

CBSE Class 10

Science

Previous Year Question Paper 2020

Series: JBB/1

Set– 1

Code no. 31/1/1

- Please check that this paper contains **15** printed pages.
- Code number given on the right-hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **30** questions.
- **Please write down the Serial Number of the question in the answer-book before attempting it.**
- 15 minutes of time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

SCIENCE

Time Allowed: 3 hours

Maximum Marks: 80

General Instructions:

Read the following instructions very carefully and strictly follow them:

(i) Question paper comprises three sections - A, B and C.

There are **30** questions in the question paper. **All** questions are compulsory.

(ii) **Section A** - question no. 1 to 14 - all questions or part thereof are of one mark each. These questions comprise multiple choice questions (MCQ), very short answer (VSA), and Assertion-Reason type questions. Answers to these questions should be given in one word or one sentence.

(iii) **Section B** - question no. 15 to 24 are short answer type questions, carrying 3 marks each, Answers to these questions should not exceed 50 to 60 words.

(iv) **Section C** - question no. **25 to 30** are long answer type questions, carrying 5 marks each. Answer to these questions should not exceed

80 to 90 words.

(v) Answer should be brief and to the point. Also, the abovementioned word limit be adhered to as far as possible.

(vi) There is no overall choice in the question paper. However, an internal choice has been provided in some questions in each Section.

Only one of the choices in such questions have to be attempted.

(vii) In addition to this, separate instructions are given with each section and question, wherever necessary.

SECTION - A

1. Name acyclic unsaturated carbon compound.

1 Mark

Ans: Acyclic unsaturated carbon compounds are those which contain double or triple bonds between carbon atoms and are acyclic in nature. For example: Butene.

2. The change in magnetic field lines in a coil is the cause of induced electric current in it. Name the underlying phenomenon.

1 Mark

Ans: According to the phenomenon of electromagnetic induction, the change in magnetic field lines in a coil is the cause of induced electric current in it.

Answer question numbers 3(a) to 3(d) and 4(a) to 4(d) on the basis of your understanding of the following paragraphs and the related studied concepts.

3. 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 the population.

(a) List two common signs of sexual maturation in boys and girls. 1 Mark

Ans: Two common signs of sexual maturation in boys and girls are:

1. Pubic, underarm and facial hair development.
2. Common signs of acne development.

(b) What is the result of reckless female foeticide? 1 Mark

Ans: The reckless female foeticide will ultimately result in men: women ratio. Since due to foeticide the number of females decreases with respect to the number of males.

(c) Which contraceptive method changes the hormonal balance of the body? 1 Mark

Ans: The oral contraceptive method changes the hormonal balance of the body so this woman does not ovulate by taking such pills.

(d) Write two factors that determine the size of a population. 1 Mark

Ans: Two factors which determine the size of population are:

1. Birth rate
2. Death rate

4. 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?
1 Mark

Ans: Pesticides are extensively used for good production of crops and these crops will be consumed by us. Hence these pesticides transfer to the human body. Therefore the maximum concentration of pesticides found in human beings.

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

Ans: Before eating food we must ensure to wash it properly so that if there is a layer of pesticides on the fruit then it gets washed.

(c) Various steps in a food chain represent:
1 Mark

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

Ans: The various steps which are represented in the food chain are known as trophic level. Each trophic level represents a class of organism.

Hence the correct option is (b).

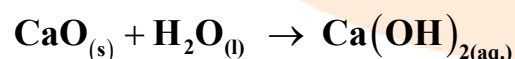
(d) With regard to various food chains operating in an ecosystem, man is a:

- (a) Consumer (b) Producer
(c) Producer and consumer (d) Producer and decomposer **1 Mark**

Ans: According to various food chains operating in the ecosystem, a man is a consumer which does not produce anything of its own. It only consumes.

Hence the correct option is (a).

5. Calcium oxide reacts vigorously with water to produce slaked lime.



This reaction can be classified as:

- (A) Combination reaction (B) Exothermic reaction
(C) Endothermic reaction (D) Oxidation reaction

Which of the following is a correct option?

(a) (A) and (C)

(b) (C) and (D)

(c) (A), (C) and (D)

(d) (A) and (B)

1 Mark

Ans: The above reaction is an exothermic in nature which releases large amounts of heat and it is an example of a combination reaction.

Hence the correct option is (d).

Or

When hydrogen sulphide gas is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is obtained and the sulphuric acid so formed remains in the solution. The reaction is an example of a:

1 Mark

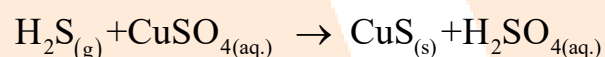
(a) Combination reaction

(b) Displacement reaction

(c) Decomposition reaction

(d) Double displacement reaction

Ans: The reaction can be represented as:



Thus it is a double displacement reaction.

Hence the correct option is (d).

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

1 Mark

(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:

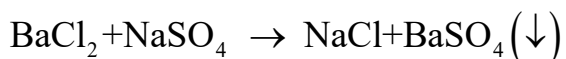
(a) (B) and (D)

(b) (A) and (C)

(c) only (B)

(d) (B), (C) and (D)

Ans: The reaction can be represented as:



Sodium chloride is not an insoluble salt therefore the correct options are A and C.

