

INSTRUCTIONS :

- ▶ Q.1 to Q.4 are very short answers. Each question is a one mark question.
- ▶ Q.5 to Q.7 are short answers. Each question is a two marks question.
- ▶ Q.8 to Q.10 are short answers. Each question is a three marks question.
- ▶ Q.11 & Q.12 are long answers. Each question is a four marks question.

1. Unit of resistivity is $\Omega \times \text{m}$.
2. The ratio of speed of light in vacuum to the speed of light in a medium is called absolute refractive index of medium.
3. (1) It should be capable of doing large amount of work per unit mass or volume.
(2) It should be easily accessible i.e., it should be convenient to use.
4. (4) retina
5. Resistance of the electric bulb, $R = \frac{V^2}{P} \left(P \frac{V^2}{R} \right)$

$$\text{or } R = \frac{(220)^2}{100} = 484 \Omega$$

OR

According to Ohm's law, 'the current through certain conductors is directly proportional to the potential difference between its ends at a constant temperature'.

$$I \propto V \quad \text{or} \quad V \propto I$$

$$\text{or } V = I R$$

$$\text{or } R = \frac{V}{I} \quad \text{Where, } R \text{ is constant called resistance of the conductor.}$$

6. The mirror is convex mirror. Convex mirrors are used as rear view mirrors because they always give an erect, though diminished image. Also, they have a wider field of view as they are curved outwards. Thus, convex mirrors enable the driver to view much larger area than would be possible with a plane mirror.
7. **Principle of working of an electric motor :** It is based on the fact that a current-carrying coil, when placed in external magnetic field experiences equal and opposite forces on its edges which rotates it continuously.

Function of brushes : Brushes transmit current to the rotating coil.

8. Advantages :

- (1) The major benefit of hydro energy is that it provides power without burning fossil fuels. That is, it saves the non-renewable energy resources or fuels.
- (2) Hydro energy provides power which is clean—it does not release pollutants like particulate matter, carbon dioxide, sulphur dioxide, etc. into the air. It does not contribute to global warming or acid rain.

Disadvantages :

- (1) Hydro energy is not totally reliable. Electricity generation depends on the water level of the dam, which depends on the natural rain. In case of low rain in a year, hydroelectricity may not be generated.
- (2) Exploiting hydro energy requires a huge investment.

9. (i) $R_{eq} = \frac{V}{I} = \frac{10}{1} = 10 \Omega$

So, $R_{lamp} + R_{conductor} = 10 \Omega$

$\therefore R_{lamp} + 5 \Omega = 10 \Omega$

$\therefore R_{lamp} = 5 \Omega$

(ii) If a resistance of 10Ω is connected in parallel with this series combination, potential difference across lamp & conductor of 5Ω remains 10 V .

So, $I = \frac{V}{R_{lamp} + R_{conductor}} = \frac{10}{10} = 1 \text{ A}$

There is no change in current flowing through a 5Ω conductor.

10. (i) Given, height of the object $h_1 = +5 \text{ cm}$; focal length $f = +20 \text{ cm}$; object distance $u = -30 \text{ cm}$; image distance $v = ?$

Lens equation,

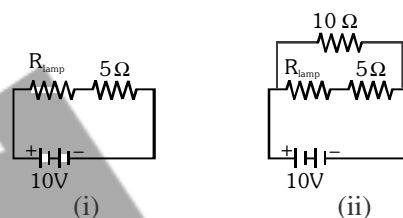
$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f} \quad \text{or} \quad \frac{1}{v} - \frac{1}{(-30)} = \frac{1}{20}$$

$$\text{or} \quad \frac{1}{v} = \frac{1}{20} - \frac{1}{30} = \frac{3-2}{60} = \frac{1}{60} \quad \text{or} \quad v = +60 \text{ cm}$$

(ii) Magnification, $m = \frac{v}{u} = \frac{60}{-30} = -2$

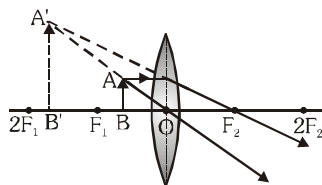
The image is real and inverted

(iii) $m = \frac{h_2}{h_1} \Rightarrow -2 = \frac{h_2}{5} \Rightarrow h_2 = -10 \text{ cm}$



OR

Object is placed between optical centre and focus :



