SECTION A - MCQS

Q: 1 **Which of the following may be observed during a chemical reaction?**

P. change in state

Q. change in colour

R. change in temperature

S. evolution of gas

1. only P
2. only P and Q
3. only P, Q and R
4. all - P, Q, R and S

Q: 2 **A valid chemical reaction is represented by an equation that correctly shows the reactants and the products formed.The equation can also be balanced to show the ratio of the amounts of the different reactants and products involved in the reaction. Which of the following represents a valid chemical reaction which is also balanced?**

P) $Mg + H_2SO_4 \longrightarrow MgH_2 + SO_4$

Q) $Mg + H_2SO_4 \longrightarrow MgO_4 + H_2S$

R) $Mg + H_2SO_4 \longrightarrow MgS + H_2O + O_3$

S) $Mg + H_2SO_4 \longrightarrow MgSO_4 + H_2$

1. P
2. Q
3. R
4. S

Q: 3 **Shown below is a table with the pH values of some unknown substances.**

Substances	pH
P	12.4
Q	7.0
R	1.1
S	10.3

The reaction of which of these two substances is an example of a neutralization reaction?

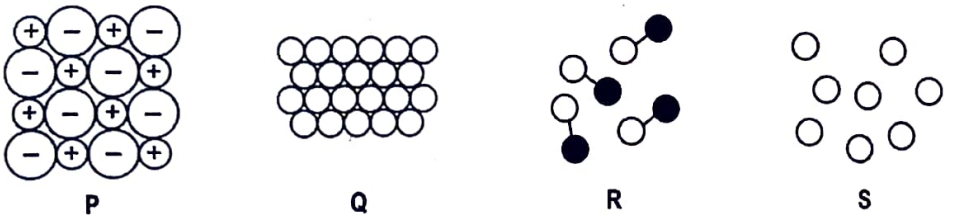
1. P with Q
2. P with R
3. P with S
4. Mixing any of them would be a neutralization reaction.

Q: 4 **Corrosive chemicals refer to those chemicals which may cause serious injuries on prolonged contact with skin. The corrosive symbol, as shown below, can be found on which of the following chemicals in a lab?**

P. a bottle of hydrochloric acid
Q. a bottle of distilled water
R. a bottle of sodium hydroxide

1 only P **2** only Q **3** only P and R **4** all - P, Q and R

Q: 5 **Which one of the following structures represents an ionic/electrovalent compound?**



1 only P **2** only Q
3 only P and S **4** all - P, Q, R and S

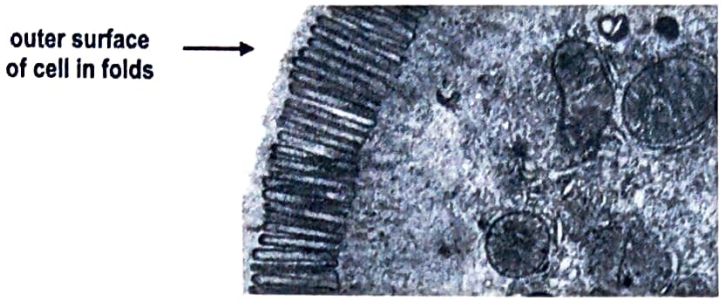
Q: 6 **Mixing which of the following metals is likely to form an amalgam?**

1 copper and zinc **2** gold and silver
3 tin and mercury **4** steel and chromium

Q: 7 **What is the green deposit formed during the corrosion of copper in moist air?**

1 copper oxide **2** copper sulphide
3 copper sulphate **4** basic copper carbonate

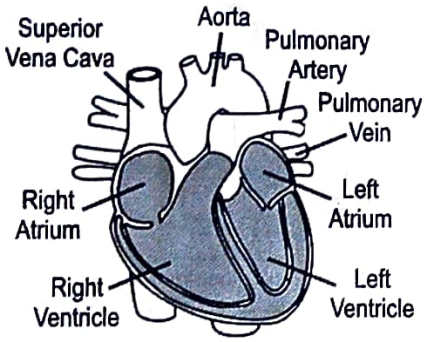
Q: 8 **The outer surface of the intestinal cells is folded into finger-like projections as shown in the figure here. This helps in increasing the absorption of nutrients by the cell.**



The way in which these finger-like projections help the intestine in its function is similar to which of the following?