Hence the correct option is (b).

7. Baking soda is a mixture of:

1 Mark

- (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

Ans: Baking soda is sodium bicarbonate which is NaHCO_3 which is a mixture of sodium hydrogen carbonate and tartaric acid.

Hence the correct option is (c).

8. The chemical formula for plaster of Paris is:

1 Mark

- (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) $2\text{CaSO}_4 \cdot \text{H}_2\text{O}$

Ans: The correct formula for plaster of Paris is $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$.

Hence the correct option is (c).

9. The laws of reflection hold true for:

1 Mark

- (a) plane mirrors only
- (b) concave mirrors only
- (c) convex mirrors only
- (d) all reflecting surfaces

Ans: The laws of reflection hold true for all reflecting surfaces.

Hence the correct option is (d).

Or

When an object is kept within the focus of a concave mirror, an enlarged image is formed behind the mirror. This image is: 1 Mark

- (a) real (b) inverted
(c) virtual and inverted (d) virtual and erect

Ans: The nature of the image will be virtual and erect.

Hence the correct option is (d).

10. At the time of short circuit, the electric current in the circuit: 1 Mark

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

Ans: At time of short circuit the current increases heavily which will burn our devices too.

Hence the correct option is (d).

Or

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

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

Ans: The current will always be equal in series connection. Therefore current will be 1A.

Hence the correct option is (d).

12. Incomplete combustion of coal and petroleum: 1 Mark

- (A) increases air pollution.
(B) increases the efficiency of machines.
(C) reduces global warming.

(D) produce poisonous gases.

The correct option is:

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

Ans: Incomplete combustion of petrol will increase the air pollution and produce the poisonous gases consequently.

Hence the correct option is (b).

For question numbers 13 and 14, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

- (a) Both A and R are true and R is 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.

13. Assertion (A): Esterification is a process in which a sweet-smelling substance is produced.

Reason (R): When esters react with sodium hydroxide an alcohol and sodium salt of carboxylic acid are obtained. **1 Mark**

Ans: Esterification is the process by which ester is formed and ester is a sweet smelling substance. When this ester reacts with sodium hydroxide an alcohol and sodium salt of carboxylic acid are obtained. Thus Assertion is true but reason is not correct explanation because ester smell because of volatile in nature.

Hence the correct option is (b).

14. Assertion (A): In the process of nuclear fission, the amount of nuclear energy generated by the fission of an atom of uranium is so tremendous that

it produces 10 million times the energy produced by the combustion of an atom of carbon from coal.

Reason (R): The nucleus of a heavy atom such as uranium, when bombarded with low energy neutrons, splits apart into lighter nuclei. The mass difference between the original nucleus and the product nuclei gets converted to tremendous energy. **1 Mark**

Ans: Nuclear fission produces a large amount of energy and this energy is produced as the result of bombardment of uranium with low energy neutrons. Thus both are true and reason is the correct explanation of assertion.

Hence the correct option is (a).

SECTION-B

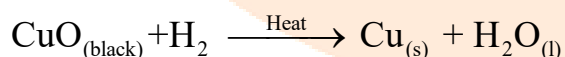
15. 1g of copper powder was taken in a China dish and heated. What change takes place on heating? When hydrogen gas is passed over this heated substance, a visible change is seen in it. Give the chemical equations reactions, the name and the color of the products formed in each case.

3 Marks

Ans: When 1g Copper powder is taken in a china dish and then it is heated, a black colored substance is formed which is known as copper oxide. The above reaction can be represented by using the equation as:



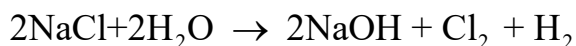
This is because the copper is being oxidized to copper oxide which is black in color. Now when hydrogen gas is passed over this heated substance which is copper oxide then the copper metal is obtained. The reaction can be represented as:



Thus we get copper back on heating the copper oxide with hydrogen gas and also water is formed as a by-product of reaction.

16. List the important products of the Chlor-alkali process. Write one important use of each. **3 Marks**

Ans: The chlor-alkali process is used in the electrolysis of sodium chloride (NaCl). The important products which are formed during the electrolysis of sodium chloride are:

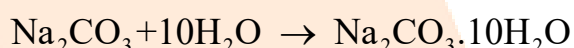


The important products are sodium hydroxide, chlorine and hydrogen gas. When the electric current is passed through the aqueous solution of sodium chloride then hydrogen gas is formed at cathode and chlorine gas is formed at anode. Their uses are listed below:

- (a) Sodium Hydroxide: It is used in manufacturing of soaps and detergents.
- (b) Chlorine gas: It is used in pesticides and manufacturing of PVC pipes.
- (c) Hydrogen gas: It is used in fuels and reduction reactions also.

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? 3 Marks

Ans: Washing soda can be prepared from sodium carbonate by adding ten molecules of water of crystallization. It is then known as sodium carbonate decahydrate or we can simply call it a washing soda in common name. The reaction of adding water of crystallization can be shown as:



Washing soda is a sodium salt and we know that sodium salt is basic in nature. Therefore sodium carbonate is basic in nature and it is basic salt.

