Section A

1.

(d) Oxygen is used during germination

Explanation:

In the given experimental set-up, germinating peas will undergo aerobic respiration, in which they will use up oxygen and release carbon dioxide. Carbon dioxide released will be absorbed by sodium hydroxide present in this test tube. As germinating peas will consume oxygen present in test tube, a suction force will be developed. Due to pressure difference, the coloured oil drop will move towards the test tube. Thus, this experiment will help to investigate the amount of oxygen used during germination.

2.

(d) Hydrogen bond

Explanation:

Each DNA molecule consists of two twisted strands of bases that form a shape called a double helix. The two strands are held together by hydrogen bonds between pairs of bases.

3.

(c) The population of tiger will decreases and the population of grass will increase.

Explanation:

If deer are missing from the given food chain, the population of the tiger will decrease and the growth of the grass will increase. A missing link in a food chain will create an imbalance in the ecosystem.

4. **(a)** (i) - (a), (ii) - (c), (iii) - (b), (iv) - (d)

Explanation:

- Phototropism refers to the movement of a plant toward a light source.
- Geotropism the growth of the parts of plants in response to the force of gravity.
- Hydrotropism the growth or turning of plant roots towards or away from moisture.
- Chemotropism may be defined as the movement or the growth of the organism in response to a chemical stimulus.

5.

(d) Unidirectional

Explanation:

The flow of energy in an ecosystem is always unidirectional. As the energy moves progressively through one trophic level to another, it is no longer available to the previous level. The energy that is captured by the autotrophs (producers) does not revert back to solar radiation. The energy which passes on to the herbivores (primary consumers) from the autotrophs does not come back to the autotrophs.

6.

(d) (i) and (iv)

Explanation:

The respiration process can be aerobic or anaerobic. Aerobic respiration occurs in the presence of oxygen in mitochondria whereas, anaerobic respiration occurs in the absence of oxygen in the cytoplasm. Alcoholic fermentation, which is carried out by unicellular organisms like yeast. Yeast breaks down pyruvic acid anaerobically into ethanol and carbon dioxide in the cytoplasm.

Hence option (ii) and (iii) are wrong.

7. **(b)** Sensory neuron
   Explanation:
   Sensory neuron carries electrical impulses from receptor to brain while motor neuron carries electrical impulses from the brain to effectors.

8. **(a)** Both A and R are true and R is the correct explanation of A.
   Explanation:
   Gametes are mandatory for sexual reproduction. Though plants can reproduce through other parts like stem and roots (vegetative reproduction), but they cannot reproduce sexually in absence of flowers. Thus both assertion and reason are true and reason is the correct explanation of the assertion.

9. **(d)** A is false but R is true.
   Explanation:
   A food chain can have a maximum of five to six trophic levels, this is because a lot of energy is lost as heat at each trophic level on account of metabolism. So, a small amount of energy becomes available to the next trophic level. This limits the number of trophic level in a food chain.

10. Sexual reproduction takes place with the help of fusion of male and female gametes, thus 2 haploid gametes restore the diploid nucleus and thus form zygote, which have content from both the parent and hence producing a new recombination Whereas, in asexual reproduction the offspring develops from a single parent, the genetic material of the offspring is exact copy of the single parent.
    Better chances of survival are seen in sexually reproducing organisms. This is because variation occurs in sexual reproduction which improves the vigour and vitality of the individual. This is helpful for the organisms in better adaptability to the environment.
11. If microrganisms are removed from the earth's environment then there would be dead bodies of plants and animals all around the Earth making it a difficult place to live in, more and more environmental pollution will pile up and accumalate. Moreover, the nutrient cycle will be stopped in the environment which will disturb the ecological balance.

    OR

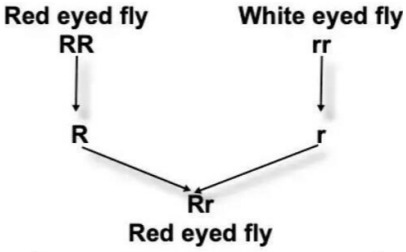
    a. It shields the earth from the harmful ultraviolet (UV) radiations from the sun.
    b.
    - By the action of UV radiations on oxygen molecule which splits to form free oxygen atoms.
    - These free oxygen atoms combine with oxygen molecule to form ozone.

    c. The compound responsible for ozone depletion is chlorofluorocarbons (CFCs), along with other halogenated compounds such as halons and bromine-containing compounds.
12. Difference between movement of leaves of sensitive plants and movement of shoot towards light:

Movement of leaves of sensitive plant	Movement of shoot towards light
(i) Growth is not involved.	(i) Growth is involved.
(ii) Movement is away from the source of stimulus (touch).	(ii) Movement is towards the source of stimulus (light).

