

Topper's
Answers

C.B.S.E.
2019
Class-X
Delhi/Outside Delhi Set

Science

Time : 3 Hours

Max. Marks : 80

General Instructions :

- (i) The question paper comprises **five** Sections, A, B, C, D and E. You are to attempt **All** the sections.
- (ii) All questions are **Compulsory**.
- (iii) Internal choice is given in Sections B, C, D and E.
- (iv) Questions number **1 and 2** in Section A are one-mark questions. They are to be answered in one word or in one sentence.
- (v) Questions number **3 to 5** in Section B are two-marks questions. These are to be answered in about 30 words each.
- (vi) Questions number **6 to 15** in Section C are three-marks questions. These are to be answered in about 50 words each.
- (vii) Questions number **16 to 21** in Section D are five-marks questions. These are to be answered in about 70 words each.
- (viii) Questions number **22 to 27** in Section E are based on practical skills. Each question is a two-marks question. These are to be answered in brief.

SECTION - A

1. State the S.I. unit of potential difference and name the device used to measure it. 1

Ans. The S.I. unit of potential difference is 'volts' in honour of Alessandro Volta.
Voltmeter is a device that is always connected in parallel in a circuit to measure the voltage.

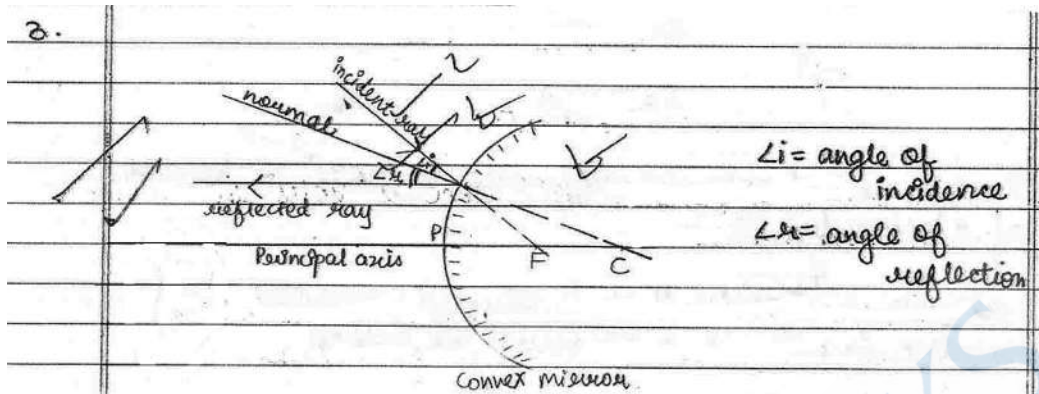
2. List two characteristics of a good fuel. 1

Ans. 2. A good fuel is the one that -
1) does a large amount of work per unit volume or mass i.e. it has high calorific value.
2) has a moderate ignition temperature.
3) is easy to store and transport.

SECTION - B

3. Draw a labelled ray diagram to show the path of the reflected ray corresponding to the ray which is directed towards the principal focus of a convex mirror. Mark the angle of incidence and angle of reflection on it. 2

Ans.



The ray of light directed towards focus will bounce back and move parallel to the principal axis after reflection.

4. List four properties of magnetic field lines.

2

Ans.

4. The lines representing the magnetic field are called magnetic field lines. They have the following characteristics –

- 1) Two magnetic field lines never intersect at a point.
- 2) They are always arranged in the form of closed concentric circles outside the magnet and move from North to South.
- 3) They are uniform, straight and parallel inside the magnet and move from South to North.
- 4) They are denser and stronger near the poles and weaker when wider apart.

5. What is brine ? What happens when an electric current is passed through it ? Write chemical equation for it. 2

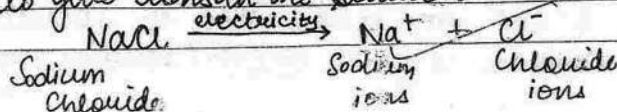
OR

List the changes that are observed when dil. HCl is added to a small amount of copper oxide in a beaker. Write balanced chemical equation for the reaction.

Ans.

5. Brine is the cold and concentrated solution of sodium chloride.

1) When electricity is passed through it, ~~the~~ NaCl breaks to give ions in the solution.



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$$\frac{1}{u} = \frac{1}{30} - \frac{1}{20}$$