Basically there are two types of hardness in water which are temporary hardness and permanent hardness. Washing soda is used to remove both types of hardness. When we add washing soda in water it adds a large amount of carbonate ions in water which will react with calcium and magnesium ions to form insoluble precipitates and thus cleansing action is completed.

17. A 3 ml ethanol is taken in a test tube and warmed gently in a water bath. A 5% a solution of alkaline potassium permanganate is added first drop by drop to this solution, then in excess.

(i) How is 5% solution of KMnO_4 prepared?

(ii) State the role of alkaline potassium permanganate in this reaction. What happens when you add it in excess?

(iii) Write the chemical equation of this reaction.

3 Marks

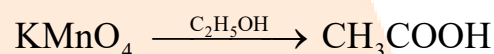
Ans:

(i) 5% solution of KMnO_4 is the solution in which there is 5 g of KMnO_4 is dissolved in 100 ml solution. Therefore it is ratio of weight of KMnO_4 and the volume of solution. It can be prepared in the following steps as:

(a) Take 100 ml of distilled water in a beaker.

(b) Now add 5 g of KMnO_4 into beaker gently and thus it from the 5% solution of KMnO_4 .

(ii) When the alkaline potassium permanganate is added to ethanol then the ethanol gets oxidized. This is because alkaline potassium permanganate is an oxidizing agent which will oxidize the alcohol into carboxylic acid. The reaction between them can be shown as:



Here in the above reaction alkaline potassium permanganate acts as an oxidizing agent. When we add excess alkaline potassium permanganate then the purple color will persist.

(iii) The equation for the chemical reaction will be:



18. 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?

3 Marks

Ans: There will be some immediate changes that take place in its body for the squirrel to be ready to fight or run away. These changes are listed below as:

(a) There will be release of adrenaline hormone which will cause an increase in the pumping rate of the heart and also the breathing rate of squirrels increases.

(b) There will be a change in blood pressure and the dilation of the pupil which helps while running.

(c) The hypothalamus of the squirrel activates the sympathetic nervous system and thus releases the adrenaline from adrenal gland.

(d) At that time the digestive activities and reproductive activities stop for a moment.

All these changes made squirrels to be active while running or fighting like situations.

Or

Why is chemical communication better than electrical impulses as a means of communication between cells in a multicellular organism? 3 Marks

Ans: Chemical communications is better than electrical impulses as means of communication between cells in a multicellular organism because of the following reasons:

(a) Chemical communication involves the communication which takes place through hormones. Thus it does not require any specialized tissue like nervous tissue which is used for electrical impulses.

(b) Since electric communication is limited to only certain regions. These regions are connected by nerves while the chemical connection is not specific to some regions, it is all over the body.

(c) In chemical communication signals are sent persistently and steadily while in nervous communication it can be done only at certain intervals of time.

19. Define the term pollination. Differentiate between self pollination and cross pollination. What is the significance of pollination? 3 Marks

Ans: Pollination can be defined as the act of transferring of pollen grains from the anther of male flower to stigma of female flower. After the pollination the seeds can be produced which will create offspring.

Self-Pollination	Cross Pollination
When the pollen grains transfer from anther of the same flower to the stigma of the same flower then this	When the pollen grains transfer from anther of flower to the stigma of different flowers then this kind of

kind of pollination is called self-pollination.	pollination is called cross pollination.
Here pollinating agents are not necessary.	Here pollinating agents are necessary for the transfer of pollen grains.

Significance of pollination:

The transfer of pollen grains is significant as it helps in fertilization by bringing male gamete to female egg and thus it helps in the production of seed and which will ultimately produce new offspring.

20. What are homologous structures? Give an example. Is it necessary that homologous structures always have a common ancestor? Justify your answer. 3 Marks

Ans: Homologous structures are those structures which have common basic structure but they perform different operations or functions. Thus we can say that homologous structures are similar to each other but they are modified to perform different functions.

For example: forelimbs of reptiles, amphibians and mammals have the same structure but they can perform different functions.

The Arms of human beings, wings of birds and the front legs of horses are homologous structures.

Yes, homologous structures have common ancestors but they are modified to carry out different operations or activities. The basic structure of the arms of the humans and wings of the bird are similar in structure but they are modified and hence perform different operations in different individuals. Arms of human beings cannot be used for flying while that of birds does. Thus we can say that they have common ancestors but perform different functions.

21. Why is the Tyndall effect shown by colloidal particles? State four instances of observing the Tyndall effect. 3 Marks

Ans: The scattering of light in a colloidal dispersion medium by colloidal particle is known as the Tyndall effect. When the same light is passed through pure medium then no such scattering of light takes place. Thus it is a property of colloidal particles to scatter the light when it passes through it. Hence we can say

that the Tyndall effect is used to determine whether a mixture is a true solution or a colloidal solution. The instances where we can see this Tyndall effect are listed below:

- (a) The Tyndall effect can be shown when headlights of a car turns on on a foggy day. The light from the headlight gets scattered by the colloidal particles of the fog and thus we can see colloidal particles too.
- (b) When sunlight passes through the canopy of the forest then we can see the scattering of light at the top of the tree which is the canopy region.
- (c) The Tyndall effect can be visible when light enters a dark room through a hole and thus we can easily see the light scattered by the particles in the way of the light.
- (d) When we direct the beam of light into the glass full of milk then we can also see this effect too.

