a food chain represent:

[2020] ...[1M]

- (a) Food web (b) Trophic level
(c) Ecosystem (d) Biomagnification

- (d) With regard to various food chain operating in an ecosystem, man is a:

[2020] ...[1M]

- (a) Consumer
(b) Producer
(c) Producer and consumer
(d) Producer and decomposer

7. In an ecosystem, 10% of energy available for transfer from one trophic level to the next is in the form of :

[2020] ...[1M]

- (a) heat energy
(b) chemical energy
(c) mechanical energy
(d) light energy

8. Soil fertility is determined by its ability to :

[2020]...[1M]

- (a) Decay organic matter
(b) Hold organic matter
(c) Hold water
(d) Support life

9. "Burning fossil fuels is a cause of global warming." Justify this statement.

[2012] ...[2M]

10. We often observe domestic waste decomposing in the bylanes of residential colonies. Suggest ways to make people realise that the improper disposal of waste is harmful to the environment.

[2013] ...[2M]

11. State with reason any two possible consequences of elimination of decomposers from the Earth.

[2014] ...[2M]

12. You being an environmentalist are interested in contributing towards the conservation of nature resources. List four activities that you can do on your own.

[2017] ...[2M]

13. In the following food chain, only 2J of energy was available to the peacocks. How much energy would have been present in Grass? Justify your answer.

[2022] ...[2]

GRASS → GRASS HOPPER → FROG
SNAKE → PEACOCK

OR

- (a) What is meant by garbage? List two classes into which garbage is classified.

- (b) What do we actually mean when we say that the "enzymes are specific in their action"?

[2022] ...[2]

14. How is ozone formed in the upper atmosphere? Why is damage to ozone layer a cause of concern to us? What causes this damage?

[2008] ...[3M]

15. (a) What is an ecosystem? List its two main components.

- (b) We do not clean ponds or lakes, but an aquarium needs to be cleaned regularly. Explain.

[2009, 2013] ...[3M]

16. Explain the phenomenon of "biological magnification." How does it affect organisms belonging to different trophic levels particularly the tertiary consumers?

[2010] ...[3M]

17. "Energy flow in a food chain is unidirectional". Justify this statement. Explain how the pesticides enter a food chain and subsequently get into our body.

[2014] ...[3M]

18. Differentiate between biodegradable and non-biodegradable substances with the help of one example each. List two changes in habit that people must adopt to dispose non-biodegradable waste, for saving the environment.

[2015] ...[3M]

19. The activities of man had adverse effects on all forms of living organisms in the biosphere. Unlimited exploration of nature by man disturbed the delicate ecological balance between the living and nonliving components of the biosphere. The unfavorable conditions created by man himself threatened the survival not only of himself but also of the entire living organisms on the mother earth. One of your classmates is an active member of 'Eco club' of your school which is creating environmental awareness amongst the school students, spreading the same in the society and also working hard for preventing environmental degradation of the surroundings.

- (a) Why is it necessary to conserve our environment?
- (b) State the importance of green and blue dust-bins in the safe disposal of the household waste.
- (c) List two values exhibited by your classmate who is an active member of Eco-club of your school. **[2016] ...[3M]**

20. Students in a school listened to the news read in the morning assembly that the mountain of garbage in Delhi suddenly exploded and various vehicles got buried under it. Several people were also injured and there was traffic jam all ground. In the brain storming session the teacher also

discussed this issue and asked the students to find out a solution to the problem of garbage. Finally they arrived at two main points - one is self management of the garbage we produce and the second is to generate least garbage at individual level.

- (a) Suggest two measures to manage the garbage we produce.
- (b) As an individual, what can we do to generate the least garbage? Give two points.
- (c) List two values the teacher instilled in his students in this episode. **[2018] ...[3M]**

21. How can we help in reducing the problem of waste disposal? Suggest any three methods.

OR

Define an ecosystem. Draw a block diagram to show the flow of energy in an ecosystem.

[2017, 2019] ...[3M]

22. (a) We do not clean ponds or lakes, but an aquarium needs to be cleaned regularly. Why?
- (b) Why is ozone layer getting depleted at the higher levels of the atmosphere? Mention one harmful effect caused by its depletion.

[2022] ...[3M]

6 : Sustainable Management of Natural Resources

1. What are the advantages of water stored in the ground? **[2012] ...[2M]**

2. Every one of us can do something to reduce our consumption of various natural resources. List four such activities based on the 3-R approach. **[2013] ...[2M]**

3. Why is sustainable management of natural resources necessary? Out of the two - reuse and recycle - which, in your opinion, is better to practice? Give reason. **[2015] ...[2M]**

4. What is meant by bio-diversity? List two advantages of conserving forests and wildlife. **[2015] ...[2M]**

5. List four stakeholders which may be helpful in the conservation of forests. **[2016] ...[2M]**

6. You being an environmentalist are interested in contributing towards the conservation of natural resources. List four activities that you can do on your own. **[2017] ...[2M]**

7. Why are coal and petroleum categorized as natural resources? Give a reason as to why they should be used judiciously. **[2017] ...[2M]**
8. (a) Water is an elixir of life, a very important natural resource. Your science teacher wants you to prepare a plan for a formative assessment activity, "How to save water, the vital natural resource". Write any two ways that you will suggest to bring awareness in your neighbourhood, on how to 'save water'.
- (b) Name and explain any one way by which the underground water table does not go down further. **[2017] ...[3M]**
9. What is a dam? Why do we seek to build large dams? While building large dams, which three main problems should particularly be addressed to maintain peace among local people? Mention them. **[2018] ...[3M]**
10. What is water harvesting? List two main advantages associated with water harvesting at the community level. Write two causes for the failure of sustained availability of groundwater. **[2019] ...[3M]**



CHAPTER-WISE PREVIOUS YEARS' QUESTIONS

MATHEMATICS