$$\frac{1}{u} = \frac{20 - 30}{60}$$

$$\frac{1}{u} = -\frac{1}{60}$$

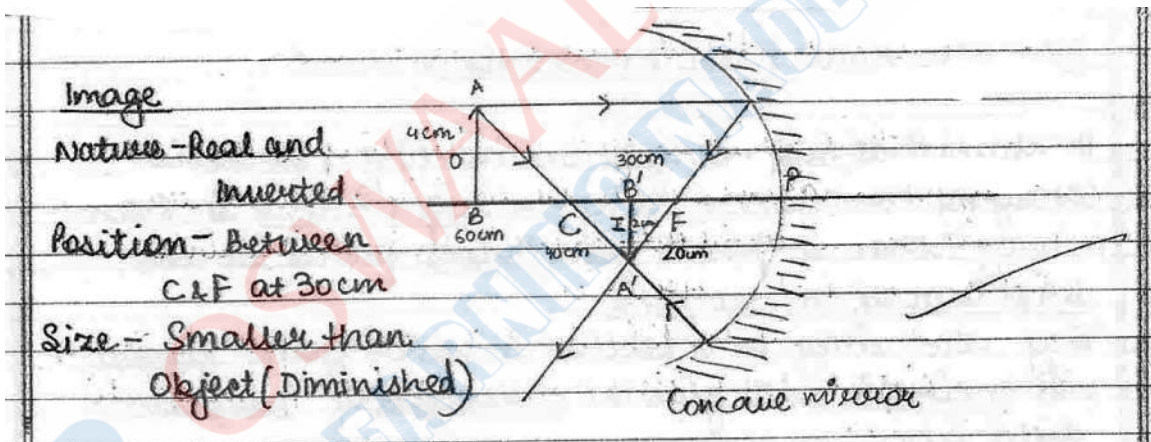
$$u = -60 \text{ cm}$$

According to linear magnification,

$$\frac{-v}{u} = \frac{h'}{h}$$

$$\frac{-(-30)}{+60} = \frac{h'}{+2}$$

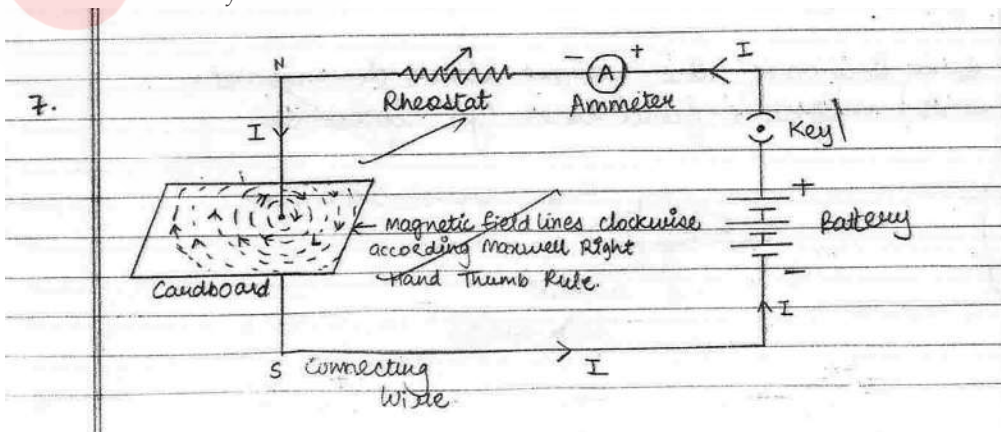
$$h' = -2 \text{ cm}$$



7. Draw the pattern of the field lines of the magnetic field around a current carrying straight conductor passing through and held perpendicular to a horizontal cardboard. State right-hand thumb rule and explain how this rule is useful to determine the direction of the magnetic field in the above case, if the direction of current in the conductor is vertically downwards.

3

Ans.



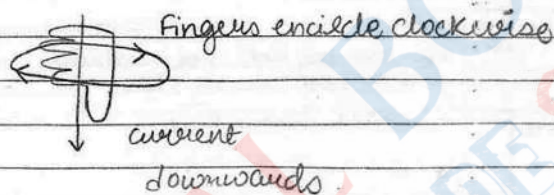
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Maxwell Right Hand Thumb Rule is used.

It states that, suppose you are holding a current carrying conductor in your right hand in such a way that it points your thumb points in the direction of the current.

They the way or direction in which your fingers will encircle will give the direction of magnetic field lines.

As in this case, the current flows downwards, so the magnetic field lines go clockwise.



8. An ore on treatment with dil. HCl gives the smell of rotten egg. Name the type of this ore. How can the metal be obtained from its concentrated ore ? 3

Ans

8. Smell of rotten eggs is usually produced by Sulphide.

∴ It must be a sulphide ore.

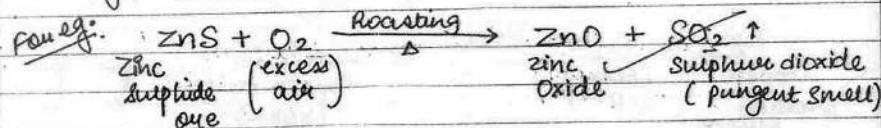
Let us suppose that the ore is Zinc blende (ZnS).

Concentration of ore

First of all, the ore is concentrated by the method of Froth floatation.

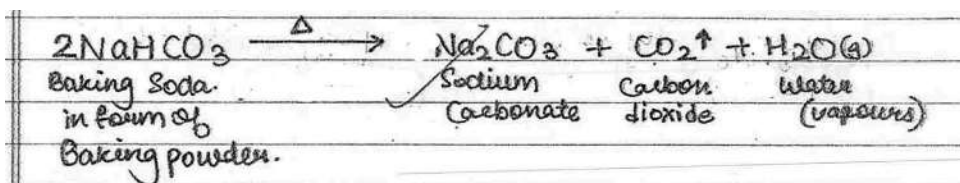
Conversion into metal oxide

Then it is ~~roasted~~ converted into its metal oxide via Roasting in supply of excess air.