Or

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?
3 Marks

Ans: The difference between glass slab and glass prism is listed as:

Glass Slab	Glass Prism
It is a transparent substance in which reflecting surfaces are parallel to each other.	It is also a transparent substance in which reflecting surfaces are at an angle.
It is rectangular in shape.	It has two triangular sides inclined to each other and a rectangular base.
The direction of incident ray and emergent ray are parallel to each other.	The direction of incident ray and emergent ray are not parallel to each other.

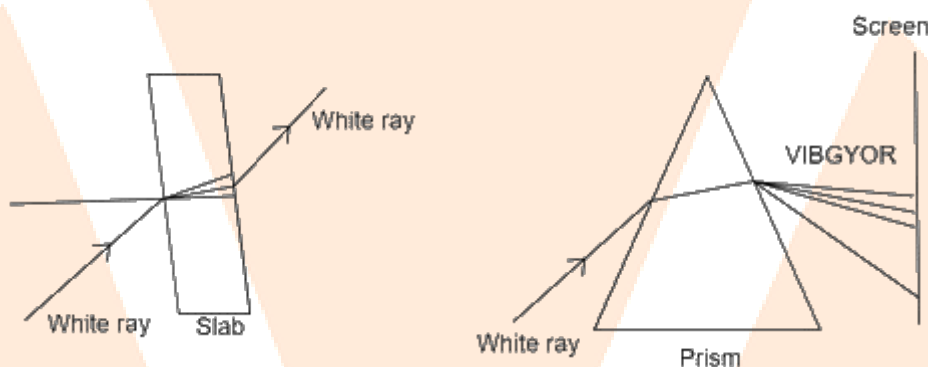
(i) When the narrow beam of monochromatic light get passed through:

- (a) Glass slab: It will deviate from the actual path but we know that the direction of the incident ray and the emergent ray are parallel to each other.
- (b) Glass prism: There is splitting of white into seven colors and the direction of incident ray and emergent ray are not parallel to each other.

(ii) When the narrow beam of white light get passed through:

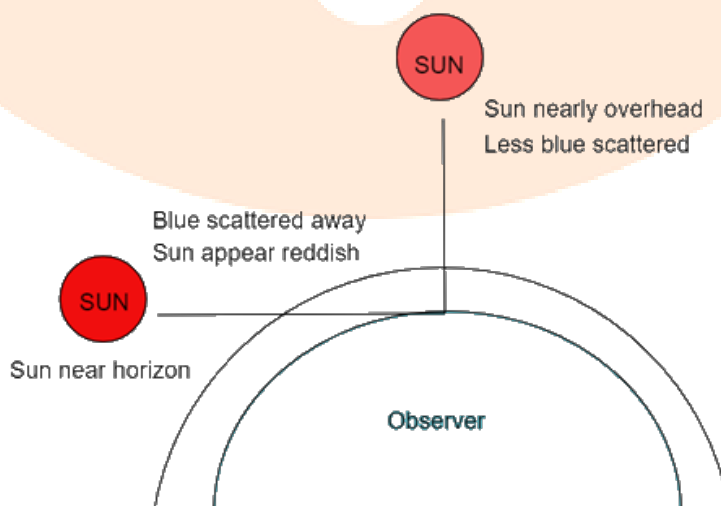
(a) Glass slab: When it strikes the first surface then splitting of white light takes place and when it strikes on the second surface then it comes out as single white light.

(b) When it falls on a prism, white light gets dispersed into seven different colors on the screen placed in front of the prism.



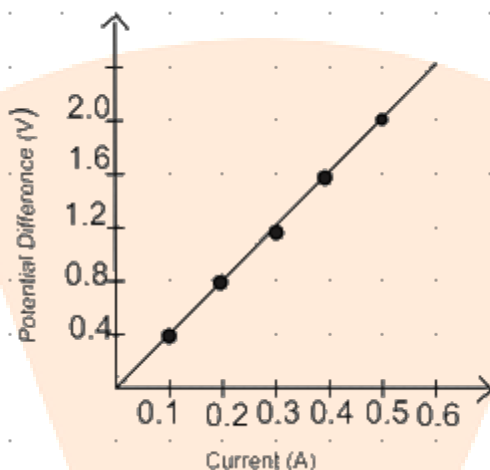
22. Draw a labelled diagram to show (i) reddish appearance of the sun at the sunrise or the sunset and (ii) white appearance of the sun at noon when it is overhead. **3 Marks**

Ans: When the sun is near the horizon then it appears to be reddish in color because as the light passes through the atmosphere enters at slant angle and due to which a large amount of scattering of light takes place. The blue light of the sky gets scarier than the red light of the sun thus we can see the reddish color of the sun more precisely. The same phenomena does not happen at noon.



