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S. No.	Chapter Name	Section-A (MCQs & A/R) 1 Mark	Section-B (VSAQs) 2 Marks	Section-C (SAQs) 3 Marks	Section-D (LAQs) 5 Marks	Section-E (Case Study) 4 Marks	Total Marks
		Q. No.	Q. No.	Q. No.	Q. No.	Q. No.	
1	Chemical Reactions and Equations	3(Q1,4,5)	1(Q26)	1(Q28)			8
2	Acids, Bases and Salts	1(Q2)			1(Q36)		6
3	Metals and Non-metals	2(Q3,6)		1(Q33)			5
4	Carbon and its Compounds	2(Q7,20 (A/R))				1(Q38)	6
5	Life Processes	1(Q18)	1(Q21)			1(Q37)	7
6	Control and Co-ordination	1(Q9)	1(Q22)		1(Q35)		8
7	How do Organism Reproduce	1(Q15)	1(Q23)	1(Q32)			6
8	Heredity and Evolution	2(Q12,16)	1(Q24)				4
9	Light- Reflection and Refraction	2(Q 10, 11)	1(Q25)				4
10	Human Eye and Colourful World	2(Q 8,19)		2(Q27,30)			8
11	Electricity				1(Q34)	1(Q39)	9
12	Magnetic Effects of Electric Current	1(Q13)		1(Q29)			4
13	Our Environment	2(Q17,14)		1(Q31)			5
	*** Total Questions (Total Marks)**	**20(20)**	**6(12)**	**7(21)**	**3(15)**	**3(12)**	**80**

* The number given outside the bracket denotes number of questions asked in the sample paper, while the number given inside the bracket denotes marks.

Time Allowed : 3 Hours **Max. Marks : 80**

General Instructions

1. This question paper consists of 39 questions in 5 sections.
2. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
3. **Section A** consists of 20 objective type questions carrying 1 mark each.
4. **Section B** consists of 6 Very Short Answer type questions carrying 02 marks each. Answers to these questions should in the range of 30 to 50 words.
5. **Section C** consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should in the range of 50 to 80 words
6. **Section D** consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.
7. **Section E** consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

SECTION-A

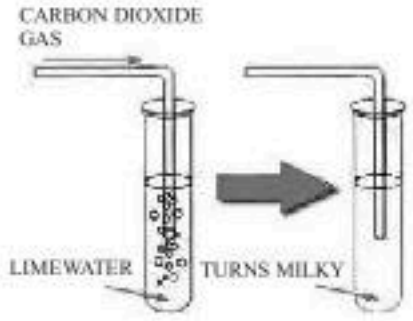
Select and write one most appropriate option out of the four options given for each of the Questions 1 to 20

1. In the equation, $NaOH + HNO_3 \rightarrow NaNO_3 + H_2O$ nitric acid is acting as –
(a) an oxidising agent (b) an acid
(c) a nitrating agent (d) a dehydrating agent

2. An aqueous solution 'A' turns phenolphthalein solution pink. On addition of an aqueous solution 'B' to 'A', the pink colour disappears. The following statement is true for solution 'A' and 'B'.
(a) A is strongly basic and B is a weak base.
(b) A is strongly acidic and B is a weak acid.
(c) A has pH greater than 7 and B has pH less than 7.
(d) A has pH less than 7 and B has pH greater than 7.

3. Food cans are coated with tin and not with zinc because
(a) zinc is costlier than tin (b) zinc has higher melting point than tin
(c) zinc in more reactive than tin (d) zinc is less reactive than tin

4. When CO_2 is passed through lime water, it turns milky. The milkiness in due to formation of –



(a) $CaCO_3$ (b) $Ca(OH)_2$
(c) H_2O (d) CO_2

5. Identify the endothermic process from the following
(a) Addition of conc. HCl to water (b) $CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(l)$
(c) $H_2O(l) \longrightarrow H_2O(g)$ (d) $CaO(s) + H_2O(l) \longrightarrow Ca(OH)_2(aq)$

6. An element can react with oxygen to give a compound with high melting point. This compound is also water soluble. The element is likely to be
(a) Calcium (b) Carbon
(c) Silicon (d) Iron