Conversion into metal

It is then converted into its metal form by using a reducing agent like Carbon, Aluminium etc.



The carbon dioxide released gets trapped in the cake layers and makes it soft and spongy.

11. List in tabular form three differences between blood and lymph.

3

Ans.	Blood	Lymph
1.	It is a fluid connective tissue consisting of plasma, red blood cells, white blood cells, platelets etc.	It is an extra cellular fluid consisting of plasma, proteins, white blood cells etc.
2.	It contains red blood cells and is red in colour due to presence of haemoglobin.	It lacks colour and is therefore colourless.
3.	It contains more proteins.	It has lesser proteins.
4.	It has many functions like transport of O_2 , CO_2 , food, nitrogenous wastes etc.	It carries absorbed fats from small intestine and drains extra fluid back into the blood vessels.

12. Why does the flow of signals in a synapse from axonal end of one neuron to dendritic end of another neuron take place but not in the reverse direction? Explain.

3

Ans. 12.

The diagram labels the following parts: Dendrites, Axon, Synapse, Nucleus, Cell body, Myelin sheath, and Nerve endings.

- The nerve impulses are transmitted from one neuron to the other in the form of electric impulses.
- They enter through the dendrites, move through axon and reach the nerve ending.

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- ③ As soon as they reach there, they need to be converted into chemical signals and electric signals are unable to cross the gap i.e. synapse.
- ④ Thus, chemicals called 'neurotransmitters' are released from the vesicles that move from nerve ending of one neuron to the dendrite of the next one.
- ⑤ As soon as the chemicals reach the dendritic tip, they again get converted to electrical impulses and move on.
- ⑥ They chemicals are released and move only in one direction and do not reverse in order to reach their destination that can be spinal
(They are released in one direction.)
- cord or brain or effectors in order to deliver the message.

13. How does the creation of variations in a species promote survival? Explain with the help of an example. 3

- Ans. 13. ① Populations of organisms live in well defined places or niches.
- ② They are native to that area. ~~The rest~~
- ③ Reproduction involves DNA replication which can generate errors that is the main source of variations.
- ④ This consistency of DNA is responsible for maintenance of body design.
- ⑤ Suppose the temperature in that region increases or decreases, water level changes or there is a meteorite hit, the population may get wiped out.
- ⑥ But if there are some organisms that can tolerate the heat, they would survive.
- ⑦ They would further reproduce and survive in nature.
- ⑧ For e.g. Bacteria are one of the oldest surviving organisms.
Due to variations in their body designs, they adapt most of the inhospitable climates like deserts, ice etc.

14. What is a food chain ? Why is the flow of energy in an ecosystem unidirectional ? Explain briefly.

OR

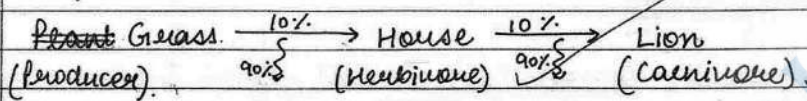
(a) Why should National Parks be allowed to remain in their pristine form ?

(b) Why is reuse of materials better than recycling ?

Ans.

14. ① Food Chain is a sequence of organisms in which one consumes the other to transfer energy.

for eg.



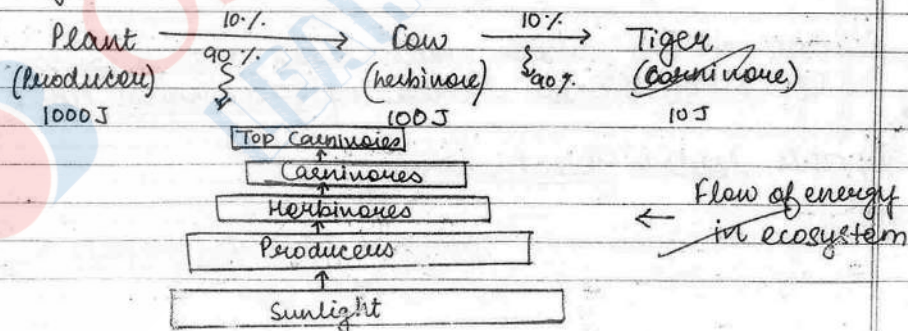
② The flow of energy in an ecosystem is always unidirectional as they cannot revert back the energy consumed or lost in environment.

③ For example, plants cannot revert back the chemical energy into solar energy.

④ Since they move progressively from one trophic level to the other, the energy content goes on decreasing according to 10% law.

⑤ They do not have that much energy to reverse the flow even if they want to.

for eg.



15. Mention the environmental consequences of the increasing demand for energy. List four steps you would suggest to reduce the consumption of energy.

3

Ans.

15. ① Since the industrial revolution, and the development of living standards of people, the demand for energy has also increased.