1. Larger the mop, quicker it dries up the floor.
2. More the population of a city, denser it will be.
3. Smaller the holes in a sieve, better will be the filtration.
4. Longer the tube, longer the water takes to come out of it.

Q: 9 **Blood travels from the heart to different parts of the body. Shown here is a figure of the heart.**



From which part is the blood pumped out into the aorta which transports blood to different parts of the body?

1. right atrium
2. right ventricle
3. left atrium
4. left ventricle

Q: 10 **Addition of iodine to a bleached leaf turns it blue-black in colour. What does this test indicate?**

1. the presence of chlorophyll
2. the presence of water
3. the presence of starch
4. the presence of carbon dioxide

Q: 11 **Mira came across a plant in her garden which folded its leaves when touched. Her gardener told her it was a 'touch-me-not' plant and responds to external touch by_____.**

1. a change in the amount of water in the cells
2. a change in temperature as a result of touch
3. contraction in specialised touch sensitive tissues
4. transfer of mechanical impulses from the cells

Q: 12 **Actions or responses which are in our conscious control are called voluntary action/responses and those that are not in our control are called involuntary actions/responses.**
Which of the following is a voluntary response?

1. change in the size of the pupil
2. pumping of the heart
3. raising a hand
4. sweating

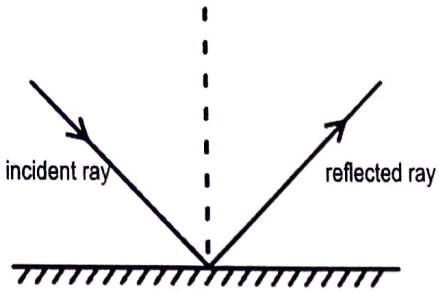
Q: 13 **A bacteria is a one-celled organism. How does it reproduce?**

1. by cell division
2. by fusing with another cell
3. by forming gametes and releasing them to the surroundings
4. by forming a bud that will eventually grow into another cell

Q: 14 **Around the time of ovulation, how does the uterus prepare itself to receive and nourish a newly formed embryo if fertilization occurs?**

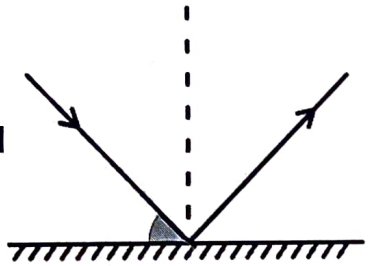
1. The uterus wall thickens with blood.
2. The uterus produces new ovum or egg cell.
3. The blood vessels in the uterus wall form a placenta.
4. The uterus creates a sac filled with amniotic fluid.

Q: 15 **The diagram below shows a ray of light being reflected off a plane mirror. The normal is shown by the dotted line.**



There are some angles below marked in grey. Which one of them correctly shows the <u>angle of incidence</u> ?

1



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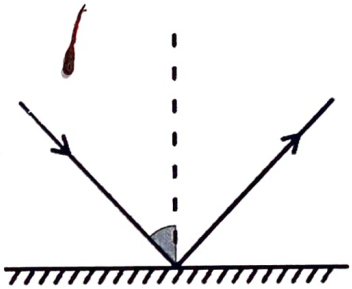

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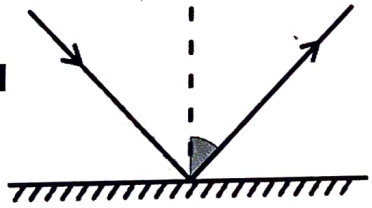

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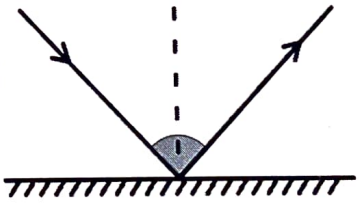
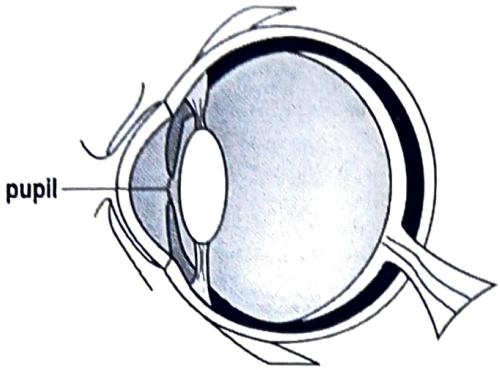


Q: 16 Shown here is the structure of the inner parts of the human eye.