13. a. The **dominant trait** is identified by observing its expression in the F1 generation.
    b. The **recessive trait** is the one that is masked in the presence of the dominant trait and only expressed in the homozygous recessive state.

c. The **ratio** of red-eyed to white-eyed individuals is 3:1



	R	r
R	RR Red eyed fly	Rr Red eyed fly
r	Rr Red eyed fly	rr White eyed fly

14. Algae are the main source of productivity in sea. they prepare there own food with the help of photosynthesis. they are food for many small aquatic animals living in the sea. hence the algae is food for small fishes and small fishes are food for big fishes. it is like a food chain.

    Algae produce O_2 as a result of photosynthesis. This oxygen is utilized by fishes in the sea for carrying out respiration. If there were no algae, no oxygen would have been produced. Thus fishes might have died. Hence we can say if there were no algae there would be no fish in the sea.

15. i. In given case, genotypic ratio of F_2 progeny will be 1 : 2 : 1 where one is homozygous dominant, two are heterozygous dominant and one is homozygous recessive.

    ii. $\frac{1}{4}$ of them have wrinkled seeds and $\frac{3}{4}$ of them have smooth seeds.

    iii. Factors representing the alternate or same form of a character are called alleles. In heterozygous individuals or hybrids, a character is represented by two contrasting alleles. Out of the two contrasting alleles, only one is able to express its effect in the individual. It is called the dominant allele. The other allele which does not show its effect in the heterozygous individual is called the recessive allele, e.g., in the case of hybrid tall pea plants (Tt). 'T' is a dominant allele whereas 't' is a recessive allele.

    OR

    The alternative form of the gene is called Allele. Alleles are a pair of genes that occupy a specific location on a particular chromosome and control the same trait.

16. a. Two types of pollination are-

    I. Self-pollination

    II. Cross-pollination

    Differences between the two are given below:-

Self-pollination	**Cross-pollination**
If the transfer of pollen occurs in the same flower, it is referred to as self-pollination.	The pollen is transferred from one flower to another, it is known as crosspollination.
It occurs in bisexual flowers.	It occurs in both bisexual and unisexual flowers.
It refers to the transfer of pollen grains from anther to stigma of the same flower or to another flower of the same plant.	It refers to the transfer of pollen grains from anther to stigma of flowers belonging to two different plants.
It is not necessary to use pollinators.	This transfer of pollen from one flower to another is achieved by agents like wind, water or animals.

    b. The fusion of the female gamete (ovum or egg) and the male gamete created in the pollen tube by the pollen grains is known as fertilisation. The ovary transforms into the fruit after fertilisation, while the ovary wall transforms into the pericarp.

    c. i. A: The young shoot of a plant embryo above the cotyledons is called a plumule. It is made up of the epicotyl and frequently immature leaves gives rise to mature shoot.

    ii. B: In the course of germination, the radicle is the first component of a seedling to emerge from the seed. The plant's first root, known as a radicle, emerges from the soil downward give rise to future root system.

    iii. C: The cotyledon is a crucial component of the embryo inside a plant seed. The cotyledon may develop into the seedling's first embryonic leaves after germination stored food.

OR

a. Iodised salt is advisable because Iodine present in iodised salt is essential for functioning of thyroid and formation of thyroxine hormone. The disease caused due to deficiency of iodine is Goitre. The symptom due to goitre is Swollen neck.

b. Nerve impulses travels from dendrite to cell body, then along the axon to its end. At the end, some chemicals are released which fill the gap of synapse, and starts a similar electrical impulse to another neuron and the impulse further travel in the body.

Section B

17.

(c) A and B

Explanation:

(C) and (D) are incorrect because the solution of washing soda in water is alkaline which turns red litmus blue. And washing soda is prepared from sodium chloride.

18.

(b) Both the statements A and B are true.

