SCIENCE SQP (2024-25)
CLASS X
(Science 086)

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

General Instructions:

1. All *questions would be compulsory. However, an internal choice of approximately 33% would be provided. 50% marks are to be allotted to competency-based questions.*
2. *Section A would have 16 simple/complex MCQs and 04 Assertion-Reasoning type questions carrying 1 mark each.*
3. *Section B would have 6 Short Answer (SA) type questions carrying 02 marks each.*
4. *Section C would have 7 Short Answer (SA) type questions carrying 03 marks each.*
5. *Section D would have 3 Long Answer (LA) type questions carrying 05 marks each.*
6. *Section E would have 3 source based/case based/passage based/integrated units of assessment (04 marks each) with sub-parts of the values of 1/2/3 marks.*

Section-A

Question 1 to 16 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

1 (1)

Identify 'p', 'q' and 'r' in the following balanced reaction

$$p\ Pb(NO_3)_{2(s)} \xrightarrow{Heat} q\ PbO_{(s)} + r\ NO_{2(g)} + O_{2(g)}$$

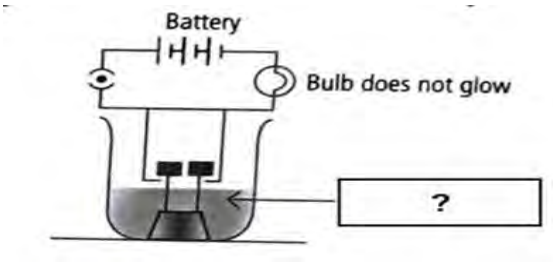
A. 2,2,4
B. 2,4,2
C. 2,4,4
D. 4,2,2

2 (1)

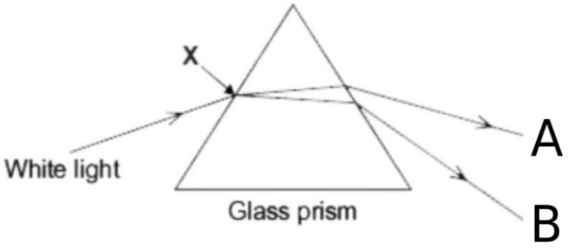
Match column I with column II and select the correct option using the given codes.

Column I	Column II
a. A metal that forms amphoteric oxides	(i) Ga
b. A metal which melts when kept on our palm	(ii) Au
c. A metal that reacts with nitric acid	(iii) Al
d. A metal which cannot displace hydrogen from acids	(iv) Mn

A. a – (ii), b – (i), c – (iii), d – (iv)
B. a – (iii), b – (i), c – (iv), d – (ii)
C. a – (iv), b – (ii), c – (iii), d – (i)
D. a – (iii), b – (ii), c – (i), d – (iv)

3	 The solution in the given figure is likely to be A. HNO_3 B. C_2H_5OH C. H_2SO_4 D. CO_2 in water - - - - - - - - - - - - - - *For Visual Impaired Students* Which among the following is considered as the strongest electrolyte? A. Dilute acid B. Dilute sugar solution C. Glucose solution D. Ethanol in water	1
4	An aqueous solution 'A' turns the phenolphthalein solution pink. On addition of an aqueous solution 'B' to 'A', the pink colour disappears. Which of the following statement is true for the solutions '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 a pH greater than 7 and B has a pH less than 7. D. A has a pH less than 7 and B has a pH greater than 7.	1
5	When 50g of lead powder is added to 300 ml of blue copper sulphate solution, after a few hours, the solution becomes colourless. This is an example of A. Combination reaction B. Decomposition reaction C. Displacement reaction D. Double displacement reaction	1
6	The electronic configuration of three elements X, Y and Z are X- 2, 8, 7; Y- 2, 8, 2; and Z - 2, 8 A. Y and Z are metals B. Y and X are non-metals C. X is a non -metal and Y is a metal D. Y is a non-metal and Z is a metal	1
7	Which of the following is an endothermic reaction? A. Burning of candle. B. Cooking of food. C. Decomposition of Vegetable matter. D. Reaction of Sodium with air	1