Position of the image : On the same side of lens as the object

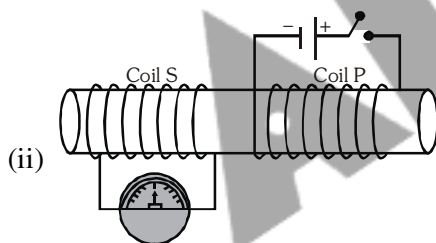
Nature : Virtual and erect

Size : Enlarged

11. (i) The apparent size of stars is very small as compared to apparent size of planets. Thus, the star may be considered as a 'point sized' source of light and the planet as an 'extended source' of light. So, the planet can be considered as a collection of large number of 'point sized' sources of light, such that the dimming effect of some 'point sources' is nullified by the brighter effect of the other 'point sources'. The variable atmospheric conditions are unable to create variations in light flux from the planet entering our eye and thus, planets do not twinkle.

(ii) In the morning, the sun is near the horizon. Light reaching the eye of an observer travels a larger distance in the atmosphere. Thus, most of the blue light and shorter wavelength rays are scattered away by the air particles. Hence, the light that reaches the eye of an observer is of longer wavelengths (of red end). Thus, the sun appears reddish at sunrise or sunset.

12. (i) The phenomenon of production of an emf or electric current in a circuit (or a conductor) when the magnetic field lines linked with it change is called 'electromagnetic induction'.



(a) When the current is switched on in the coil P, the needle of galvanometer deflects momentarily and returns to zero. This indicates a flow of current in the second coil for a very short time.

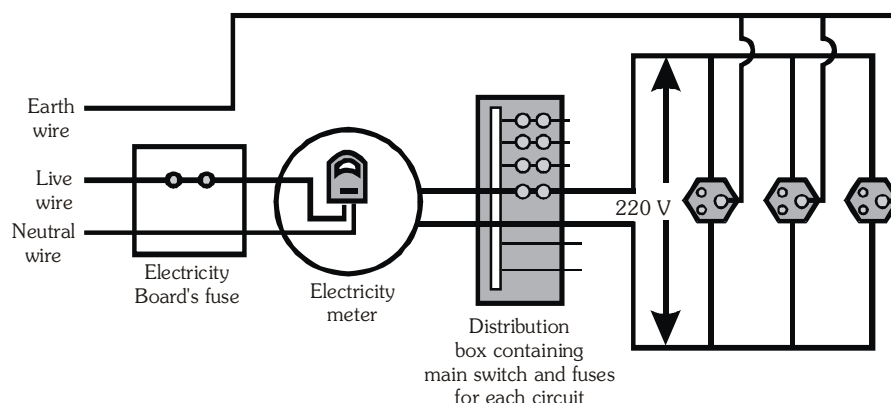
Reason : As the current in the coil P changes, the magnetic field associated with it also changes. Thus, the magnetic field lines around the coil S also change. This change in magnetic field lines associated with the coil S induces electric current in it.

(b) When the current is steady or zero in the coil P, no deflection is seen in the galvanometer present in coil S.

Reason : When steady current flows through a coil P, magnetic field associated with it remains unchanged. Thus, the magnetic field lines around coil S do not change. So, current is not induced in it.

OR

(i) Domestic electric circuit :



(ii) Earth wire acts as a safety measure. When the live wire touches the metallic casing of an electric appliance, the electric current flows from the casing of the appliance to the earth through the copper wire. An electric current flows along the path of low resistance. Thus, current passes through the copper wire instead of human body. Thus, the human body is saved from electric shock.

SECTION-B : CHEMISTRY
MARKS : 25
INSTRUCTIONS :

- ▶▶ Q.13 to Q.17 are very short answers. Each question is a one mark question.
- ▶▶ Q.18 to Q.20 are short answers. Each question is a two marks question.
- ▶▶ Q.21 to Q.22 are short answers. Each question is a three marks question.
- ▶▶ Q.23 & Q.24 are long answers. Each question is a four marks question.

13. (1) Reddish brown in colour.
14. (2) Benzene
15. (3) OH, CHO
16. (2) 16, 2
17. (2) Be, Mg, Cr
18. Ionic compounds have high melting points because there is a strong electrostatic force of attraction between the oppositely charged ions hence a large amount of energy is required to break the strong force of attraction between ions.
19. Hydrogen gas is liberated when an acid reacts with a metal. For example, when zinc metal reacts with dil. HCl hydrogen gas is evolved and salt zinc chloride is formed as product. The gas burns with a popping sound showing the gas is hydrogen.

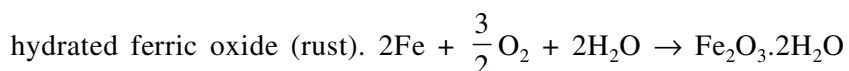
$$\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$$
20. Mendeleev's Periodic Law: "Properties of elements are the periodic function of their atomic masses."