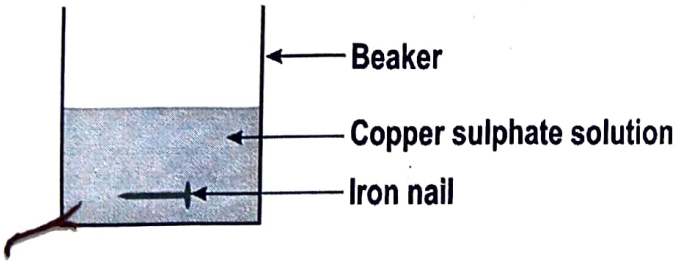
The part marked as the pupil is an opening. What could most likely be its function?

1. It filters the light entering the eyes.
2. It permits light rays to enter the eye.
3. It emits light rays from the eye to the object.
4. It bends the light rays causing them to meet and form an image.

SECTION A - AR

Q: 17 Two statements are given below. One is labelled Assertion (A) and the other is labelled Reason (R).

Assertion (A): Copper can be deposited on iron by dropping an iron nail into copper sulphate solution. (as shown in the figure below.)



Reason (R): Iron is more reactive than copper.

Choose the option that correctly describes statements A and R.

1. Both A and R are true and R is the correct explanation for A.
2. Both A and R are true and R is NOT the correct explanation for A.
3. A is true but R is false.
4. A is false but R is true.

Q: 18 **Two statements are given - one labelled Assertion (A) and the other labelled Reason (R). Read the statements carefully and choose the option that correctly describes statements A and R.**

Assertion (A): The conduction of nerve impulses is regulated by chemicals found in neurons.
Reason (R): When information is acquired at the dendritic tip, a chemical reaction occurs which creates an electric impulse.

Which of the following is correct?

1. Both A and R are true and R is the correct explanation for A.
2. Both A and R are true and R is not the correct explanation for A.
3. A is true but R is false.
4. A is false but R is true.

Q: 19 **Two statements are given below - one labeled Assertion (A) and the other labeled Reason (R).**

Assertion (A): Plants produced by vegetative propagation are genetically similar to the parent plant.

Reason (R): Vegetative reproduction does not involve the fusion of male and female germ cells.

Which of the following is correct?

1. Both A and R are true, and R is the correct explanation of A.
2. Both A and R are true, but R is not the correct explanation of A.
3. A is true, but R is false.
4. A is false, but R is true.

Q: 20 **Two statements are given - one labelled Assertion (A) and the other labelled Reason (R). Read the statements carefully and choose the option that correctly describes statements A and R.**

Assertion (A): The shorter the focal length of a convex lens, the higher is its power.
Reason (R): A convex lens of longer focal length causes a greater degree of convergence of light rays.

1. Both A and R are true and R is the correct explanation for A.
2. Both A and R are true but R is not the correct explanation for A.
3. A is true but R is false.
4. A is false but R is true.

SECTION B

Q: 21 **(a) How is sodium an exception to the general physical properties of metals?**
(b) How is iodine an exception to the general physical properties of nonmetals?

Q: 22 Write the chemical reaction taking place during aerobic respiration and anaerobic respiration in plants. [2]

Q: 23 ***Attempt either option A or B.*** [2]

A. Explain in two steps how auxin helps a plant bend towards light?

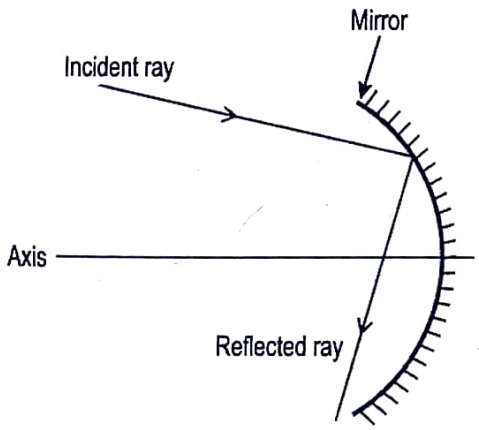
OR

B. Give any one point of difference between the functions of gibberellins and abscisic acid in plants.

Q: 24 Goitrogens are substances that reduce the body's ability to absorb iodine. This affects the production of an important hormone. Goitrogens are found in foods like cabbage, cauliflower, soya beans. [2]

(a) Name the organ and the hormone most likely to be affected by including too many goitrogenic foods in our diet?
(b) What body functions are affected by a deficiency of the hormone referred to in (a)?