- ② This energy is mainly met by fossil fuels like coal and petroleum.
- ③ They have the following effects on environment :
- i) Increased pollution of air, water, soil due to presence of oxides of carbon, nitrogen, sulphur.
 - ii) Coal contains carbon which leads to emission of carbon dioxide increasing green house effect.
 - iii) This leads to global warming.
 - iv) They also cause acid rain that corrodes marble on our heritage and affects plants life.
- To Reduce their consumption :
- 1) we must use alternatives like CNG which are cleaner fuels.
 - 2) We must develop healthy habits like using public transport instead of private.
 - 3) we must harness non-conventional sources of energy.
 - 4) we must make people aware of their limited quantity and use them judiciously.

SECTION - D

16. A concave lens of focal length 60 cm is used to form an image of an object of length 9 cm kept at a distance of 30 cm from it. Use lens formula to determine the nature, position and length of the image formed. Also draw labelled ray diagram to show the image formation in the above case. 5

Ans.

16. Concave lens

$$f = -60 \text{ cm}$$

$$h = 9 \text{ cm}$$

$$f = -60 \text{ cm}$$

$$h' = ?$$

$$h = +9 \text{ cm}$$

$$u = -30 \text{ cm}$$

$$v = ?$$

According to lens formula,

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$\frac{-1}{60} = \frac{1}{v} - \frac{1}{(-30)}$$

$$\frac{-1}{60} = \frac{1}{v} + \frac{1}{30}$$

$$\frac{-1}{60} + \frac{-1}{30} = \frac{1}{v}$$

$$\frac{1}{v} = \frac{-1}{60} - \frac{1}{30}$$

$$\frac{1}{v} = \frac{-1-2}{60}$$

$$\frac{1}{v} = \frac{-3}{60}$$

$v = (-20) \text{ cm}$

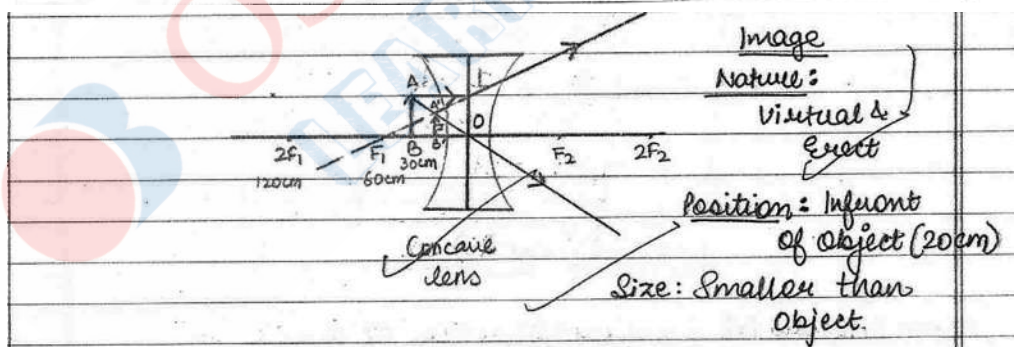
According to linear magnification of lens,

$$m = \frac{v}{u} = \frac{h'}{h}$$

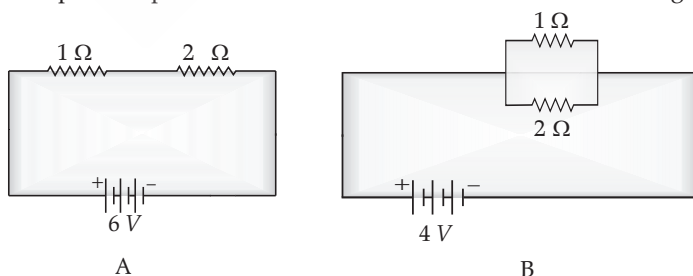
$$\frac{-20}{-30} = \frac{h'}{9}$$

$$h' = \frac{2 \times 9}{3}$$

$h' = 6 \text{ cm}$



17. Compare the power used in 2Ω resistor in each of the following circuits :



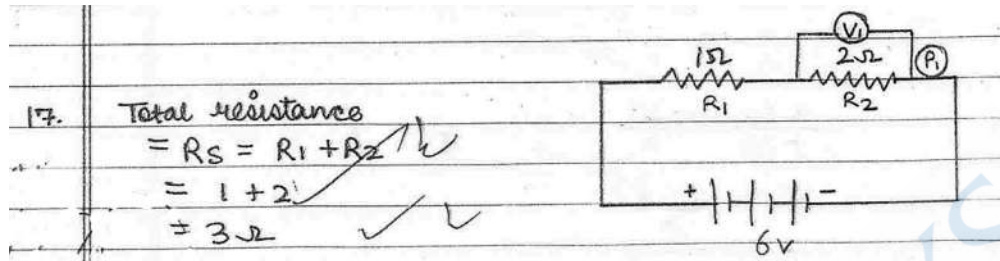
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OR

A bulb is rated 40 W; 220 V. Find the current drawn by it, when it is connected to a 220 V supply. Also find its resistance. If the given bulb is replaced by a bulb of rating 25 W; 220 V, will there be any change in the value of current and resistance? Justify your answer and determine the change.