7. Pentane has the molecular formula C_5H_{12}. It has
(a) 5 covalent bonds (b) 12 covalent bonds
(c) 16 covalent bonds (d) 17 covalent bonds

8. The danger signals installed at the top of tall buildings are red in colour. These can be easily seen from a distance because among all other colours, the red light
   (a) is scattered the most by smoke or fog
   (b) is scattered the least by smoke or fog
   (c) is absorbed the most by smoke or fog
   (d) moves fastest in air

9. Which is the correct sequence of the components of a reflex arc?
   (a) Receptors → Muscles → Sensory neuron → Motor neuron → Spinal cord
   (b) Receptors → Motor neuron → Spinal cord → Sensory neuron → Muscle
   (c) Receptors → Spinal cord → Sensory neuron → Motor neuron → Muscle
   (d) Receptors → Sensory neuron → Spinal cord → Motor neuron → Muscle

10. The path of a ray of light coming from air passing through a rectangular glass slab traced by four students shown as *A*, *B*, *C* and *D* in the figure. Which one of them is correct?

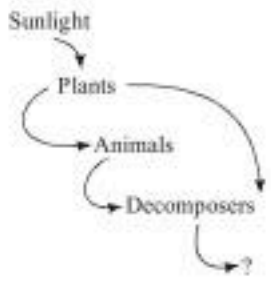
   (a) *A* (b) *B* (c) *C* (d) *D*

11. A convex mirror is used
   (a) by a dentist
   (b) for shaving
   (c) as a rear view mirror in vehicles
   (d) as a light reflector for obtaining a parallel beam of light.

12. In the experiment conducted by Mendel, RRyy (round green) and rrYY (wrinkled, yellow) seeds of pea plant were used. In the F_2 generation 240 progeny were produced, out of which 15 progeny had specific characteristics. What were the characteristics?
   (a) round and green
   (b) round and yellow
   (c) wrinkle and yellow
   (d) wrinkle and green

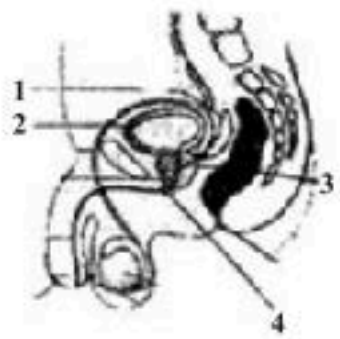
13. The magnetic field inside a long straight solenoid-carrying current
   (a) is zero.
   (b) decrease as we move towards its end.
   (c) increases as we move towards its end.
   (d) is the same at all points.

14. The following diagram shows a simple version of energy flow through food web.



What happens to energy having the decomposers?
   (a) It is used by the decomposers itself.
   (b) It is reflected from the surface of earth.
   (c) It is lost as heat
   (d) It is used in natural biocomposting

15. The given figure shows the male reproductive system. Some structures are marked as 1, 2, 3 and 4. Identify the structure whose removal will came the sperm to be reacted with acidic urine in the urethra.



(a) 1 (b) 2 (c) 3 (d) 4

16. If two parents have the genotypes AA × aa, the probability of having an aa genotype in the F_1 generation is –

(a) 25 percent (b) 50 percent

(c) 75 percent (d) None of the above

Q.No. 17–20 are Assertion - Reasoning based questions: These consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

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

(b) Both A and R are true and R is not the correct explanation of A

(c) A is true but R is false

(d) A is False but R is true

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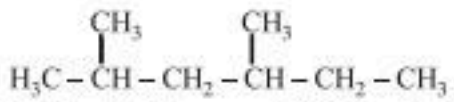
17. **Assertion:** In a greenhouse the glass panel lets the light in but does not allow heat to escape.
Reason: The greenhouse effect is naturally occuring phenomenon that is responsible for heating of Earth's surface and atmosphere.

18. **Assertion:** Blood of insects is colourless.
Reason: The blood of insect does not play any role in transport of oxygen.

19. **Assertion:** Clouds are generally white.
Reason: Larger particles like dust and water drops scatter light of all colours, almost equally and all the colours reach our eyes equally.

20. **Assertion :** The correct IUPAC name for the compound



is 2, 4 dimethyl hexane not 3, 5 dimethyl hexane

Reason: When the parent chain has two or more substitutents, numbering must be done in such a way that the sum of the locants on the parent chain is the lowest possible.