Explanation:

- **The oxyacetylene flame** is used for welding purposes. The oxyacetylene welding process uses a combination of oxygen and acetylene (C_2H_2) gas to provide a high-temperature flame. It is commonly used to join mild steel permanently.
- Ethyne (C_2H_2) reacts with HCl in the presence of $HgCl_2$ to from vinyl chloride or chloroethane H_2C=CHCl. This colourless compound is an important industrial chemical. It is chiefly used to produce polyvinyl chloride (PVC).

19.

(d) NH_4Cl is formed

Explanation:

Ammonium chloride is formed when ammonia reacts with hydrogen chloride. It is a combination reaction.

$NH_3(g) + HCl(g) \rightarrow NH_4Cl(s)$

20.

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

Explanation:

- Hydrogenation is an addition reaction. The addition of hydrogen to an unsaturated hydrocarbon to obtain a saturated hydrocarbon is called hydrogenation.
- Carbon tetrachloride is a product of a substitution reaction - a characteristic property of saturated hydrocarbons.
- Alcohol meant for industrial purposes is made unfit for human consumption by adding small amounts (about 5%) of methanol to alcohol. The mixture is known as denatured spirit or denatured alcohol.
- Ethyl ethanoate is a product of esterification.
  $CH_3COOH + C_2H_5OH \rightarrow CH_5COOC_2H_5 + H_2O$

21.

(c) Student C

Explanation:

Fe + ZnSO4 → No reaction

It is because iron is less reactive than Zinc.

$Zn + FeSO_4 \rightarrow ZnSO_4 + Fe$

The solution becomes colourless and black iron gets deposited.

22.

(d) 13 covalent bonds

Explanation:

Butane C_4H_{10} has 3 C-C covalent bonds and 10 C-H covalent bonds. Thus, it has 13 covalent bonds.

23. **(c)** basic salt

Explanation:

Washing soda is a is basic salt because washing soda is an alkali salt. Alkali salts or basic salt are salts that are the product of the neutralization of a strong base and a weak acid. As it is strongly basic it is so-called basic salt.

24. **(a)** Both A and R are true and R is the correct explanation of A.

Explanation:

Tap water conducts electricity as it contains ions whereas distilled water does not contain ions. Thus both assertion and reason are true and reason is the correct explanation of the assertion.

25. i. When Ammonium Hydroxide is added to the Ferrous Sulphate solution then a dirty green ppt. of Ferrous Hydroxide is formed with Ammonium Sulphate by Double Displacement reaction.

$2NH_4OH\ (aq) + FeSO_4\ (aq) \rightarrow Fe(OH)_2\ (ppt) + (NH_4)_2\ SO_4\ (aq)$

ii. When Ammonium Hydroxide is added to Aluminium Cholride then a white ppt. of Aluminium Hydroxide is formed with Ammonium Choride by Double Displacement Reaction.

$3NH_4OH\ (aq) + AlCl_3\ (aq) \rightarrow Al(OH)_3\ (ppt.) + 3NH_4Cl\ (aq)$

26. i. Cooking oil gets oxidized when comes in contact with air and gives a bad smell or turns "rancid". The oxygen present in the chips packet is replaced by flushing nitrogen in the packet, this in turn puffs up the packet.

ii. Iron easily reacts with atmospheric oxygen in presence of slight moisture to give iron oxide. In this process of 'corrosion', the outer layer of iron is oxidized and hence sacrificed leading to the shaping of the iron article. To avoid this oxidation, the article is coated with paint so as to make a barrier between the article's surface and atmosphere.

OR

Hydrogen gas and Iron chloride are produced.

$2HCl\ (aq) + Fe(s) \rightarrow FeCl_2\ (aq) + H_2(g)$

This is a redox reaction

$Fe(0) - 2e^- \rightarrow Fe(II)$ oxidation loss of electrons

$2H^+ + 2e^- \rightarrow H_2$ reduction: gain of electrons

So it is certainly a chemical reaction: bonds are broken and made.

HCl is not a sufficiently strong oxidizing agent to produce $FeCl_3$ (need Cl2).