8	During cellular oxidation of Glucose, ATP is produced along with formation of other products in this reaction. Which of the following events is associated with production of maximum ATP molecules per molecule of Glucose during this process? Synthesis of A. ethanol in yeast B. lactic acid in muscle cells C. carbon dioxide in yeast cells D. carbon dioxide in human cells	1
9	During which of the following stages of the circulation of blood in a normal human being, the oxygenated blood is pumped to all parts of the body? A. contraction of the left atrium B. contraction of left ventricle C. relaxation of the right atrium D. relaxation of the right ventricle	1
10	Which of the following adaptations in herbivores helps in digestions of cellulose? A. Longer large intestine B. Smaller large intestine C. Smaller small intestine D. Longer small intestine	1
11	There was a cerebellar dysfunction in a patient. Which of the following activities will get disturbed in this patient as a result of this? A. Salivation B. Hunger control C. Posture and balance D. Regulation of blood pressure	1
12	In snails individuals can begin life as male and depending on environmental conditions they can become female as they grow. This is because A. male snails have dominant genetic makeup. B. female snails have dominant genetic makeup. C. expression of sex chromosomes can change in a snail's life time. D. sex is not genetically determined in snails.	1
13	In the following cases, a ray is incident on a concave mirror. In which case is the angle of incidence equal to zero? A. A ray parallel to the principal axis. B. A ray passing through the centre of curvature and incident obliquely. C. A ray passing through the principal focus and incident obliquely. D. A ray incident obliquely to the principal axis, at the pole of the mirror.	1

14	 Choose the correct option for the colour of rays for A and B. **Colour of Ray A** / **Colour of Ray B** A. Blue / Red B. Green / Yellow C. Red / Violet D. Violet / Indigo	1
15	Identify the incorrect statement 'The energy available to the producers is maximum' because: A. It is the first trophic level which absorbs1% of light energy directly from the source. B. It utilizes the most of the chemical energy for its own respiration, growth, reproduction, movement etc. C. It utilizes 10% of light energy and transfers the rest to the next trophic level. D. It transfers only 10% of light energy to the next trophic level.	1
16	Which of the following is not a role of decomposers in the ecosystem? A. Natural replenishment of soil. B. Enrichment of oxygen in atmosphere. C. Waste decomposition. D. Break-down of dead remains.	1
Question No. 17 to 20 consist of two statements – **Assertion** (A) and **Reason** (R). Answer these questions by 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		
17	**Assertion (A):** On adding dil. HCl to a test tube containing a substance 'X', a colourless gas is produced which gives a pop sound when a burning match stick is brought near it. **Reason (R):** In this reaction metal 'X' is displaced by Hydrogen.	1
18	**Assertion (A):** The number of chromosomes in a cell and in a germ cell is not the same in any species. **Reason (R):** When 2 germ cells combine they restore the normal number of chromosomes in a species.	1

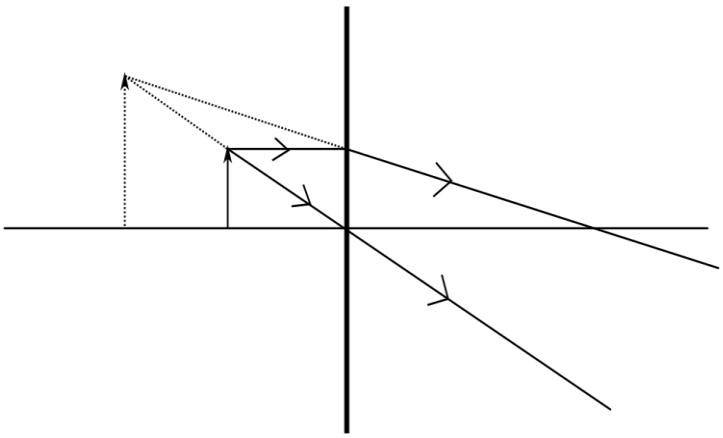
19	**Assertion (A)**: A convex mirror always forms an image behind it and the image formed is virtual. **Reason (R)**: According to the sign convention, the focal length of a convex mirror is positive.	1
20	**Assertion (A):** If the lions are removed from a food chain it will not affect the food chain, however if the plants are removed from a food chain it will disturb the ecosystem. **Reason (R)**: Plants are producers who can make food using sunlight, while lions are consumers.	1