SECTION-B

Q. no. 21 to 26 are Very Short Answer Questions.

21. What is the importance of transpiration?

OR

What is the role of valves in the human heart?

22. Write the main functions of the following:

(i) Sensory neuron (ii) Cranium

(iii) Vertebal column (iv) Motor neuron.

23. What is STDs (sexually transmitted diseases)? Give some example ?

24. How do Mendel's experiments show that.

(i) traits may be dominant or recessive? (ii) inheritance of two traits is independent of each other?

25. Name the type of mirror used in the following situations:

(i) Headlights of a car (ii) Solar furnace

Support your answer with reasons.

OR

Mention the kind of lens that can form:

(i) Real, inverted and magnified image
(ii) Virtual, erect and magnified image
(iii) Real, inverted and diminished image
(iv) Virtual, erect and diminished image.

26. Write the chemical involved in the following chemical reactions :

(i) White washing
(ii) Black and white photography

OR

Give one difference between covalent and ionic compound. Illustrate your answer with a suitable example?

SECTION-C

Q.no. 27 to 33 are Short Answer Questions.

27. What is meant by scattering of light? The sky appears blue. Explain this phenomena with reason.

28. Mention with reason the colour changes observed when :

(i) silver chloride is exposed to sunlight.
(ii) copper powder is strongly heated in the presence of oxygen.
(iii) a piece of zinc is dropped in copper sulphate solution.

29. Give reasons for the following :

(i) There is either a convergence or a divergence of magnetic field lines near the ends of a current carrying straight solenoid.
(ii) The current carrying solenoid when suspended freely rests along a particular direction.
(iii) The burnt out fuse should be replaced by another fuse of identical rating.

OR

An electric oven of 2 kW power rating is operated in a domestic circuit (220 V) that has a current rating of 5 A. What result do you expect ? Explain.

30. A prism causes dispersion of white light while a rectangular glass block does not. Explain.

31. Explain the fertilization process in human beings in detail?

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

33. A metal 'X' combines with a non-metal 'Y' by the transfer of electrons to form a compound Z.

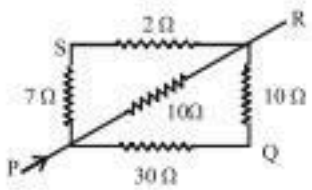
(i) State the type of bond in compound Z.
(ii) What can you say about the melting point and boiling point of compound Z?
(iii) Will this compound dissolve in kerosene or petrol?
(iv) Will this compound be a good conductor of electricity?

SECTION-D

Q.no. 34 to 36 are Long Answer Questions.

34. (i) Derive a formula for the equivalent resistance for three resistances connected in parallel?

(ii) Find the equivalent resistance and total current in the circuit, if the point P and R are connected to a 6V battery.



35. (i) Define reflex arc. Draw a flowchart showing the sequence of event which occur during sneezing .

(ii) List four plant hormones. Write one function of each.

36. (a) Name the properties of baking powder responsible for the following uses:

(i) Baking industry
(ii) As an antacid
(iii) As soda-acid fire extinguisher

(b) Acid when react with metals release hydrogen gas but there is one acid which when reacts with metals does not release hydrogen except for two metals. Prove this statement.

OR

(a) What do you mean by the family of salts?

(b) Why do HCl, HNO_3, etc., show acidic characters in aqueous solutions while solutions of compounds like alcohol and glucose do not show acidic character ?

(c) A weak acid is added to a concentrated solution of hydrochloric acid. Does the solution become more or less acidic ?

SECTION-E

Q.no. 37 to 39 are case - based/data -based questions with 2 to 3 short sub - parts. Internal choice is provided in one of these sub-parts.

37. Read the following case/passage and answer the questions.

Heterotrophic nutrition is a type of nutrition in which organisms obtain that food from other sources. Such type of the organisms that depend upon outside sources for their food are called as heterotrophs.

Heterotrophic nutrition is classified as saprophytic, holozoic and parasitic nutrition.

(i) Give two example of parasite.