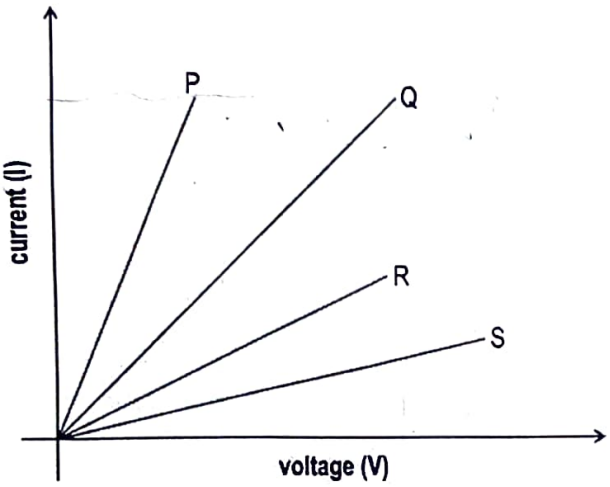
Q: 25 The diagram below shows a ray of light incident on a concave mirror and the reflected ray. [2]



(a) Copy the diagram above and draw the normal at the point of incidence.
(b) State the relationship of the point at which the normal intersects the axis with the focal length of the mirror.

Q: 26 ***Attempt either A or B.*** [2

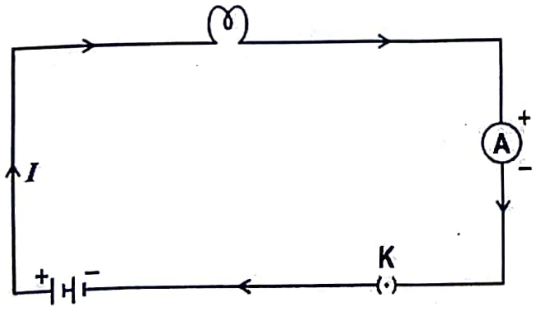
A. The graph shows current-voltage relationships for four different resistors, P, Q, R, and S.



(i) Rank the resistors in order of increasing resistance.
(ii) If all four resistors were connected to the same 12V power supply, which resistor would get hot the fastest? Justify your answer.

OR

B. The circuit diagram shows a simple electrical circuit containing a cell (H), a bulb (the looped component), an ammeter (A), and a switch (K).



When the switch K is closed, the ammeter reads a steady current of 0.5 A. The cell has an EMF of 9.0 V, and the circuit operates for exactly 2 minutes.

(i) Calculate the total electric charge that flows through the light bulb during this 2-minute period.
(ii) Calculate the work done by the cell to move this charge around the complete circuit.

SECTION C

Q: 27 Study the chemical reaction given below: [3]

$Fe_2 + 3O_2 \rightarrow Fe_2O_3$

A. Identify any ONE error in this incorrectly balanced equation.
B. Write the correct balanced equation for the formation of Fe_2O_3.
C. Why is this reaction considered harmful for the economy?

Q: 28 *Attempt either option A or B.* [3]

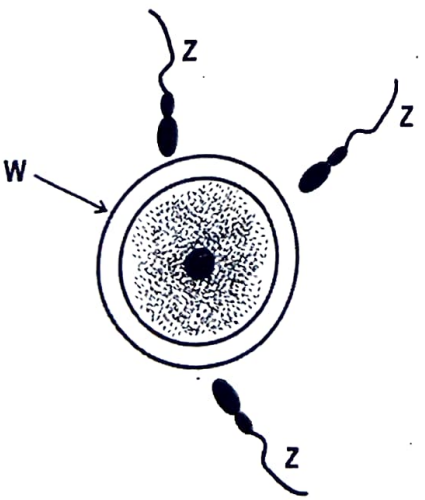
A. (i) Give the steps along with the chemical reaction to obtain Lead from Lead sulphide. [2 marks]
(ii) What will be the state of the obtained metal after the above process? Justify. [1 mark]