23. A V-I graph for a nichrome wire is given below. What do you infer from this graph? Draw a labelled circuit diagram to obtain such a graph.

3 Marks



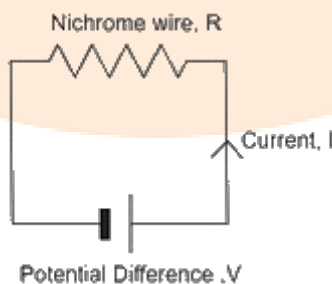
Ans: From the above we can see that there is a linear relation between the potential difference (V) and current (A), therefore it gives a straight line between them. We can depict that when we increase the potential difference across the nichrome wire then the current also increases in a constant ratio respectively. Thus we can say that the resistance of nichrome wire is constant. Since there is a linear relation between the current and potential difference we can say that the nichrome wire follows the ohm's law.

According to ohm's law there is a linear relation between the applied potential difference and the current passing through wire. It can be represented as:

$$V \propto I$$

$$\Rightarrow V = IR$$

Hence we can draw the circuit diagram of the above graph as:



Thus the resistance of nichrome wire is R and current passing through it is I. It is an ohmic device which follows ohm's law.

24.

3 Marks

(a) Write the mathematical expression for Joule's law of heating:

Ans: (a) According to Joule's of heating when a current, I passes through conductor of resistance r, for time t, then the amount of heat produced in the conductor will be equal to product of square of current , the resistance and time. This can be represented as:

$$H=i^2rt$$

The S.I unit of energy is Joules.

(b) Compute the heat generated while transferring 96000 coulomb of charge in two hours through a potential difference 40 V.

Ans: Here the amount of charge, Q is 9600 C and time for this flow of charge is 2 hr which is equal to 7200 s . Hence we can find the electric current as:

$$i=\frac{Q}{t}$$

$$i=\frac{9600}{7200}=\frac{40}{3} \text{ A}$$

Since we know that $V=ir$ the above equation can be reduced as:

$$H=Vit$$

It is given that $V=40 \text{ V}$, therefore the amount of heat can be calculated as:

$$H=40 \times \frac{40}{3} \times 7200$$

$$H=3840000 \text{ J}$$

$$H=3.84 \times 10^6 \text{ J}$$

SECTION-C

25. Carbon cannot reduce the oxides of sodium, magnesium and aluminium to their respective metals. Why? Where are these metals placed in the reactivity series? How are these metals obtained from their ores? Take an example to explain the process of extraction along with chemical equations.

5 Marks

Ans: Carbon cannot reduce the oxides of sodium, magnesium and aluminium to their respective metals because sodium, magnesium and aluminium have higher affinity towards oxygen than that of carbon. This is because all these are highly reactive metals and thus it requires a lot of energy to reduce their oxides.

According to the reactivity series of metals which helps in finding the more reactive elements, it is found that sodium, magnesium and aluminium are more reactive than carbon and thus placed at higher levels than carbon in the reactivity series of elements. Therefore being less reactive, carbon is not used for extraction of sodium, magnesium and aluminium from their ores.

Such metals which are highly reactive than carbon elements are extracted by the help of electrolytic reduction process. It is also known as electrolysis of the molten solution of the ore. Thus we can say that sodium can be obtained with the help of electrolysis of its salt. In electrolysis a sufficient amount of current is passed through the aqueous solution and thus it breaks into its respective ions and thus metals get collected at cathode. The reaction can be represented as:

At cathode: $\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$

At anode: $\text{Cl}^- \rightarrow \frac{1}{2}\text{Cl}_2 + \text{e}^-$

Therefore we get the pure metal at cathode. This method is basically used for elements which cannot be reduced by carbon.

26. 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 the largest atomic size?

(v) To which family does H, C and F belong?

5 Marks

Ans: (i) The element which forms covalent compounds must have valence electrons greater than three and less than eight. Thus we can say that elements E and B will have a tendency to form covalent compounds.

(ii) Non-metals are present at the right hand side of the periodic table. They have a tendency to accept electrons. Thus we can say that element E will be non-metal and it can accept two electrons to form inert in nature.

(iii) Metals are present on the left hand side of the periodic table and they have a tendency to lose electrons. Thus we can say that G, A and D are metals. But D element will have a valency of 2.

(iv) As we go down the group the size of the element increases in the same group. Hence we can say that out of H, C and F, F has the largest atomic size. The size of atoms increases as the number of shells increases.

OR

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?

5 Marks

Ans: Atomic size: The distance between the centre of the nucleus of an atom and its outermost shell is known as the atomic size of an atom. The atomic size varies as the number of shells inside the atom increases. A atom having more number of shells will have more atomic size than an atom having less number of shells.

The atomic size is the distance between the nucleus of atom to outermost shell, hence it is measure in Angstrom $\left(\overset{\circ}{\text{\AA}}\right)$.

$$1\overset{\circ}{\text{\AA}} = 10^{-10} \text{ m}$$

Trend observed in atomic radius in a group and period in modern periodic table:

Along the periods: When we move along the periods from left to right in a period the atomic radius of elements gradually decreases. The decrease in atomic radius is due to an increase in effective nuclear energy and more attraction between the electron and the nucleus of the atom. Since the shell does not increase and number of electrons increases which increases the attraction between the electrons and nucleus of the atom. This attraction will ultimately shrink the size of atoms. Therefore we can say that along the periods while moving from left to right the atomic radius decreases generally.