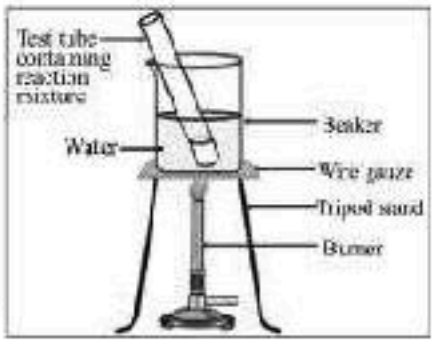
(ii) What do you understand by heterotropic nutrition?

(iii) Give an example of saprotroph.

(iv) Which mode of nutrition can fix carbon dioxide into sugar?

38. Read the following case/passage and answer the questions.

The given diagram represent an experiment in which a test tube contains 1 mL of ethanol (absolute alcohol) and 1 mL glacial acetic acid along with a few drops of concentrated H_2SO_4. Observe the diagram and answer the following questions.



(a) Name the type of reaction taking place in this experiment.

(b) Write the chemical equation. Give two uses of the resulting product.

(c) Why reverse of this reaction is known as saponification reaction?

OR

How do detergents/soaps act on cleaning the cloth?

39. Read the following case/passage and answer the questions.

The heat generated when current passes through a resistive material is used in many common devices. The material through which the current passes is surrounded by an insulating substance in order to prevent the current from flowing through the cook to the earth when he or she touches the pan. Hair dryer, in which a fan blows air past heating coils. In this case the warm air can be used to dry hair, but on a broader scale this same principle is used to dry clothes and to heat buildings. Other practical application includes heater, toaster, electric kettle etc.

(a) Why are coils of electric toasters and electric irons made of an alloy rather than a pure metal?

(b) Why does the cord of an electric heater not glow while the heating element does?

(c) What determines the rate at which energy is delivered by a current?

OR

(c) How much current will an electric heater draw from 220 V, if the resistance of the heater is 40Ω ?

Solution

SAMPLE PAPER-10

1. **(b)** The reaction represents a neutralisation reaction in which base (NaOH) reacts with an acid (HNO_3) to form salt ($NaNO_3$) and water (H_2O).

2. **(c)** Aqueous solution of A is basic while that of B is acidic. Therefore A has pH greater than 7 and B has pH less than 7.

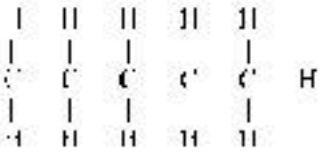
3. **(c)** Zinc is more reactive than tin (zinc is above tin in reactivity series) so it will react with organic acids (present in food) to form poisonous compounds. To avoid this food cans are coated with tin and **not** with zinc.

4. **(a)** $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

5. **(c)** Conversion of liquid to gas is endothermic process.

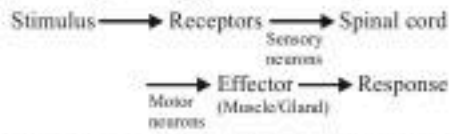
6. **(a)** Calcium (Ca) combines with oxygen to form calcium oxide (CaO) which has a high melting point and dissolves in water to form $Ca(OH)_2$.

7. **(c)**



8. **(b)** The danger signals are red in colour because among all other colours, red colour is scattered the least by smoke or fog. So, it can be easily seen from a distance even in fog or smoky environment.

9. **(d)** The pathway of nerve impulse in a reflex action is called the reflex arc. A reflex action is an involuntary action in response to a stimulus e.g., coughing, sneezing etc. The specific pathway followed is given below:



10. **(b)** In a rectangular glass slab, the emergent rays are parallel to the direction of the incident ray, as the extent of bending of the ray of light at the opposite parallel faces air-glass and glass-air interface of the rectangular glass slab is equal and opposite.
This is why the ray emerges are parallel to the incident ray.

11. **(c)**

12. **(d)** Wrinkled and green are specific characters because they are different from parents and are recessive.

13. **(d)**

14. **(d)** Decomposers are present at the final level in a food web. They breakdown dead and decaying organic matter (plants and animals) and convert into nutrients in the soil. They naturally increase the decomposition process and therefore used in natural biocomposting.

15. **(d)** Removal of prostate gland will come the sperm to be reacted with the acid urine in the urethra.