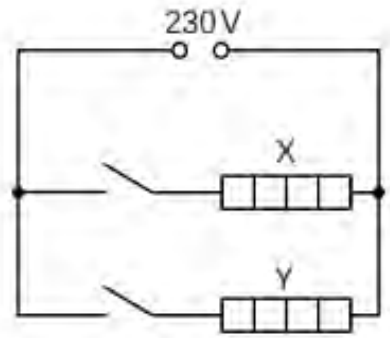
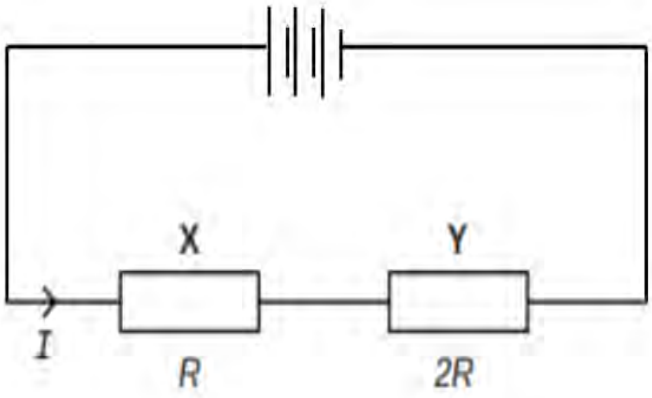
Section-B

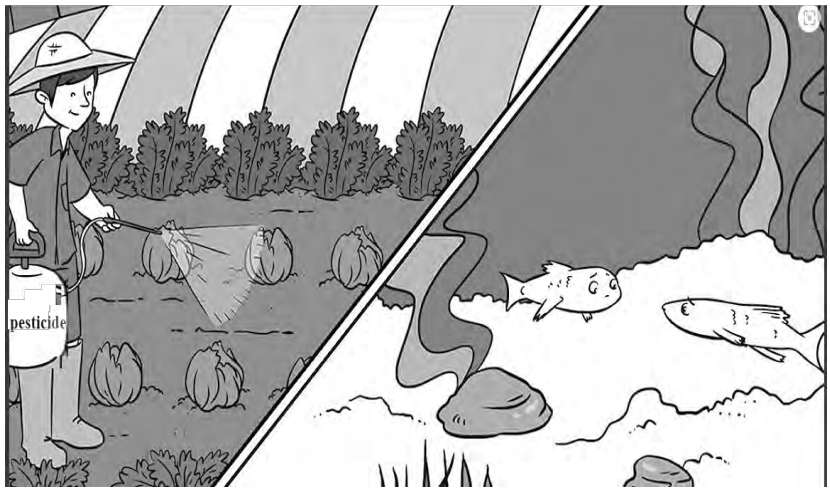
Question No. 21 to 26 are very short answer questions

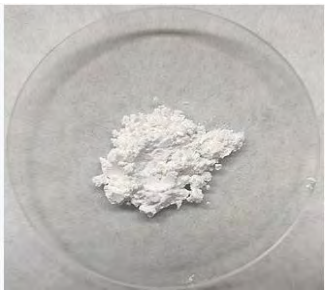
21	Identify the type of each of the following reactions stating the reason for your answers. A. $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2Fe + heat$ B. $Pb(NO_3)_2 + 2KI \rightarrow PbI_2(\downarrow) + 2KNO_3$	2
22	Differentiate between alveoli and nephron on the basis of the following points:	2

S. No.	Feature	Alveoli	Nephron
1	Structure and location		
2	Function		

23	*Attempt either option A or B.* A. List the steps for the synthesis of glucose by the plants. What special feature is found in desert plants related to this process? **OR** B. Explain the role of the following enzymes in the process of digestion of food in humans: (i) Salivary amylase (ii) Pepsin (iii) Trypsin (iv) Lipase	2
24	 The above figure shows the formation of an image by a lens shown by a thick line.	2