Down the groups: When we move down the group from top to bottom the atomic radius increases gradually. This is because the number of shells increases at each down element. Thus the number of shells increases at every element while moving down the group which ultimately increases the size of the element. Therefore we can say that the atomic radius increases while moving down the group.

27.

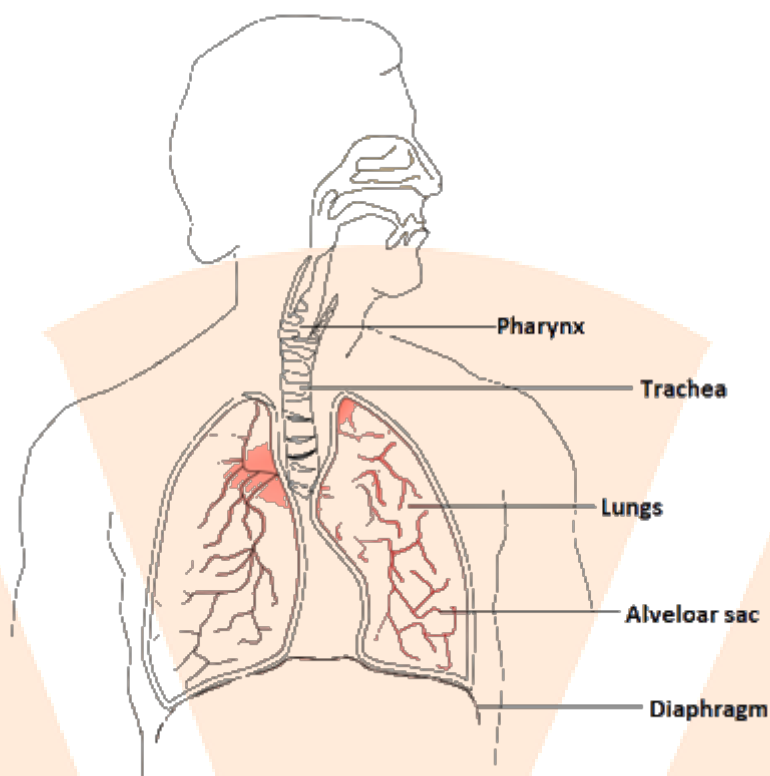
5 Marks

(a) Why is there a difference in the rate of breathing between aquatic organisms and terrestrial organisms? Explain.

Ans: One complete breath includes single inhalation and exhalation of air. Thus rate of breathing is the number of times a complete breath takes place in a minute. Rate of breathing is different in aquatic organisms and terrestrial organisms. This is because aquatic organisms like fishes obtain their oxygen from water which is present in dissolved state through their gills. Since we know that the amount of dissolved oxygen in water is less as compared to oxygen present in undissolved form in air. Thus they have high breathing rates to meet the breathing requirements. They breathe faster than humans to meet the oxygen demand of the body. Thus it is also seen that swimmers breathe at a faster rate when they swim across the river. Therefore there is a difference of breathing rates in both aquatic organisms and terrestrial organisms.

(b) Draw a diagram of the human respiratory system and label - pharynx, trachea, lungs, diaphragm and alveolar sac on it.

Ans: The human respiratory system can be shown as:



Or

5 Marks

(a) Name the organs that form the excretory system in human beings.

Ans: Human excretory system consists of following organs:

1. Two kidneys : Kidneys are located at one on each side of the spine at the level of the liver. Kidneys are the important organ of the human body and it is present in pairs. Kidney helps in purification of blood.
2. A urinary bladder: It is a sac-like structure and it stores urine until the process of expelling the urine. It receives urine from the ureters which are connected to each kidney separately.
3. Urethra: It is a tube -like structure which arises from the urinary bladder. It is shorter in females and longer in males. In males, it is a common path for sperms and urine both.

(b) Describe in brief how urine is produced in the human body.

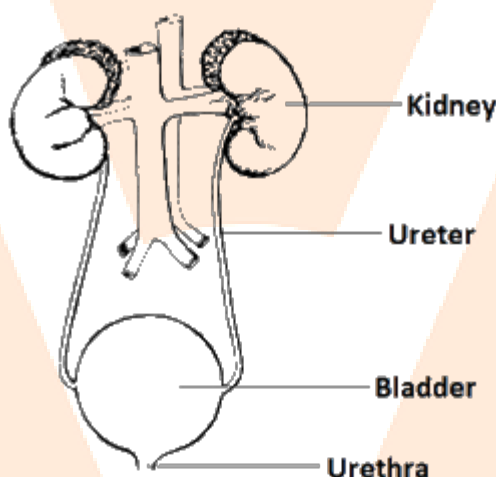
Ans: The human body produces the waste chemical compounds like urea and uric acid with the help of urine. These waste are filtered with the help of the kidney.

Thus we can say that the main role of the kidney is to filter our blood and produce the waste excreted out in the form of urine.