16. **(a)** The genotypic ratio will be 1 : 2 : 1. The probabily of having aa is 25% in F_2 generation.

17. **(b)** Both Assertion and Reason are correct but Reason is not a correct explanation of Assertion.
Carbon dioxide and methane are commonly known as greenhouse gases because they are responsible for greenhouse effect.

18. **(b)** The blood of an insect functions differently than the blood of a human. Insect blood, however, does not carry gases and has no haemoglobin which gives red colour to the blood.

19. **(a)** Clouds are generally white as larger particles like dust and water drops scatter light of all colours, almost equally and all the colours reach our eyes equally and combine to form white light.

20. **(a)** The correct IUPAC name for the compound is 2, 4-dimethyl hexane not 3, 5 dimethyl hexane.

21. Transpiration refers to the evaporative loss of water by plant. The importance of transpiration are as follows:
(a) It creates transpiration pull for absorption and transport of water and mineral from xylem of roots to the top of the plant.
(b) It supplies water for photosynthesis.
(c) It transport minerals from soil to all parts of the plant.
(d) It regulates temperature of the leaves. (2 marks)

OR

In heart, the valves (*i.e.* bicuspid and tricuspid) are present between auricles and ventricles. Their presence stops the back flow of blood. When ventricles contract, the valves get closed and it helps to maintain the unidirectional flow of blood. (*i.e.*, the blood does not go back into auricles). (2 marks)

22. (i) To pass signal from receptors to brain. (½ mark)
(ii) Bony box which protects our brain. (½ mark)
(iii) Bony structure that protects the spinal cord. (½ mark)
(iv) To transmit signal from brain or spinal cord to effector organ. (½ mark)

23. The sexually transmitted disease (STD) are a group of communicable disease that are transmitted mainly by sexual contacts. STDs are also called as Veneral Disease (V.D). STDs are caused by bacteria, viruses, protozoa and fungi. (1 + 1 = 2 marks)

24. (i) Mendel experimented on garden pea plant with selection of seven visible contrasting characters forming laws of inheritance. He selected and crossed homozygous tall pea plant with genotype TT and a homozygous dwarf pea plant with the genotype tt. F_1 generation consists only of tall plants having genotype Tt.
The expressed allele 'T' for tallness is dominant over the unexpressed allele t for dwarfness. Therefore, the trait of tallness is dominant while dwarfness is the recessive trait. Thus, Mendel's experiment showed that traits may be dominant or recessive.

(ii) In Mendel's experiment, different traits were tall and dwarf plant, round and wrinkled seeds. In F_2 (second) generation, some plants were tall with round seeds and others were dwarf with wrinkled seeds. Other combination was dwarf plants having round/wrinkled seed traits, that were independently inherited.
(1 + 1 = 2 marks)

25. Type of mirror used in:

(i) **Headlights of a car :** Concave mirror
Concave mirror is used because light from the bulb placed at the focus of it gets reflected and produces a powerful parallel beam of light to illuminate the road.

(ii) **Solar furnace:** Concave mirror
Cancave mirror has the property to concentrate the sunlight coming from sun along with heat radiation at its focus. As a result, temperature at its focus increases and the substance placed at the focal point gets heated to a high temperature. (1 × 2 =2 marks)

OR

(i) Convex lens (ii) Convex lens
(iii) Convex lens (iv) Concave lens
(½ × 4 = 2 marks)

26. (i) In white washing, quick lime reacts with water to form slaked lime. (½ mark)

$$\underset{\text{Quick lime}}{CaO} + H_2O \longrightarrow \underset{\text{Slaked lime}}{Ca(OH)_2} + \text{Heat}$$ (½ mark)

(ii) Silver bromide, when exposed to light decomposes to silver and bromine. (½ mark)

$$\underset{\text{Silver bromide}}{2AgBr(s)} \xrightarrow{\text{Sunlight}} 2Ag(s) + \underset{\text{Silver}}{} \underset{\text{Bromine}}{Br_2(g)}$$ (½ mark)

OR

Covalent bonds are formed by sharing of electrons whereas ionic bonds are formed by transfer of electrons e.g. KCl. In KCl, ionic bond is present.