OR

B. Magnesium metal is extracted from molten magnesium chloride by electrolysis. (i) Why can't magnesium be extracted by heating its oxide with carbon? [1 mark]
(ii) Explain why molten magnesium chloride is used instead of aqueous magnesium chloride for the electrolytic extraction of magnesium. [1 mark]
(iii) During the electrolysis, what products will be obtained at each electrode? [1 mark]

Q: 29 Irfan was walking barefoot in his garden and stepped on a sharp thorn. Draw and explain how the reflex action works in this scenario. [3]

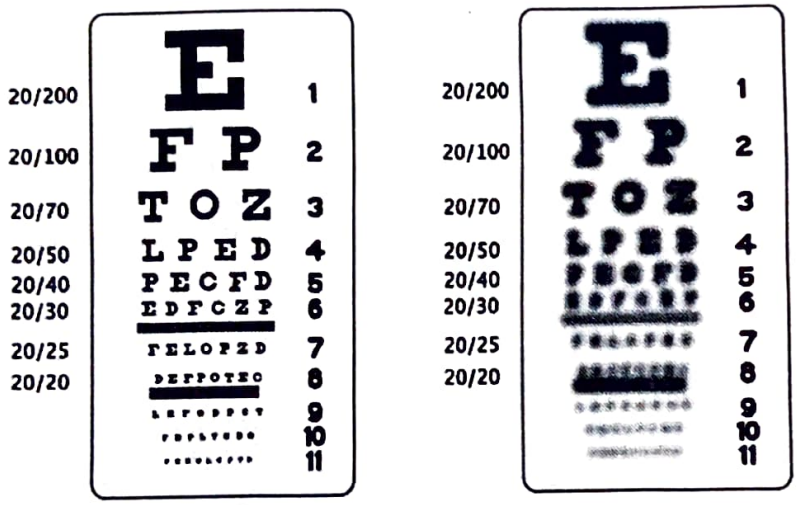
Q: 30 Answer the questions based on the diagram representing sexual reproduction shown below. [3]



(a) Identify the two types of structures shown in the diagram.
(b) Define the event that most likely occurs following the stage shown above.

Q: 31 **(a) Explain how ciliary muscles adjust the curvature and focal length of the eye to see objects at different distances.** **[3]**
(b) Mention any one natural process that affects the process mentioned in (a) and how it does so?

Q: 32 **Jatin was having some vision problems so he visited an ophthalmologist. His vision was tested using the Snellen chart. The image below shows Jatin's vision compared to that of a person with normal vision.** **[3]**



(a) What vision problem Jatin is most likely to have?
(b) After analyzing Jatin's Snellen test results, the ophthalmologist prescribed corrective lenses. Describe the nature of the lens.
(c) Draw a labelled ray diagram to show how the prescribed lens corrects the defect.

Q: 33 **(a) Why does light behave differently when travelling through a prism and a rectangular glass slab, with the same refractive index?** **[3**
(b) Draw a ray diagram of Newton's experimental setup, which helped him realise that white light is made of multiple colours.

SECTION D

Q: 34 Sneha's chemistry teacher gave her four unlabeled bottles containing different solutions: a strong acid, a weak acid, a strong base, and distilled water. To identify them safely, she decided to conduct a series of tests. First, she carefully diluted small samples of each solution. Then she tested electrical conductivity and measured pH using a pH meter. She recorded her observations in a table: [4]

Solution	pH Value	Electrical Conductivity (mS/cm) at 0.1M
P	1.0	39.1
Q	2.0	1.6
R	7.0	0.0001
S	13.0	22.7

A. When Sneha diluted 100 mL of solution P by adding 100 mL of water, which statement is CORRECT about the resulting solution?
(i) The pH will decrease.
(ii) The pH will increase.
(iii) The pH will remain the same.

B. Later that day, Sneha's classmate wanted to dilute concentrated sulfuric acid. Explain four important steps she should take to safely dilute the acid.