	Analyse the figure and answer the following questions. A. What is the type of lens used? B. What is the nature of the image? C. If the image is formed at a distance of 30 cm from the lens and the image is twice the size of the object, then where is the object placed? - - - - - - - - - - - - - - *For visually impaired students* A. What type of lens always forms a virtual erect and diminished image? B. List two uses of such a lens.	
25	*Attempt either option A or B.* A.  The electric circuit (above figure) in a clothes dryer contains two heaters X and Y in parallel. The above figure shows the circuit connected to a 230 V power supply. When both switches are closed, the current in X is 3.5 A. Analyse the circuit given above and answer the following questions. (i) Calculate the power developed in heater X. (ii) If the resistance of X is double that of Y calculate the current in heater Y. **OR** B.  The above figure shows two resistors X and Y connected in series to a battery. The power dissipated for this combination is P_1. When these resistors	2

	are connected in parallel to the same battery then the power dissipated is given by P_2. Find out the ratio $\frac{P_1}{P_2}$. - - - - - - - - - - - - - - *For visually impaired students* A. We have four resistors A, B, C and D of resistance 3 Ω, 6 Ω ,9 Ω and 12 Ω respectively. Find out the lowest resistance which can be obtained by combining these four resistors. **OR** B. You are given 2 fuse wires A and B with current ratings 2A and 5A respectively. Justify with reason which of the two would you use with a 1000W, 220V room heater?	
26	The cartoon below addresses a growing concern:  main.jpg (1148×574) (frontiersin.org) What impact will the process shown in the image have on Humans if they occupy the last trophic level? Explain. - - - - - - - - - - - - - - *For visually impaired students* Create a food chain with more than 2 trophic levels that exists in the cabbage farm. If Humans occupy the last trophic level, then how would spraying pesticide affect the humans? Explain.	2
Section-C Question No. 27 to 33 are short answer questions		
27	A. Anirudh took two metal oxides; aluminium oxide and magnesium oxide as shown in the pictures given below. But he forgot to label them. How will you guide/ help Anirudh to identify the oxides and label them?	3



B. In an activity Aishu was given two substances; Copper Sulphide (Cu_2S) and Copper Oxide (Cu_2O) to obtain copper from these compounds. She was able to extract Copper successfully. Illustrate with the help of chemical equations how Aishu might have completed the activity.

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For visually impaired students

Give reasons for the following

i. Certain metals are used for making cooking utensils.

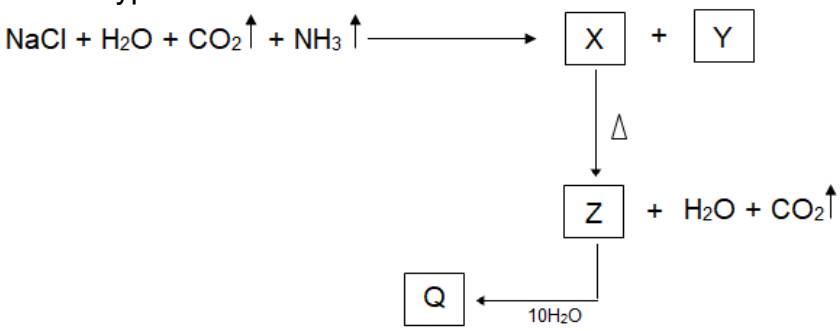
ii. Hydrogen gas does not evolve when certain metals except Mg & Mn react with nitric acid.

28 *Attempt either option A or B.* 3

A.

(i) In the given series of reactions, name the compounds X and Z.

(ii) Which type of reaction is X to Z?



(iii) You are given 3 unknown solutions A, B, and C with pH values of 6, 8 and 9.5 respectively. In which solution will the maximum number of hydronium ions be present? Arrange the given samples in the increasing order of H^+ ion concentration.

OR

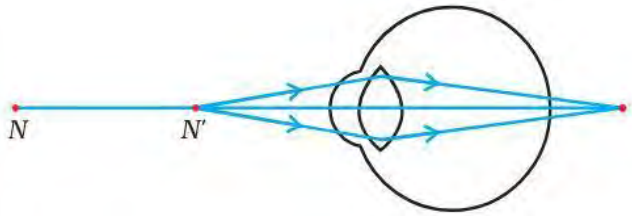
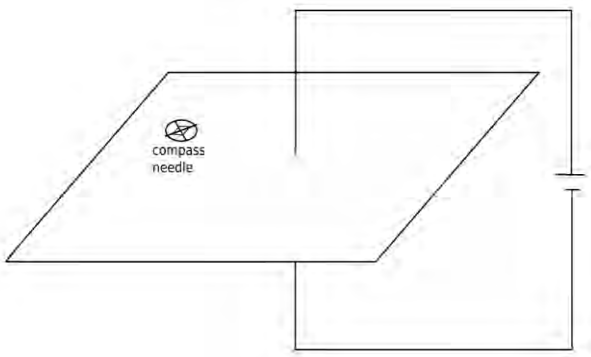
B. Comment on the following statements:

(i) Bee sting is treated with baking soda paste whereas wasp sting is treated with dilute vinegar.