Basically the kidney contains a basic structure called nephrons which helps in the filtration process. It has two parts:

1. Bowman's Capsule: It is a cup shaped structure which consists of a coiled tube of blood capillary. This helps in the filtration process.
2. Renal Tubule: Now the filtrate obtained from Bowman's capsule goes into renal tubule. But some of the substances like amino acids and salts get absorbed in their initial state. The rest of water which contains only uric acid and urea gets passed through the tubule.

Now it moves through a duct and moves towards the urinary bladder where it gets stored and excreted out from the body in the form of urine.

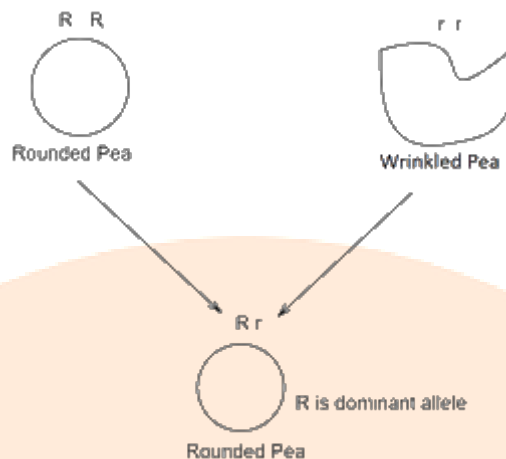


28.

5 Marks

(a) What is the law of dominance of traits? Explain with an example.

Ans: The law of dominance of traits states that in a heterozygous or we can say in a hybrid condition the allele having the characters expressed over the other allele is the dominant allele.



Here in the parent generation one of them is homozygous dominant and the other one is homozygous recessive allele. The first one gamete has the dominant pea shape structure while the other one gamete has the recessive structure. After fertilization takes place, the first generation F_1 would have heterozygous conditions among the both alleles the 'R' character expresses over the 'r' allele. Thus we can say that here 'R' is the dominant allele.

(b) Why are the traits acquired during the lifetime of an individual not inherited? Explain.

Ans: The traits which are inherited during the lifetime cannot be inherited to successive generations as the changes do not reflect in the DNA of the germ cells. The traits acquired during the lifetime brings the change in non-reproductive tissues which cannot be passed to germ cells. Thus we can say these acquired traits cannot be passed to successive generations.

For example: a swimmer good at swimming cannot pass this acquired trait to successive generations as it brings changes only in non-reproductive cells which do not take part in reproduction.

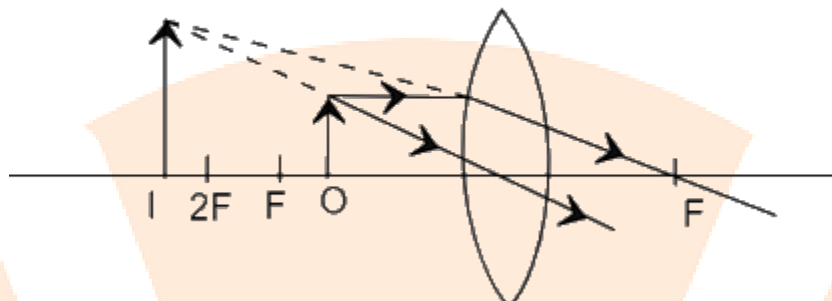
29. Draw a ray diagram in each of the following cases to show the formation of image, when the object is placed:

(i) between the optical centre and principal focus of a convex lens.

State the signs and values of magnifications in the above-mentioned cases (i) and (ii). 5 Marks

Ans: (i) Let us suppose O be the object and I be the image then the image can be formed as:

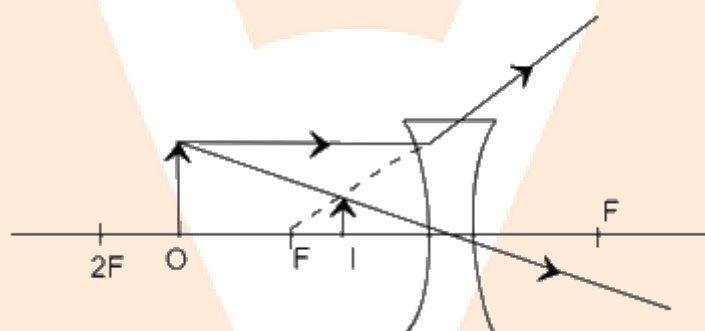
The image formed is enlarged and erect. Therefore its magnification will be positive and since it is enlarged therefore magnification will be greater than one.



(ii) anywhere in front of a concave lens.