OR

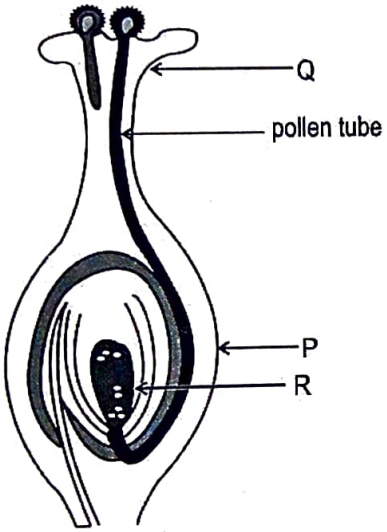
Sneha added solution P to water in a beaker. She noticed that on mixing the substance in water, the beaker became warm to the touch. Sneha concluded that the liquid added was definitely a strong acid. Is her conclusion valid? Explain your answer.

C. Which statement BEST explains the reason for the difference in electrical conductivity between HCl and $C_6H_{12}O_6$ solutions of the same concentration?
(i) HCl has more molecules than $C_6H_{12}O_6$ in solution.
(ii) HCl molecules are smaller than $C_6H_{12}O_6$ molecules.
(iii) HCl produces ions in solution while $C_6H_{12}O_6$ remains as molecules.

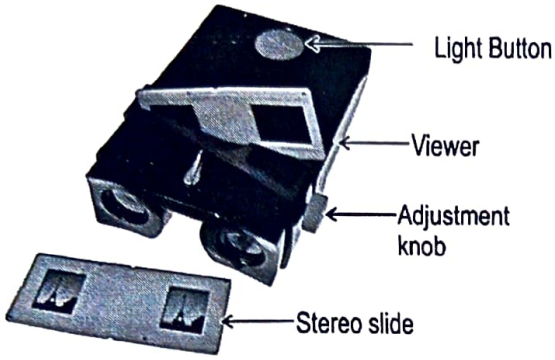
Q: 35 **Shreel planted 4 plants in her greenhouse - papaya, watermelon, hibiscus and mustard. In order to bring about fruit formation, she set up a big fan inside.** [4

Attempt either sub-part A or B.

A. She noticed that only half of the Papaya plants formed fruit. Explain her observation.
OR
B. If pollen from hibiscus landed on a mustard flower, would fertilisation occur? Why or why not?
C. How could the fan help in fruit formation?
D. The diagram below shows the female reproductive whorl of the hibiscus plant during fertilisation:
Shreel noticed that for fruit formation, the pollen had to fall on part Q. Identify Q and explain how it is adapted for this function.



Q: 36 **The device shown below is a handheld stereoscopic slide viewer manufactured by the David White Company in the 1950s, known as the Stereo Realist viewer.** **[4]**



The viewer consists of two identical optical viewing ports, each containing a single lens. The images are printed on 35 mm transparency film. The red button on the body illuminates the slides when pressed, and the side adjustment knob allows the user to change the distance between the lenses and the slides within a range of 2-10 cm. At the correct position, the device creates a virtual, upright, and magnified image.

A. What type of lens must this viewer use? Justify your answer.
B. The lenses used in the Stereo Realist viewer have an optical power of +25 diopters. Calculate the focal length of these lenses in centimetres.

Attempt either subpart C or D.

C. If the average person can focus clearly on objects no closer than 25 cm from their eyes, calculate the minimum distance between the slide and lens to get a clear image.

OR

D. If the slides are placed 5cm from the lens, explain the nature of the image that the observer would see. Explain without any calculations.

SECTION E

Attempt either option A or B.

A. Study the observations in the table given below and answer the questions that follow.

Metal	Reaction with Cold Water	Reaction with Steam	Hydrogen Gas Produced (mL/g) with Steam	Temperature Change with Cold Water
P	No visible reaction	No visible reaction	0	No change
Q	No visible reaction with cold water	Slow reaction, metal surface darkens	198	No change
R	No visible reaction	No visible reaction	0	No change
S	Violent reaction, metal melts and moves across the surface	Too dangerous to test	Not measurable	+ 86°C
T	No visible reaction with cold water	Very slow reaction, slight darkening	43	No change
U	No visible reaction with cold water	Moderate reaction, white powder forms	462	No change
V	Steady reaction, bubbles form, metal gradually dissolves	Too reactive for the steam test	Not measurable	+ 42°C

(a) Arrange metals P, Q, R, S, T, U, and V in order of decreasing reactivity.
(b) What type of reaction is occurring when metals react with water?
(c) Explain, using a chemical reaction, the formation of white powder when metal U reacts with steam.
(d) A student experiments by placing small samples of metals S and V in water. Describe two safety precautions the student should take when performing this experiment and explain why each is necessary.
(e) Explain why S float on water even though they are metals?