(1 mark)

In CH_4, covalent bond is present. (1 mark)

27. (i) Scattering of light – Phenomenon of spreading of light (diffused reflection) by minute particles in a medium. (1 mark)

(ii) The sky appears blue because the blue colour of sunlight scatters much more strongly than the red colour by particles in atmosphere/air due to its shorter wavelength. (2 marks)

28. (i) Photo decomposition of silver chloride takes place which results in formation of silver and colour changing to grey. (1 mark)

$$2AgCl \rightarrow \underset{\text{(grey)}}{2Ag} + Cl_2$$

(ii) Copper undergoes oxidation and black coloured copper oxide is formed.
$2Cu + O_2 \rightarrow 2CuO$ (1 mark)

(iii) Zinc is more reactive than copper so it displaces copper from its solution and colour of the solution changes from blue to colourless.
$Zn(s) + CuSO_4(aq.) \rightarrow Cu(s) + ZnSO_4(aq.)$ (1 mark)

29. (i) One end of current carrying solenoid behaves as a magnetic north pole, while the other behaves as the south pole. Like in bar magnet, the field lines emerge from one end and merge into another. So, there is either a convergence at S-pole or a divergence from N-pole of magnetic field lines near the ends of solenoid. (1 mark)

(ii) A current carrying solenoid behaves like a bar magnet. We know that a freely suspended bar magnet aligns itself in the north-south direction. Hence, it rests along north-south direction when suspended freely. (1 mark)

(iii) Fuse of lower rating will blow off immediately (and require frequent replacements). Fuse of higher rating will not break the circuit, even in case of higher load. So, burnt out fuse should be replaced by another fuse of identical rating for electrical safety. (1 mark)

OR

$$P = \frac{V^2}{R}$$ (1 mark)

$$2\times10^3 = \frac{220\times220}{R} \Rightarrow R = \frac{220\times220}{2\times10^3}$$ (1 mark)

$$I = \frac{V}{R} = \frac{220\times2\times10^3}{220\times220} = \frac{100}{11} = 9.09A$$

At this stage, due to very high value of current, oven will be damaged. (1 mark)

30. In a prism the refraction of light takes place at the two slant surfaces. The dispersion of white light occurs at the first surface of prism where its constituent colours are deviated through different angles. At the second surface, these split colours suffer only refraction and they get further separated. But in a rectangular glass block, the refraction of light takes place at the two parallel surfaces. At the first surface, although the white light splits into its constituent colours on refraction, but these split colours on suffering refraction at the second surface emerge out in form of a parallel beam, which give an impression of white light. (3 marks)

31. 1. Fertilization is the process of fusion of sperm with ovum. It is internal in human beings.
2. During copulation (mating or coitus), the sperms are released in the vagina near the lower end of the uterus.
3. Millions of sperms are released in the vagina, and they actively swim with the help of their tails and pass into the uterus.
4. From the uterus , they reach the oviduct (fallopian tube).
5. If there is an egg in the oviduct, it gets fertilised only by one sperm. (If copulation has taken place during ovulatory period i.e., middle of menstrual cycle).
6. When the sperm unites with ovum, zygote is formed.
7. The absence of menstruation indicates fertilisation (after copulation).

8. After fertilisation, the embryonic development of zygote starts in the fallopian tube (pregnancy starts). The embryo reaches the uterus and gets attached to its thickened inner wall. This attachment of the embryo with the uterus is called implantation.
9. After implantation, a special tissue develops between the embryo (foetus) and uterine wall called as placenta. It is richly supplied with blood.
10. Function of placenta : It provides all the basic needs of foetus till birth such as nutrition, respiration, excretion with the help of maternal body.
11. The growth or development of foetus inside the uterus till birth is known as gestation. On completion of gestation, the birth of fully grown and developed foetus taken place. This is known as parturition.
12. The duration of pregnancy, on an average lasts 280 days or 40 weeks from the 1st day of the last menstrual cycle.
13. The average weight of newborn should be 3.5 Kg After 40 weeks of gestation. (3 marks)

32. (i) In a food chain the energy always moves progressively through the various trophic levels and is no longer available to the organisms of the previous trophic level/energy captured by the autotrophs does not go back to the solar input. (1 mark)