(ii) Farmers treat soil with quicklime when tilling.

(iii) Ancient sculptures and marble structures are conserved by treating them with certain chemicals."

29 Water is used by the leaves of the plants for photosynthesis but rather than watering the leaves, we water the plant through the soil. How does this water reach the leaves of the plant? 3

30	A. In a family of four individuals, the father possessed long ears and the mother possessed short ears. If the parents had pure dominant and recessive traits respectively, then calculate the ratio of genetic makeup of F2 generation. Show a suitable cross. (2) B. If father had short ears and the mother had long ears, explain what effect it will have on the ratio of genetic makeup in F2 generation. (1)	3
31	A. What is the fundamental difference between hypermetropia and myopia in terms of the optical experience of a person? B. The diagram below shows a special case of an eye defect. (i) What is the defect that is shown in the figure? (ii) State one cause for such a defect? (iii) Explain with reason if a concave lens can be used to correct the defect.  - - - - - - - - - - - - - *For visually impaired students* A. What is the fundamental difference between hypermetropia and myopia in terms of the optical experience of a person? B. What are the causes of myopia in the human eye?	3
32	A. State the relationship between the resistance R of a wire to its length l and cross sectional area A. Use the mathematical symbols to arrive at the final formula. B. Using the formula define the resistivity of a material.	3
33	 Mona was doing an experiment with a magnetic compass and a straight current-carrying wire. She observed that as she moved the compass away from the current-carrying wire, the deflection of the compass needle reduced. A. Explain why the deflection of the compass needle reduced as Mona moved away the compass needle from the current carrying wire. B. Mention one thing that could have changed in the circuit of the wire that could increase the deflection of the needle. C. Explain with reason what will be the direction of the magnetic field associated with the wire for the case described by the above figure.	3

	- - - - - - - - - - - - - - *For visually impaired students* A. Explain why the deflection of the compass needle reduced as Mona moved away the compass needle from the current carrying wire. B. Mention one thing that could have changed in the circuit of the wire that could increase the deflection of the needle. C. Explain with reason how the direction of the magnetic field associated with the wire changes if the polarity of battery reversed.	
Section-D Question No. 34 to 36 are long answer questions.		
34	*Attempt either option A or B.* A. (i) "Keerthi thinks that Substitution reaction occurs in saturated Hydrocarbons, on the contrary Krishi thinks, it occurs in unsaturated Hydrocarbons." Justify with valid reasoning whose thinking is correct. (ii) "Methane and Propane and their Isomers are used as fuels" Comment. Draw the electron dot structure of the immediate lower homologue of Propane. Give any two characteristics of homologues of a given homologous series. (iii) A mixture of oxygen and ethyne is burnt for welding. Can you predict why a mixture of ethyne and air is not used? **OR** B. (i) 'A' & 'B' are sodium salts of long-chain carboxylic acid and long chain Sulphonic acid respectively. Which one of A or B will you prefer as a cleansing agent while using underground water (hand pump water)? Give the reason for your answer. (ii) Elaborate on the process of cleansing action. Illustrate micelle with the help of labelled diagram. (iii) Write the chemical equation of the preparation of soap from an ester CH_3COOCH_3. What is the name of this process?	5
35	*Attempt either option A or B.* A. The image below shows a banana plant which is growing with the help of suckers. These suckers are small plant stem outgrowths which can be separated from the main plant and planted separately and they will grow into a new plant subsequently.	5

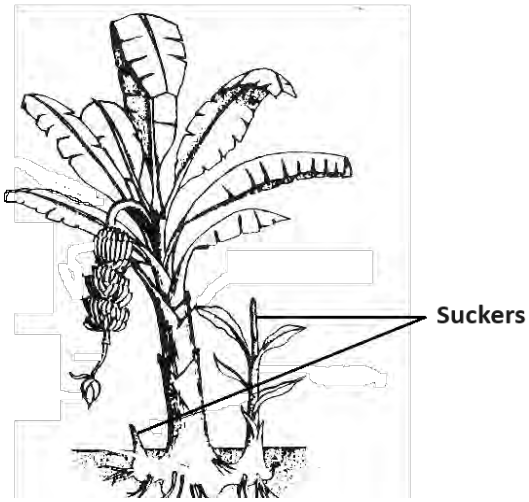


Fig.-1-Parts-of-Banana-plant-FAO-2021.png (623×609) (wp.com)