Ans: Let us suppose O be the object and I be the image then the image can be formed as:

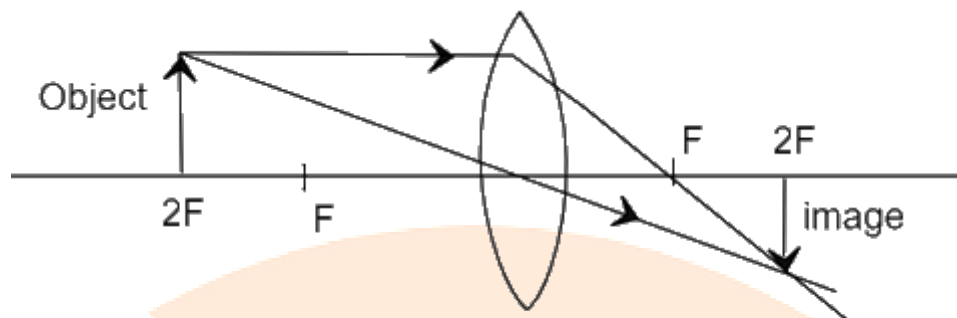
The image formed is diminished and erect. Therefore its magnification will be positive and since it is diminished therefore magnification will be less than one.



(iii) at $2F$ of a convex lens.

Ans: Let us suppose O be the object and I be the image then the image can be formed as:

The image will be formed at $2F$ on the other side of the lens and its magnification will be the same as that of the object.



Or

An object 4.0 cm in size, is placed 25.0 cm in front of a concave mirror of focal length 15.0 cm. 5 Marks

(i) At what distance from the mirror should a screen be placed in order to obtain a sharp image?

Ans: Here, height of object, $h_i = 4$ cm

Object distance $u = 25$ cm

Focal length $f = 15$ cm

We know that:

$$\Rightarrow \frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

V is the image distance, object distance is taken as negative and focal length of concave mirror is always negative. Therefore,

$$\Rightarrow \frac{1}{-15} = \frac{1}{v} + \frac{1}{-25}$$

$$\Rightarrow \frac{1}{v} = \frac{1}{-15} + \frac{1}{25}$$

$$\Rightarrow \frac{1}{v} = \frac{-5+3}{75}$$

$$\Rightarrow \frac{1}{v} = \frac{-2}{75}$$

$$v = -37.5 \text{ cm}$$

(ii) Find the size of the image.

Ans: Magnification, $m = \frac{-v}{u} = \frac{h_i}{h_o}$

$$\Rightarrow m = \frac{-(-37.5)}{-25} = \frac{h_i}{4}$$

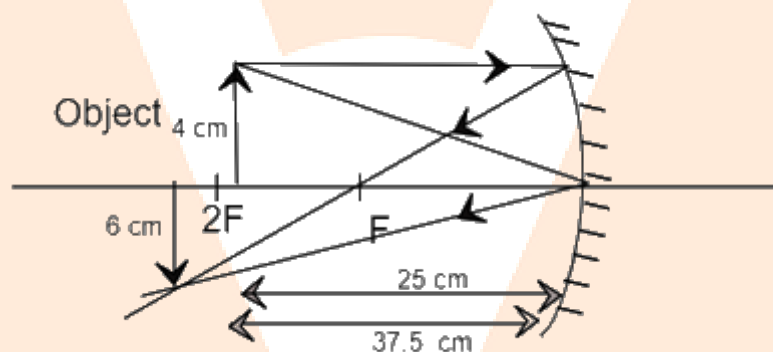
$$\Rightarrow h_i = \frac{4 \times 37.5}{-25}$$

$$\Rightarrow h_i = -6 \text{ cm}$$

Therefore height of image will be -6 cm . The image will be real and inverted.

(iii) Draw a ray diagram to show the formation of the image in this case.

Ans:



30.

5 Marks

(a) What is an electromagnet? List any two uses.

Ans: An electromagnet is a type of magnet in which the magnetic field is produced by passing the electric current. Thus whenever the electric current passes through the electromagnet then it will behave like a magnet. It is also known as a temporary magnet. Its magnetism is not permanent in nature.

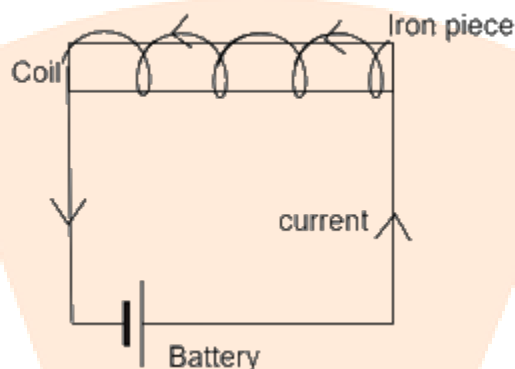
Uses of electromagnet:

1. It is used in lifting heavy weight objects.

2. It is used in transformers.

(b) Draw a labelled diagram to show how an electromagnet is made.

Ans:



(c) State the purpose of the soft iron core used in making an electromagnet.

Ans: The soft iron core is used in electromagnets because the soft iron core has high magnetic properties. Because of its magnetic capability it is used in electromagnetism. It can provide a strong magnet when it is used as a core material in the electromagnets.

(d) List two ways of increasing the strength of an electromagnet if the material of the electromagnet is fixed.

Ans: Ways of increasing the strength of an electromagnet if the material of the electromagnet is fixed are listed below as:

1. By increasing the number of turns in the coil of electromagnet we can increase its magnetic strength.
2. By increasing the amount of current we can also increase its strength. But the amount of current should be increased in the limit of the coil as more current will burn out the coil. Thus the heating effect of the coil must be remembered while increasing current.