5

Ans.



$$V = 6V$$

$$I = ?$$

According to Ohm's law, $V = IR_s$

$$\therefore I = \frac{V}{R_s}$$

$$I = \frac{6}{3}$$

$$I = 2A$$

In a series combination, current is same for all devices, but Potential difference differs.

\therefore let Potential difference of 2Ω Resistor = V_1 volts.
 let Power of 2Ω Resistor = P_1 W.

$$\therefore V_1 = IR_2$$

$$V_1 = 2 \times 2$$

$$V_1 = 4V$$

$$\text{Electric Power} = V \times I$$

$$\text{Power of } 2\Omega \text{ Resistor} = V_1 \times I$$

$$= 4 \times 2$$

$$P_1 = 8W$$

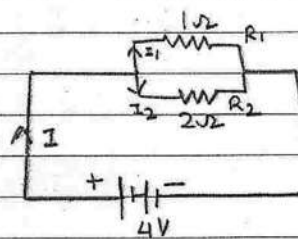
Case II

let total current in circuit = I .

In a parallel combination, V is same but I differs.

let total resistance = R_p

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$$



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$$\frac{1}{R_p} = \frac{1}{1} + \frac{1}{2}$$

$$\frac{1}{R_p} = \frac{2+1}{2}$$

$$\frac{1}{R_p} = \frac{3}{2}$$

$$R_p = \frac{2 \times 2}{3}$$

$$R_p = \frac{4}{3} \Omega$$

According to Ohm's law;

$$V = IR_p$$

$$4 = I \times \frac{4}{3}$$

$$I = 6A$$

$$I_2 = \frac{V}{R_2} = \frac{4}{2} = 2A$$

Let Power of $R_2 = P_2$ W

$$\therefore P_2 = V \times I_2$$

$$P_2 = 4 \times 2$$

$$P_2 = 8W$$

(a) $P_2 = 8W$

Both the resistors have same powers in ratio $1:1$.

18. (a) State the reason why carbon can neither form C^{4+} cations nor C^{4-} anions, but forms covalent bonds. Also state reasons to explain why covalent compounds
- are bad conductors of electricity.
 - have low melting and boiling points.

5

Ans.

(a) Carbon has a tetra valency but can't gain or lose electrons because —

- If it gains 4 electrons, it will have C^{4-} negative charge. It is very difficult for 4 protons to hold on to 8 electrons and it becomes unstable.
- If it loses 4 electrons, it requires a lot of energy to lose it which it can't afford and again becomes unstable.

(i) Covalent bonds are formed by sharing of electrons and share them as molecules, so no transfer of electrons or involvement of ions takes place.

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Since ions are responsible for conducting electricity and they do not have free ions, \therefore they are bad conductors of electricity.
eg. CCl_4 , H_2 , CH_4 etc.

(ii) Since the molecules of 2 different elements share electrons, they have weak forces of attraction and weak electrostatic forces due to which their bond can be broken easily.

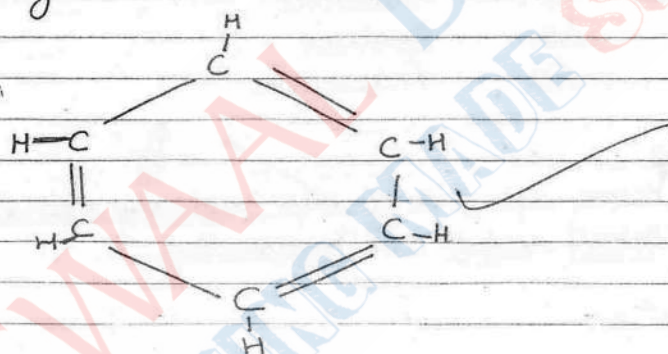
The bonds are strong within the molecule but inter ionic bonds are weak making them have low melting and boiling points. eg. Naphthalene has a melting point of about 80°C .

(b) Write the structural formula of benzene, C_6H_6 .

Ans.

(b)

Benzene - C_6H_6



OR

(a) Define the term 'isomer'.

(b) Two compounds have same molecular formula $\text{C}_3\text{H}_6\text{O}$. Write the name of these compounds and their structural formula.

(c) How would you bring the following conversions :

(i) Ethanol to ethene

(ii) Propanol to propanoic acid

19. (a) Define groups in the Modern Periodic Table. How do valency, atomic size and metallic character vary in a group ?

Ans.

19. (1) The vertical columns present in the modern

a) Periodic table having elements with similar valencies and chemical properties are called Groups.

(2) For eg. Alkali metals Group 1

H	- Hydrogen
Li	Lithium
Na	Sodium
K	Potassium

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	Rb	Rubidium
	Cs	Cesium
	Fr	Francium

③ Valency
As we move down a group, valency remains same.
eg. all alkali metals are monovalent.

④ Atomic size
Atomic size is the distance from the centre of nucleus to the last shell.
As we move down a group, the atomic size increases as number of shells increase.
eg. H → 1
Li → 2, 1
Na → 2, 8, 1 etc.