(i) Give the name and type of reproduction that is shown in the image above. (1)

(ii) List two advantages the farmer will have on using the type of reproduction mentioned above. (2)

(iii) The above plant produces male flowers. Explain how this plant will be involved in the process of pollination. (1)

(iv) Why is the offspring of this banana plant not absolutely identical to its parent plant? (1)

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For visually impaired students

A. A banana plant is growing with the help of suckers. These suckers are small plant stem outgrowths which can be separated from the main plant and planted separately and they will grow into a new plant subsequently.

(i) Give the name and type of reproduction. (1)

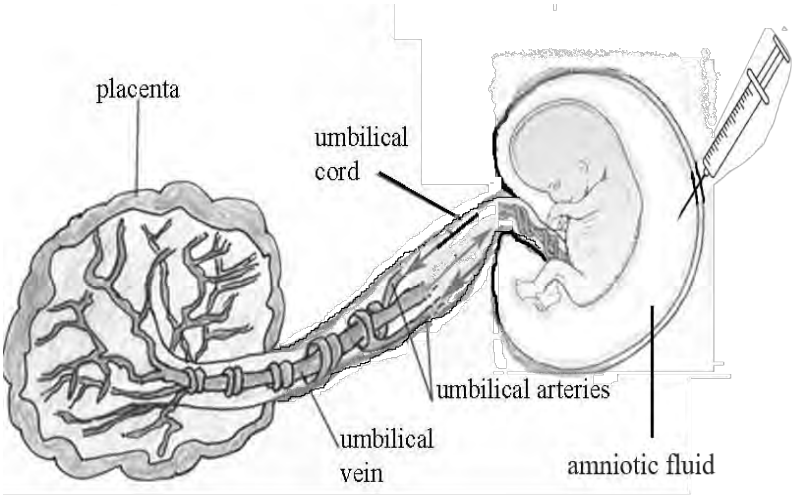
(ii) List two advantages the farmer will have on using the type of reproduction mentioned above. (2)

(iii) The above plant produces only male flower. Explain how this plant will be involved in the process of pollination. (1)

(iv) Why is the offspring of this banana plant not absolutely identical to its parent plant? (1)

OR

B. The image below shows a developing fetus in the mother's womb. The developing fetus is connected to the placenta by means of umbilical cord. The Umbilical vein and artery run inside the umbilical cord.



(i) Name two substance that moves through the blood vessels. (1)
(ii) If the placenta has less villi how will it affect the baby's growth? (1)
(iii) Name the region where the embryo develops inside the female body. Explain how this region is adapted for nourishing the baby. (1)
(iv) Some of the fetal cells fall off into the amniotic fluid and can be collected by careful procedure. The cells were screened and found to contain XY chromosome. (2)
a) What is the sex of the foetus?
b) How is this prenatal sex determination misused?

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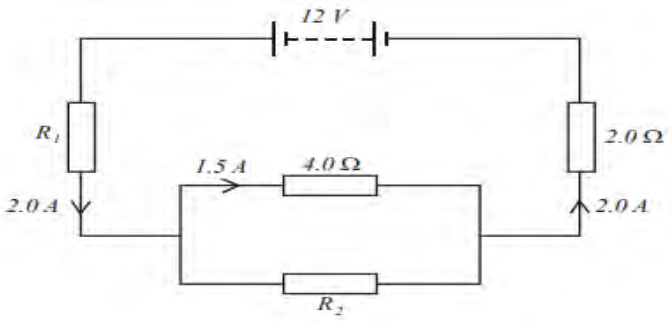
For visually impaired students

B. A developing fetus is connected to the placenta by means of umbilical cord. The Umbilical vein and artery run inside the umbilical cord.
(i) Name two substance that moves through the blood vessels. (1)
(ii) If the placenta has less villi how will it affect the baby's growth? (1)
(iii) Name the region where the embryo develops inside the female body. Explain how this region is adapted for nourishing the baby. (1)
(iv) Some of the fetal cells fall off into the amniotic fluid and can be collected by careful procedure. The cells were screened and found to contain XY chromosome.
a) What is the sex of the foetus?
b) How is this prenatal sex determination misused? (2)