(ii) Pesticides are used in agriculture for crop protection. When washed away/down into the soil/water bodies absorbed by plants/producers. (1 mark)

(iii) Upon consumption, they enter into our food chain and being non - biodegradable, these chemicals get progressively accumulated in our body. (1 mark)

33. (i) The bond which is formed by loss and gain of electron is called ionic or electro-valent bond. (½ mark)

(ii) M.P. and B.P. of ionic compounds are high. (½ mark)

(iii) Ionic compounds are soluble in water but not in organic solvents. (1 mark)

(iv) Ionic compounds are good conductors of electricity. (1 mark)

34. (i) To find out the total resistance of the circuit when three resistances are connected in parallel:

Let the three resistances R_1, R_2 and R_3 be connected in parallel across the two ends A and B. This combination is connected to a battery of 'V' volt which supplies a current 'I'. Since these three resistances are across the same points A and B i.e. why they have same PD i.e. 'V' volt.

But the current gets divided into I_1, I_2 and I_3 through R_1, R_2 and R_3 respectively.

According to Ohm's law,

$V = IR \Rightarrow I = \frac{V}{R}$ (1 mark)

Current I_1, (flowing through R_1) $= \frac{V}{R_1}$

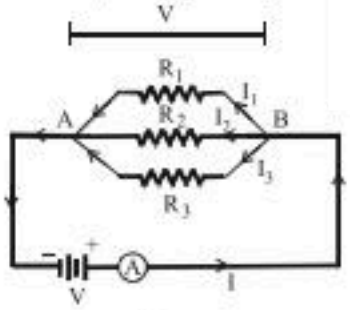
Current I_2, (flowing through R_2) $= \frac{V}{R_2}$

Current I_3 (flowing through R_3) $= \frac{V}{R_3}$

Since, $I = I_1 + I_2 + I_3$

Therefore, $I = \frac{V}{R}$

$\frac{V}{R} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$



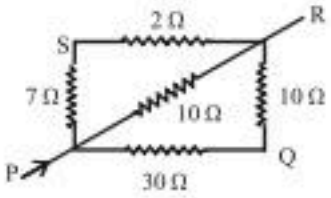
(1 mark)

$\Rightarrow \frac{V}{R} = V\left[\frac{I}{R_1} + \frac{I}{R_2} + \frac{I}{R_3}\right]$

$\Rightarrow \frac{I}{R} = \frac{I}{R_1} + \frac{I}{R_2} + \frac{I}{R_3}$ (1 mark)

If two or more resistances are connected in parallel, then the reciprocal of total resistance is equal to sum of reciprocals of individual resistance.

(ii)



$R_1 = 7\,\Omega,\ R_2 = 2\,\Omega,\ R_3 = 10\ \Omega,$

$R_4 = 30\,\Omega,\ R_5 = 10\,\Omega, V = 6\,V$

Now, R_1 and R_2 are in series,

$R' = R_1 + R_2 = 7 + 2 = 9\ \Omega$

Also, R_4 and R_5 are in series,

$R'' = R_4 + R_5 = 30 + 10 = 40\ \Omega$

Now, R', R" and R_3 are in parallel,

$\frac{1}{R} = \frac{1}{R'} + \frac{1}{R''} + \frac{1}{R_3}$ (1 mark)

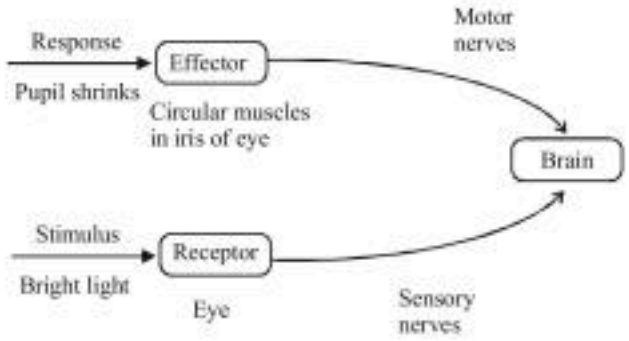
$\Rightarrow \frac{1}{R} = \frac{1}{9} + \frac{1}{40} + \frac{1}{10}$