⑤ metallic character
As we go down a group, the chemical reactivity of metals increases as it is easier for a bigger atom to lose electrons due to weaker electrostatic forces. eg. Francium is more metallic than Lithium.
But in non-metals, it decreases as it is easier for a smaller atom on top to gain electrons due to strong electrostatic forces than a bigger atom.
eg. Fluorine is more non-metallic than Astatine.

(b) The atomic number of an element is 14. Examine if this element will have metallic properties or not. Give reason to justify your answer.

5

Ans. b) Atomic number = 14
electronic configuration = 2, 8, 4
element = Silicon
This element has semi properties of both metals and non-metals,
∴ It is a metalloid.
It has 4 valence electrons due to which it can neither gain nor lose electrons as it would become unstable.
∴ It forms covalent bonds.

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20. (a) How do the following provide evidences in favour of evolution in organisms ? Explain with an example for each.

- (i) Homologous organs
- (ii) Analogous organs
- (iii) Fossils

Ans. 20. I Homologous organs

1. They are the organs that are similar in structure but have been modified to perform different functions.

20: d) For eg.

Forelimbs of humans, frog and lizard have similar structures. Frog uses it to hop and as a shock absorber, humans use it to write, hold etc. and lizards use it to creep on walls.

They explain that maybe the reptiles, mammals and amphibians had common ancestors and evolved to be in the present form.

Analogous Organs

① They have different ~~str~~ structures and appearance but perform similar function. Ans.

② For eg. wings of a bat and a bird have different structure, but perform function of flying. [birds have feathers and wings all over body.] [bat - thin flap like webbed wings.]

③ They do not show common ancestry but trace evolution due to which they inherited the became capable of flying.

(iii) Fossils

① They are the remains of plants and animals found under earth that lived in remote past.

② They tell us about the evolutionary relationships in the past.

③ For eg. Archaeopteryx has ^{round} cranium and wings similar to birds but claws and beak similar to reptiles.

④ This ~~also~~ shows relation between reptiles and aves or maybe aves evolving from reptiles.

(b) Explain two methods to determine the age of fossils.

Ans. (b) Fossils can be determined by-

(i) Carbon-14 Dating

- ① All organisms have some percentage of carbon which decreases as we die.
- ② The % percentage of fossil is compared with the present percentage in living organisms to determine their age.
- (ii) Relative method
- ① The soil is dug, the fossils found closer to Earth are recent whereas the ones found in deeper layers are the older ones.
- For eg. Dinosaurs are found in deeper layers.

21. (a) Distinguish between cross-pollination and self-pollination. Mention the site and product of fertilization in a flower.

(b) Draw labelled diagram of a pistil showing the following parts :

Stigma, Style, Ovary, Female germ cell

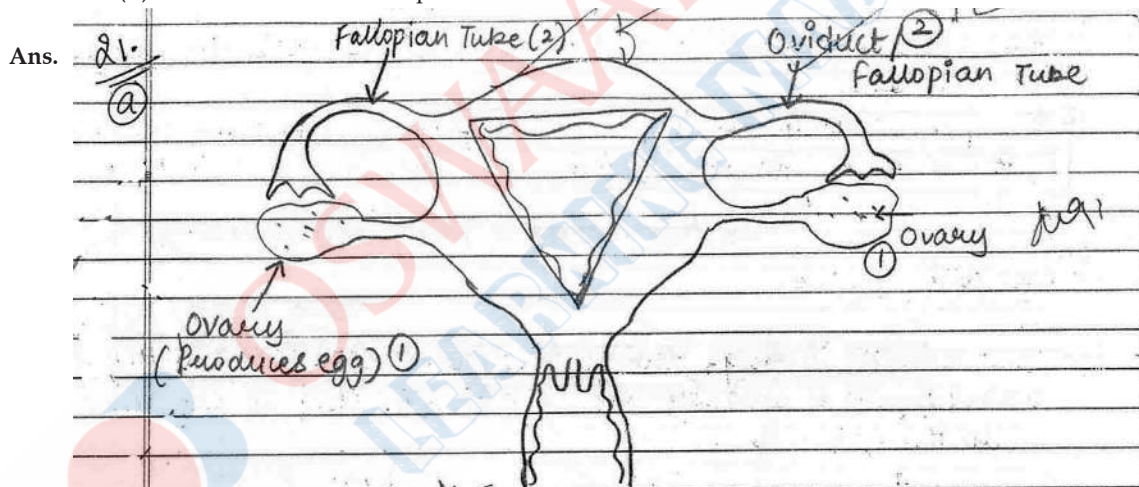
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OR

(a) Draw a diagram of human female reproductive system and label the parts :

(i) which produce an egg.

(ii) where fertilization takes place.



(b) List two bacterial diseases which are transmitted sexually.

Ans. (b) Gonorrhoea and Syphilis are bacterial diseases transmitted sexually.

(c) What are contraceptive devices? Give two reasons for adopting contraceptive devices in humans.