Achievements :

- (i) It helped in the discovery of new elements.

(ii) It helped in the correction of the atomic masses of some of the elements.

21. (a) The process of slow eating up of the surface of certain metals when kept in open for a long time called corrosion. When iron is placed in the presence of air and of water it become

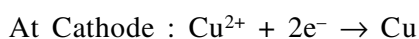
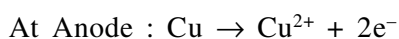


(b) Rancidity

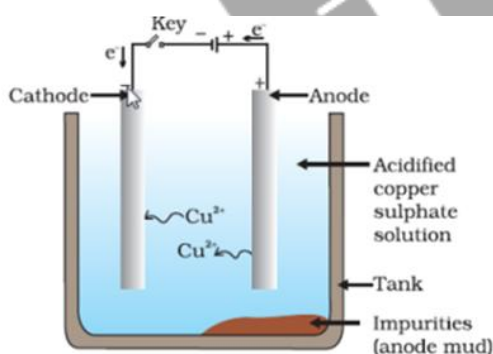
The aerial oxidation of oil or fat in food resulting in bad smell and bad taste is called rancidity. Example -Rancidity can be prevented by packaging fats and oil containing foods in nitrogen gas.

22. Impure copper is purified by electrolysis in which the anode is made up of impure copper, the cathode is made up of pure copper (thin strip) and the electrolyte is copper sulphate solution.

When the electricity is passed through copper sulphate solution, pure copper gets deposited on the negative electrode (cathode).



The soluble impurities go into the solution and insoluble impurities settle down at the bottom of the anode which is known as anode mud.



23. (a) White powder is Baking powder. The ingredients of baking powder is Baking soda and an edible acid (Tartaric acid)

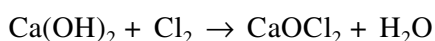
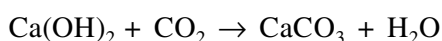
(b) X is calcium carbonate CaCO_3

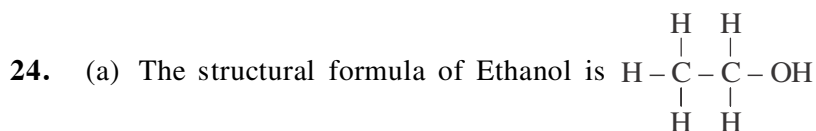
Y is slaked lime. $\text{Ca}(\text{OH})_2$

Z is bleaching powder CaOCl_2

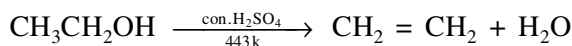
G is chlorine gas (Cl_2).

Reactions involved





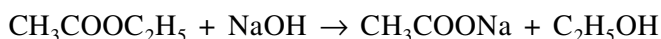
When Ethanol is heated with excess of conc. H_2SO_4 , at 443 K, Ethene is formed.



H_2SO_4 acts as a dehydrating agent, that removes water molecule from ethanol.

- (b) Esterification reaction: when an organic acid reacts with an alcohol in the presence of conc. H_2SO_4 , it produces a sweet smelling substance called ester. This reaction is called esterification reaction.
- $$\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \xrightarrow{\text{con. H}_2\text{SO}_4} \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$$

Saponification : Hydrolysis of ester in the presence of a base (NaOH) is called saponification reaction.



Use of ester - in the making of perfumes and the flavoring agents

Use of Saponification - in the manufacture of soaps.

SECTION-C : BIOLOGY
MARKS : 28
INSTRUCTIONS :

- ▶▶ Q.25 to Q.31 are very short answers. Each question is a one mark question.
- ▶▶ Q.32 to Q.35 are short answers. Each question is a two marks question.
- ▶▶ Q.36 to Q.38 are short answers. Each question is a three marks question.
- ▶▶ Q.39 is long answer. Question is a four marks question.

25. (3) Menopause

Solution: The period in a woman's life (typically between the ages of 45 and 50) when menstruation ceases.