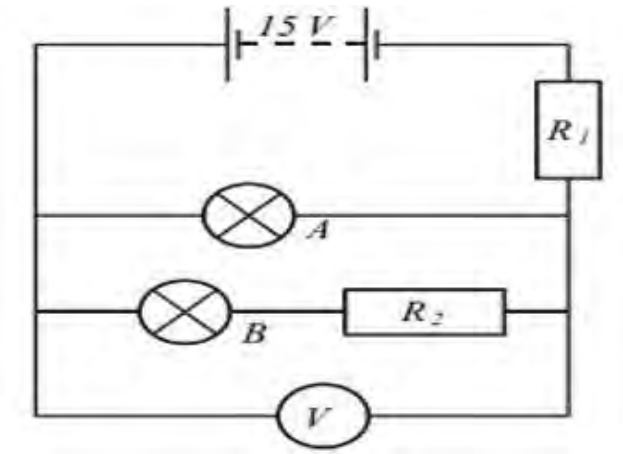
36	*Attempt either option A or B.* A.  	5

The above circuit is a part of an electrical device. Use the information given in the question to calculate the following.

(i) Potential Difference across R_2.
(ii) Value of the resistance R_2.
(iii) Value of resistance R_1

OR

B.



As shown in the figure above A and B are two lamps. Lamp A is rated at 12 V, 24W. Lamp B is rated at 6.0 V. When lamp B operates at its rated voltage, the current in it is 3.0 A. The values of R_1 and R_2 are chosen so that both lamps operate at their rated voltages.

Based on the information given, answer the following.

(i) Calculate the current in Lamp A.
(ii) State and give reason for the reading of the Voltmeter.
(iii) Calculate the resistance of R_2.
(iv) Find the value of the resistance R_1.

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For visually impaired students

A.

(i) State the law and write the formula connecting the electric current flowing through a conductor and voltage applied across it.
(ii) In a household five fans each of 100W are used for 4 hours and an electric press of 500W for 2 hours every day. Calculate the cost of using the fans and electric press for 60 days if the cost of 1 unit of electrical energy is Rs. 6.5.

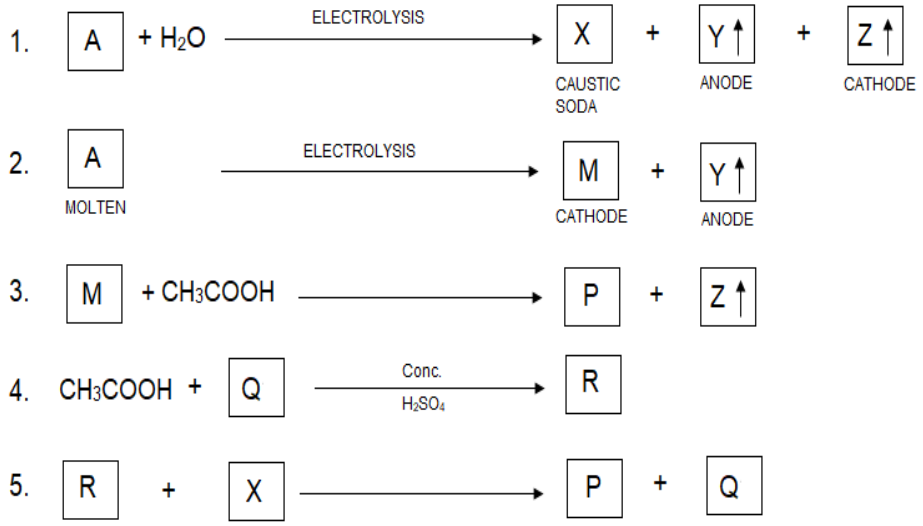
OR

B.

(i) State Joules law of heating and write its mathematical expression.
(ii) Two resistors of resistances 2Ω and 4Ω are connected in
   a) series
   b) parallel
   with a battery of given potential difference. Compute the ratio of total quantity of heat produced in the combination in the two cases if the total voltage and time are kept the same for both.

Section – E

Question No. 37 to 39 are case-based/data -based questions.