Ans. (c) The devices used to prevent fertilisation in human females are known as contraceptive devices.

① They are adopted to prevent unwanted pregnancies.

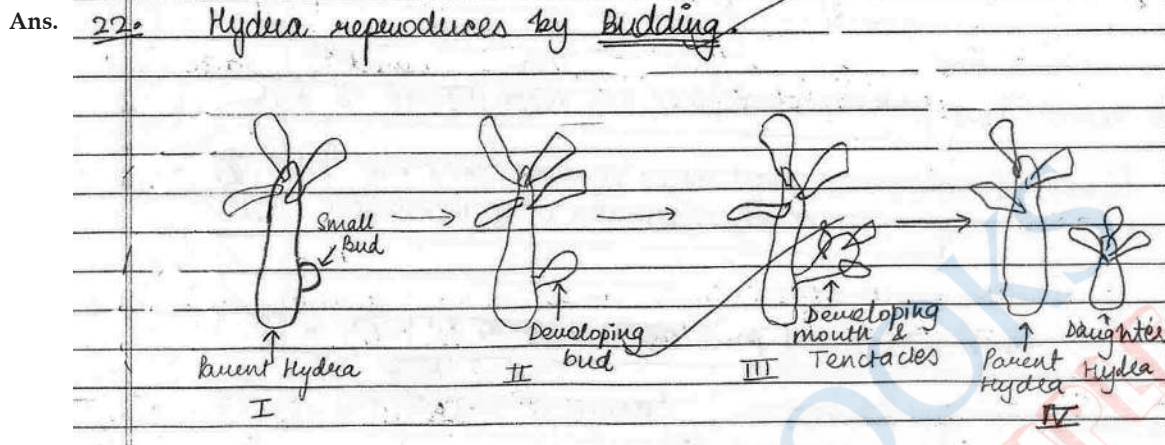
② They help to maintain the reproductive health of women & in order to control birth & death rate.

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SECTION – E

22. Draw labelled diagram to show the following parts in an embryo of a pea seed :
Cotyledon, Plumule, Radical

2

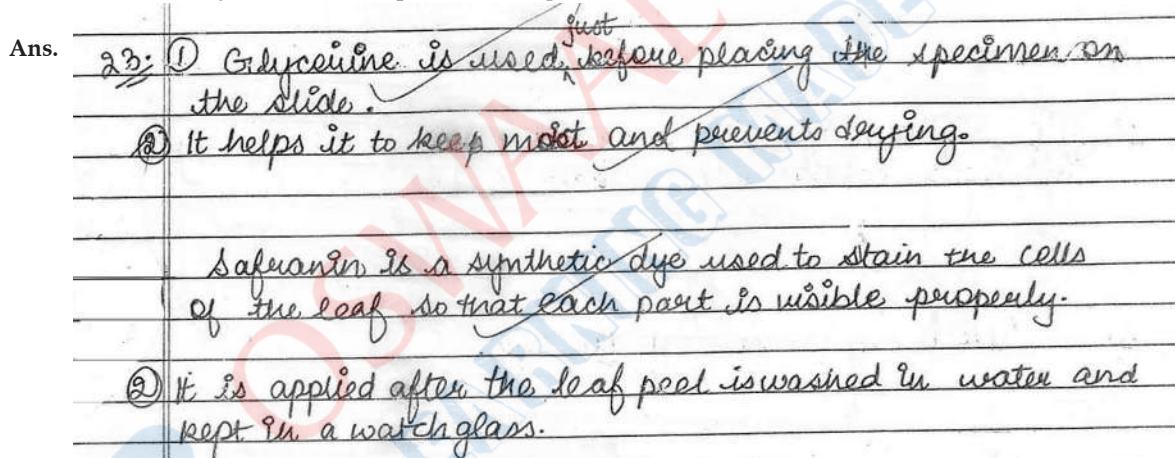


OR

A student observed a permanent slide showing asexual reproduction in Hydra. Draw labelled diagram in proper sequence of the observations that must have been made by the student. Name the process of reproduction also.

23. In the experiment "To prepare a temporary mount of a leaf peel to show stomata", glycerine and safranin are used. When and why are these two liquids used? Explain.

2



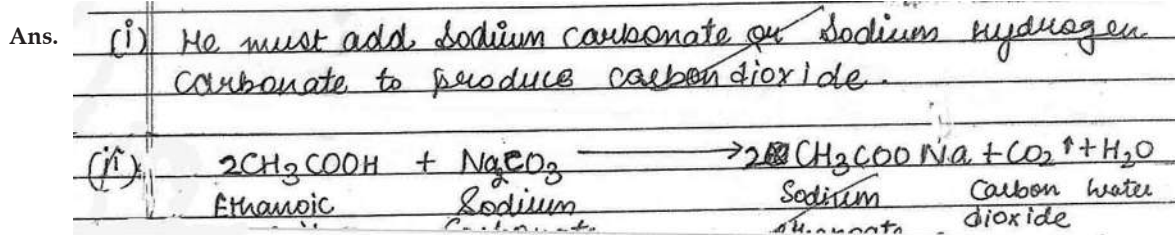
24. How is the presence of an acid tested with a strip of red litmus paper?