26. (2) Descent with modification

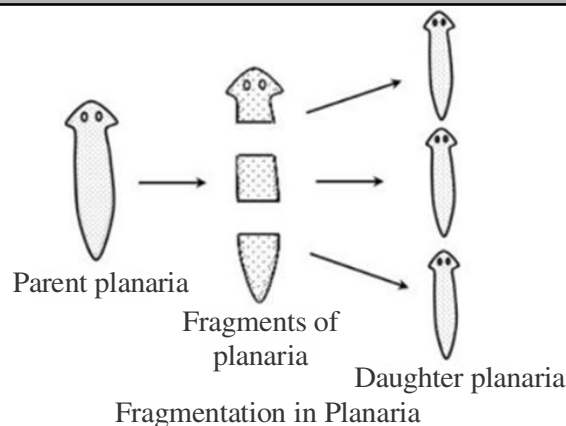
Solution: Descent with modification is simply passing traits from parent to offspring, and this concept is one of the fundamental ideas behind Charles Darwin's theory of evolution.

27. (2) T2 level

Trophic Level 1	Producer
Trophic Level 2	Primary Consumer
Trophic Level 3	Secondary Consumer
Trophic Level 4	Tertiary Consumer

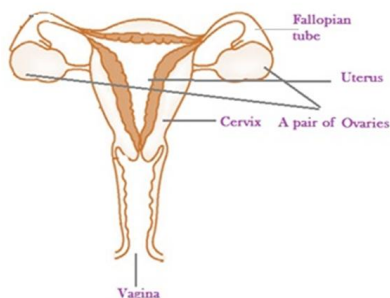
28. (3) Carbon monoxide

Solution :Carbon monoxide is formed due to incomplete combustion of coal and petroleum.



Regeneration differs from reproduction in the sense that, regeneration can take place from any part of the organism, example cut tail of lizard. Also regeneration doesnot necessarily give rise to new individual, whereas reproduction always produce new individuals from the parent organsim.

35. During rainy season, rainwater is collected in large storage tanks which also helps in reducing floods in some low lying areas. Apart from this, it also helps in reducing soil erosion. The harvested water can be used for irrigation purpose.
36. (i) A flap like structure called epiglottis prevents the entry of food into the trachea.
 (ii) Transmission of nerve impulses between two neurons takes place through the synapse. The axon terminal of a neuron releases specilized chemicals called neurotransmitters. These chemicals travel through the synapse and reach the dendrites of the next neuron. The nerve impulses travel along with the neurotransmitters.
37. (a) (1) **Phototropism** : The movement of a plant part in response to light is called phototropism. e.g. Shoot is positively phototropic and root is negatively phototropic.
 (2) **Geotropism** : The movement part of the plant in response to gravity. e.g. Root is positively geotropic and shoot is negatively geotropic.
 (b) Brain is protected within skull and covered by meninges in which fluid called cerebrospinal fluid is filled. The same fluid is also present in cranium that acts as a shock absorbent.
 (c) The two parts of hind brain are cerebellum and pons.
 (i) **Cerebellum** : It helps in muscular coordination and maintenance of body posture.
 (ii) **Pons** : It literally means bridge. It is said to be the breathing center.
38. Female reproductive system consists of Ovaries, oviducts / fallopian tubes ,uterus, cervix and vagina.



Ovaries : The ovaries are oval glands and are the primary sex organs of the female reproductive system that lies in lower abdomen. Ovaries produce female sex hormones - estrogen, progesterone and egg cells.

Fallopian tubes/oviducts : They are muscular narrow tubes which attach to the upper portion of the uterus. Fallopian tubes act as tunnels for the egg cells. Therefore, they transport the egg cells from the ovaries to the uterus. Oviducts are the site of fertilization.

Womb or Uterus : The uterus is a large, highly elastic sac specialised for the development of embryo. The two oviducts unite to form into uterus. The uterus opens into the vagina through the cervix.

Vagina : It is a large, elastic muscular tube. It receives semen during copulation, allowing menstrual flow and serving as birth canal during parturition.

39. Mechanism Of Breathing

Inspiration

- The process of intake of atmospheric air is known as inspiration. It is an active process.
- When the volume of the thoracic cavity increases and the air pressure decreases, inspiration takes place.
- Contraction of external intercostal muscles increases the volume of the thoracic cavity.
- Contraction of the diaphragm further increases the size of the thoracic cavity. Simultaneously, the lungs expand.
- With the expansion of the lungs, the air pressure inside the lungs decreases.
- The pressure equalizes and the atmospheric air rushes inside the lungs.

Expiration

- The process of exhaling carbon dioxide is called expiration. It is a passive process.
- It occurs when the size of the thoracic cavity decreases and the air pressure outside increases.
- Now the external intercostal muscles relax and the internal intercostal muscles contract.
- As a result, the ribs are pulled inward and the size of the thoracic cavity is reduced.
- The diaphragm is relaxed and the lungs get compressed.
- Consequently, the pressure increases and the air is forced to move outside.