$\Rightarrow \frac{1}{R} = \frac{40 + 9 + 36}{360} = \frac{85}{360}$

$\therefore R = \frac{360}{85} = 4.23\ \Omega$

$V = IR \Rightarrow I = \frac{V}{R} = \frac{6}{4.23} = 1.41\,A$ (1 mark)

35. (i) The pathway taken by nerve impluses in a reflex action is called the reflex arc: (2½ marks)



(ii) **Auxin :** It promotes elongation and division of cell and root formation.
Gibberellins: They help in the growth of stem.
Cytokinins: They promote cell division and delay leaf ageing.
Abscisic acid: It prevent wilting of leaves.
(2½ marks)

36. (a)

S. No.	Properties of baking powder	Uses
(i)	On heating releases CO_2 gas.	Baking industry
(ii)	Alkaline in nature, neutralises excess acid in stomach.	Antacid
(iii)	When it reacts with acid, it releases CO_2 gas which can extinguish fire.	Soda-acid fire extinguisher

(1 × 3 = 3 marks)

(b) Acid + Metal ⟶ Salt + Hydrogen
e.g., $2HCl + 2Na \longrightarrow 2NaCl + H_2\uparrow$
$H_2SO_4 + 2Na \longrightarrow Na_2SO_4 + H_2\uparrow$
$HNO_3 + Na \longrightarrow$ No hydrogen gas (1 mark)
Nitric acid does not release hydrogen gas when it reacts with metals. This is because nitric acid is strong oxidising agent. Nitric acid reacts only with magnesium and manganese to evolve hydrogen gas.
$Mg + 2HNO_3 \longrightarrow Mg(NO_3)_2 + H_2\uparrow$
$Mn + 2HNO_3 \longrightarrow Mn(NO_3)_2 + H_2\uparrow$ (1 mark)

OR

(a) Salts, having the same positive or negative radicals, are said to belong to the same family. (1 mark)

(b) It is because HCl and HNO_3 ionise in aqueous solution whereas ethanol and glucose do not ionise in aqueous solution. (2 marks)

(c) When a weak acid is added to a concentrated solution of hydrochloric acid, the solution becomes more acidic because it increases the hydronium ion concentration of the solution. (2 marks)

37. (i) Taenia and leech.
(ii) Heterotrophic nutrition is a mode of nutrition in which organisms depend upon other organisms for food to survive.
(iii) fungi (like Mushroom)
(iv) Autotrophic mode helps to fix carbondioxide into sugar by the process of hotosynthesis.
(4 × 1 = 4 marks)

38. (a) Esterification reaction (1 mark)

(b) $CH_3COOH + CH_3CH_2OH \xrightarrow{Acid}$
Ethanoic acid Ethanol
$CH_3COOCH_2CH_3$ (1 mark)
Ester
Esters are used in making perfumes and as a flavouring agent. (1 mark)

(c) Reverse reaction is known as saponification reaction because it is used in the prepration of soap. (2 marks)

OR

The soap molecules have two parts:
(i) long chain hydrocarbon which is not solible in wate buit soluble in oil; it is known as hydrophobic part.
(ii) ionic part consists of Na+ or K+salts of carboxybates ion, which is soluble in water; it is known as hydrophilic part.
While the soap solutions comes in contact with the oily dirt the hydrophobic part interacts with oil and the ionic part faces outwards to interact with water. Thus, the soap micelle helps in dissolving the dirt in water and acts as cleansing agent. (2 marks)

39. (a) Alloys have high resistivity in comparison to pure metals. Also alloys do not oxidise readily at high temperatures but pure metals do. Therefore, alloys are used for making coils of electric toasters and electric irons rather than a pure metal. (1 mark)

(b) According to the Joule's law of heating effect
$H = I^2RT$ and $H \propto R$
Because the resistance of heating element is very high. So more heat is developed, hence it glows. But the cord has very low resistance, so it does not glow. (2 marks)

(c) The rate at which energy is delivered by a current is called the power which is given by $P = VI$
Thus, the potential difference (V) determine the power delivered by a current. (1 mark)

(d) $V = 220V$, $R = 40\,\Omega$
$V = IR \Rightarrow I = \frac{V}{R} = \frac{220}{40} = 5.5\,\mathbf{A}$ (1 mark)