37	 A. Derive the names of A, Y, Z, M, P & R *Attempt either subpart B or C.* B. Improvise an activity to test Z. **OR** C. Name the process in which compounds X, Y & Z are formed from A. Justify your response. - - - - - - - - - - - - - - *For visually impaired students* A. Distinguish between ethanol and ethanoic acid experimentally. *Attempt either subpart B or C.* B. Give the IUPAC name of the first member of Alkene which is formed by addition of conc. sulphuric acid to it. Illustrate the change with the help of a chemical equation. **OR** C. "All combustion reactions are oxidation but all oxidation reactions are not combustion." Justify.	4
38	Mohan and Rohit observed that shoots of a plant growing in shade bend towards the sunlight. Whereas, leaves of 'Touch me not' plant fold and droop soon after touching. They were curious to know how these movements occur in plants.	4

A. Shoots of a plant bending towards light

B. Folding of leaves Touch me not plant

In order to help them understand the movements in the plants, answer the following questions:

Attempt either subpart A or B.

A. What causes the bending of shoots in the plants as shown in figure A?

OR

B. What causes the folding of the leaves in 'Touch me not' plant as shown in figure B? (2)

C. Compare the movement of growth of the pollen tube towards ovule with the movements shown in part A of the above figure. (1)

D. Compare the movement shown in figure B with the movement of body parts in the animals. (1)

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For visually impaired students

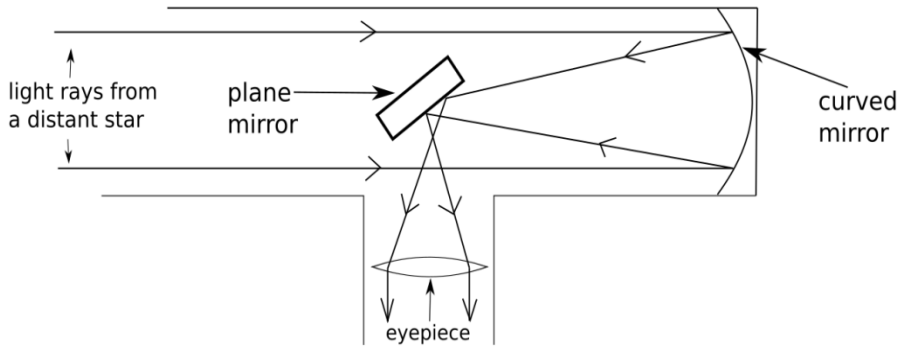
During a field trip, Mohan and Rohit observed that shoots of sunflower plants bend towards the sunlight. Whereas, leaves of 'Touch me not' plant begin to fold and droop soon after touching even during the day. They were curious to know how these movements occur in plants.

Attempt either subpart A or B.

A. What causes the bending of shoots in the sunflower plants towards sunlight?

OR

B. What causes the folding of the leaves in 'Touch me not' plants when touched by hand? (2)

	C. Compare the movement of growth of the pollen tube towards ovule with the bending of shoots of sunflower plant towards sunlight. (1) D. Compare the movement in folding of leaves of 'Touch me not' plants with the movement of body parts in the animals. (1)	
39	 The above image is that of a reflecting telescope. Reflecting telescopes revolutionised our ways of looking into the sky. They employ mirrors to gather and focus light, rather than relying solely on lenses as in their refracting counterparts. These telescopes utilise precisely shaped and polished mirrors to capture incoming light and reflect it to a focal point, where it forms an image for observation. A. What kind of image of the star is seen by the observer at the eyepiece? B. What kind of mirror is used in this reflecting telescope? *Attempt either subpart C or D.* C. Explain with reason what kind of optical device (type of lens or mirror) that is used at the eyepiece. **OR** D. What is the role of the plane mirror in the telescope? - - - - - - - - - - - - - - *For visually impaired students* Azim Taraporewala was a traveller and science enthusiast. During one of his travels he found himself on the edge of an island without any mode of communication. As he had read in many stories, he thought he would light a fire on the beach and travelling boats or ships could see that fire and come to give him a ride. He had run out of lighters and match-sticks but had a reading glass. Being a science enthusiast he knew some tricks and used that lens and a scrap of paper to light a fire, with the help of scorching rays from the sun. A. Which lens can be used by Azim to create the fire? B. What property of the lens helps Azim to create the fire? *Attempt either subpart C or D.* C. List two more uses of this kind of lens. **OR**	4

	D. Explain with reason the condition under which the lens can form both real as well as virtual images.	

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