27. Zinc is more reactive than copper. Hence, when a zinc plate is kept in a solution of copper sulphate, it slowly displaces copper from the solution and blue colour of the solution keeps fading away. Because of zinc going into solution as zinc sulphate, a number of holes are seen in the zinc plate. The reaction is

$$\underset{Blue}{CuSO_4(aq)} + Zn(s) \rightarrow \underset{Colourless}{ZnSO_4(aq)} + Cu(s)$$

28. i. **The oxidation and reduction occurring together** are called a redox reaction. $CuO + H_2 \longrightarrow Cu + H_2O$. Example: In this reaction, copper oxide is being reduced to copper whereas hydrogen is being oxidised to water.

ii. Oxidising agents give oxygen to or removes hydrogen from other substances. The reducing agent undergoes loss of electrons. A reducing agent (also called a reductant or reducer) is an element or compound that loses (or "donates") an electron to another chemical species in a redox chemical reaction.

iii. ZnO is being reduced

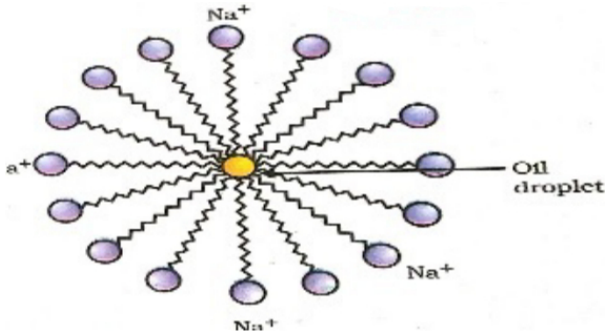
ZnO is reduced to Zn and CO is oxidised to CO_2

OR

H_2O_2 is reduced to water by removal of oxygen.

29. i. Soaps are sodium salts of fatty acids whereas Detergents are sodium salts of sulphonic acids. Soaps do not act in hard water due to formation of scum while detergents do.

ii. In soaps carbon chain dissolves in oil and the ionic end dissolves in water to form micelle



iii. Hard water contains Ca^{2+} / Mg^{2+} ions that react with soap and form precipitates called scum.

iv. By using detergents in hard water this problem can be resolved.

OR

According to the question, Given compounds are

i. $H-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-OH$

Propan-1-ol

ii. $H-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{O}{\|}}{C}-OH$

propanic acid

iii. $H-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-Cl$

1-Chloropropane

iv. $H-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-OH$

Propanol

v. $H-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-C\equiv CH$

Propyne

vi. $H-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{}{\underset{\underset{O}{\|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-H$

Butanone

Section C

30.

(d) A convex lens has 4 dioptre power having a focal length 0.25 m

Explanation:

The power P of a lens of the focal length is given by $P=\frac{1}{f}$, where f is the focal length in meter and power in dioptre

$P=\frac{1}{f} or f=\frac{1}{P}=\frac{1}{4}=0.25m$

The positive value for focal length indicates a convex lens.

31. **(a)** Violet and Red

Explanation:

The splitting of white light into its constituent colours is known as light dispersion. The spectrum is the band of seven colours produced by splitting white light. All of the constituent colours of white light have the same velocity in vacuum, but their velocity changes when they pass through a transparent 'medium' like a glass prism. Different colours are diverted by different angles on the prism's initial face. Violet's minimum speed is deviated by the maximum angle, whereas red's maximum speed is distorted by the minimum angle. As a result, the letters 'P' and 'Q' are violet and crimson, respectively.

32.

(d) A is false but R is true.

Explanation:

A is false but R is true.

33. The brightness of the image in the camera is:

a. directly proportional to time of exposure(t).

b. directly proportional to the square of diameter of aperture of the lens system (i.e. light gathering power of the objective).

c. inversely proportional to the square of focal length of the lens system.

d. is inversely proportional to the square of the lateral magnification. i.e. Image Brightness $\propto (N_A/M)^2$; where $\mathbf{N_A}$ is the objective numerical aperture and **M** is the magnification.

34. Here V = 220 volts; R = 440Ω

Now $I = \frac{V}{R} = \frac{220}{440} = 0.5\ A$

Heat energy produced in 30s = $\frac{V^2}{R}T = \frac{(220)^2 \times 30}{440} = 3300J$

OR

Wattage of colour T.V. = 60 W

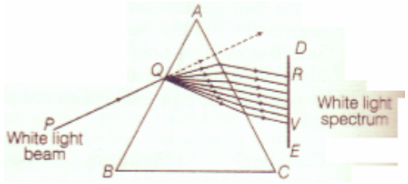
Number of hours for which colour T.V. is on during September = $2 \times 2\frac{1}{2} \times 30 = 150h$

Energy consumed = $\frac{watt \times hour}{1000} = \frac{60 \times 150}{1000} = 9\ kWh$

Cost of seeing 2 movies per day for 30 days = 9 × 4 = Rs. 36 only.