2

OR

A student is performing an experiment to study the properties of acetic acid. Answer the following questions :

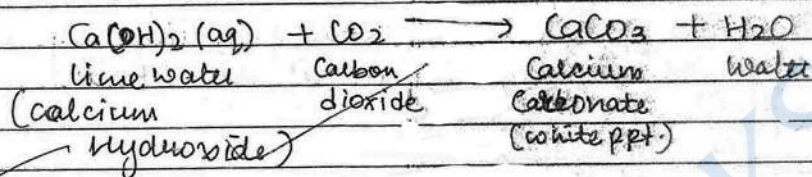
- Name the substance he must add to acetic acid to produce carbon dioxide.
- Give the relevant chemical equation for the reaction.
- How would he test CO_2 gas in the laboratory?



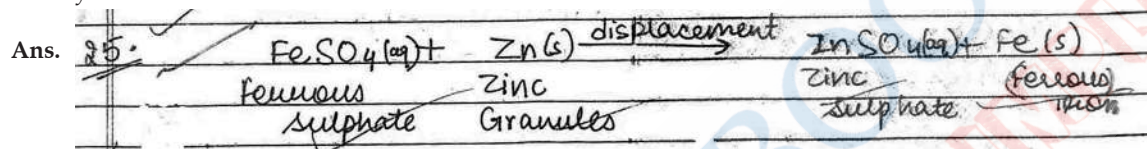
(ii) To test CO_2 in a laboratory, bring a burning candle near it, it would extinguish as it is a non supporter of combustion.

OR

Pass it through freshly prepared lime water which turns milky.



25. What would you observe on adding zinc granules to freshly prepared ferrous sulphate solution? Give reason for your answer. 2



The green colour of the solution changes to greyish-white as there is a displacement reaction occurring. Zinc being more reactive than iron displaces it from its salt solution.

\therefore Fe powder can be observed.

26. A teacher gives a convex lens and a concave mirror of focal length of 20 cm each to his student and asks him to find their focal lengths by obtaining the image of a distant object. The student uses a distant tree as the object and obtains its sharp image, one by one, on a screen. The distances d_1 and d_2 between the lens/mirror and the screen in the two cases and the nature of their respective sharp images are likely to be

- (a) (20 cm, 40 cm) and (erect and erect)
 (b) (20 cm, 40 cm) and (inverted and inverted)
 (c) (20 cm, 20 cm) and (inverted and inverted)
 (d) (20 cm, 40 cm) and (erect and inverted)

Give reason for your answer. 2

Ans. 26: (c) (20 cm, 20 cm) & (inverted and inverted) is correct as focal length remains the same.

The convex lens and concave mirror always form real and inverted images except in a few rare cases.

Since the object is a distant one, the image obtained on the screen will be the focus and when calculated focal length remains the same i.e. 20 cm.

27. The rest position of the needles in a millimeter and voltmeter, not in use, are as shown in Figure A. When a student uses these instruments in his experiment, the readings of the needles are in the positions shown in Figure B. Determine the correct values of current and voltage the student should use in his calculations. 2

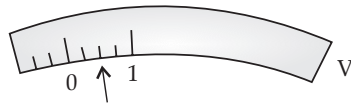
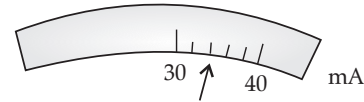
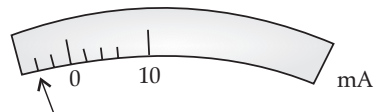


Figure A

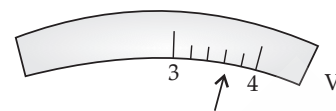


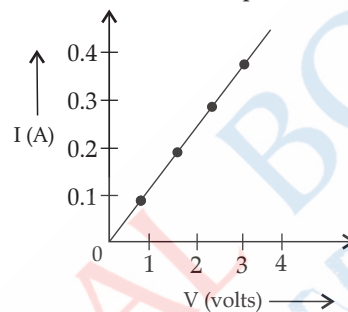
Figure B

OR

In the experiment to study the dependence of current (I) on the potential difference (V) across a resistor, a student obtained a graph as shown.

(i) What does the graph depict about the dependence of current on the potential difference ?

(ii) Find the current that flows through the resistor when the potential difference across it is 2.5 V.



Ans.

As the graph depicts, the resistance (slope) is constantly increasing which explains that the potential difference and the current are proportionately increasing.
 $\therefore I \propto V$ [Based on Ohm's Law]

Resistance for a particular conductor at a particular temperature is constant. $\therefore R = \frac{V}{I} = \frac{1}{0.1} = 10 \Omega$ or $\text{Avg. } R = \frac{1+2+3+4}{0.1+0.2+0.3+0.4} = 10 \Omega$

(Ohm's Law) $I = \frac{V}{R} \therefore I = \frac{2.5}{10} \times \frac{1}{10} = 0.25 \text{ A}$

□□