OR

B. Study the electronic configurations of the elements given below and answer the questions that follow.

Q: 37 [5]

Element	Electronic Configuration
P	2,8,1
Q	2,8
R	2,8,2
S	2,6
T	2,8,4

(a) Identify the elements that would combine to form an ionic compound of the formula X_2Y.
(b) Using a dot and cross model, show the formation of the ionic compound mentioned in (i).
(c) A student decided to add the compound identified to water and test its nature. What is the student likely to find?
(d) One of the given elements is least likely to form bonds with any of the other given elements to form a compound. Identify the element and justify the lack of bonding.
(e) Which of the given elements is likely to be a metal? Justify your answer.

Q: 38 [5]

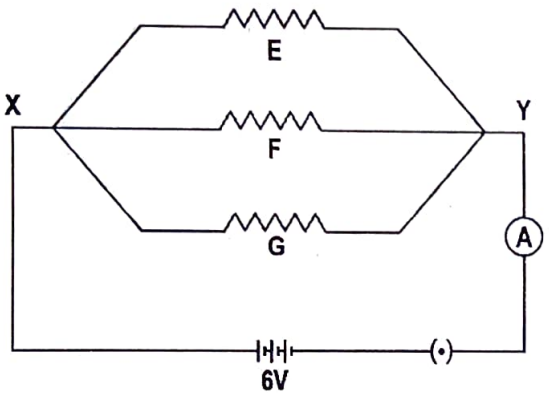
Pujara, a 37-year-old man, met with a car accident and injured his lower back. He experienced severe pain and difficulty passing urine. The doctors advised temporary dialysis until he heals completely. The dialysing machine contains many tubes with a semi-permeable lining, suspended in a tank filled with dialysing fluid. The dialysing fluid has the same osmotic pressure as blood. The patient's blood is passed through these tubes. During this passage, the waste products from the blood pass into the dialysing fluid. The purified blood is pumped back into the patient.

Attempt either question A or B.

A.
(i) Why did Pujara need dialysis?
(ii) How does the dialysing fluid help in the removal of wastes from Pujara's blood?
(iii) Mention two limitations of Pujara depending on dialysis as a long-term solution.
OR
B.
(i) Name the part of Pujara's kidney which usually carries out the function of the dialysis machine.
(ii) State two ways in which dialysis is different from the normal functioning of his kidney.
(iii) What would happen if the osmotic pressure of the dialysing fluid were not the same as that of his blood?

Q: 39 ***Attempt either option A or B.*** **[5]**

A. Study the circuit diagram shown below. The circuit shows three resistors, E, F, and G, connected in parallel between points X and Y. The circuit includes a 6V battery and an ammeter A. The resistance values are: E = 12Ω, F = 6Ω, and G = 4Ω.



(i) Calculate the total current flowing through the circuit.
(ii) Determine the potential difference across each resistor.
(iii) Calculate the power dissipated as heat in resistor F.

OR

(B) A manufacturing plant operates two industrial heaters for its production processes. The operating data for these heaters is shown in the table below:

Heater ID	Power Rating (kW)	Daily Operation Time (hours)	Maintenance Downtime (days/month)
Heater A	28	16	3
Heater B	35	12	2

The industrial electricity rates are Rs 9 per kilowatt-hour.

(i) Calculate the total electrical energy consumed by both heaters in one month (30 days), accounting for their respective maintenance downtimes.
(ii) Calculate the annual electricity cost for operating each heater and their combined cost.
(ii) If the electricity rates increase to Rs 12 per kilowatt-hour next year, calculate the projected percentage increase in the annual operating cost for both heaters combined.

End of Questions in Paper