35. i. There must be a relative motion between the coil of wire and a magnet.

ii. Resistivity of coil will determine the resistance of the coil and induced current through it, as induced current = $\frac{\text{emf}}{\text{resistance}}$

36. 

i. The phenomenon of splitting of white light into its constituent colours is called dipersion of light. It is caused due to difference in speed of constituent colours of light travel in the medium other than air/vacuum because of different speed they bend at different angles.

ii. In nature, this Phenomenon is observed in formation of rainbow where all the seven colours constituting white light is visible.

iii. Based on phenomenon of dispersion, we can conclude that

a. White light consists of seven colours. Violet, indigo, blue, green, yellow, orange and red.

b. Violet light suffers maximum deviation and red light suffers minimum deviation.

37. i. The current is in the east-west direction. By applying the right-hand thumb rule, we get that the magnetic field (at any point below or above the wire) that turns clockwise in a plane perpendicular to the wire, when viewed from the east end, and anti-clockwise, when viewed from the west end.

ii. Following are the methods of producing magnetic fields:

a. By using a permanent magnet we can produce a magnetic field and it can be visualized by spreading iron fillings on a white paper and keeping a magnet beneath the paper.

b. A current-carrying straight conductor produces a magnetic field.

38. i. In series combination, Rs = $R_1 + R_2 + R_3$ = R + R + R = 3R.

ii. The equivalent resistance is where the total resistance is connected either in parallel or in series.

Resistance of each wire = $\frac{20}{4}$ = 5 Ω

Equivalent resistance in series

R_s = 5 + 5 + 5 + 5 = 20Ω

iii. All are in series, R_s = 5R = 5 × 2 = 10Ω

OR

R_s = 1 + 2 + 3 = 6 Ω

$I = \frac{18}{6} = 3$ A

39. a. f = 20 cm, u = -30 cm

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

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

$\frac{1}{v} = \frac{1}{20} + \frac{1}{-30}$

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

v = 60 cm

ii. Real, inverted and magnified

iii. m = $\frac{v}{u}$

m = $\frac{60}{-30}$

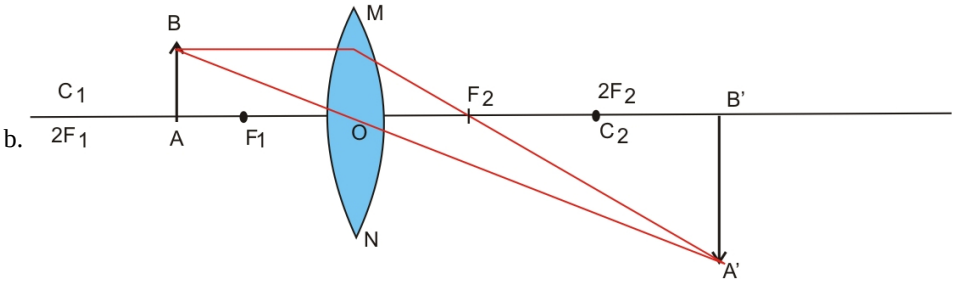
m = -2

h' = m × h

h' = -2 × 5

h' = -10 cm

b.



OR

Concave lens-

focal length $(f) = -60\ cm$

Object length $(h) = 9\ cm$

Object distance $(u) = -30\ cm$

Lens formula, $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

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

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

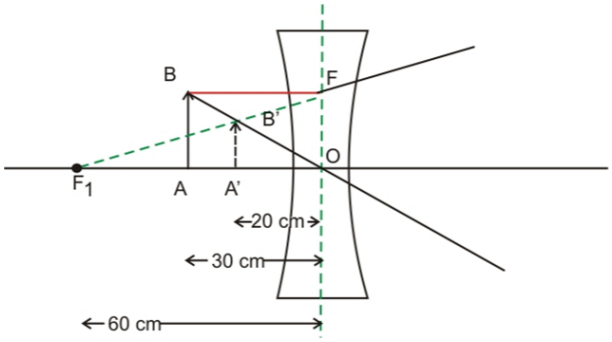
$m = \frac{v}{u} = \frac{-20}{-30} = \frac{2}{3}$

$m = \frac{h'}{h} \Rightarrow h' = m \times h$

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

$h' = 6\ cm$

Image is virtual, erect and smaller than object.



Note:

"This guess paper has been prepared with the aim of helping students score good marks; however, it does not guarantee that the Board examination will follow the same."