PRE-BOARD – 2

Max. Marks: 80 **BVP/X/SCIENCE/2022-23**

Time Allowed: 3 hours

General Instructions:

i. ***This question paper consists of 39 questions in 5 sections.***

ii. ***All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.***

iii. ***Section A consists of 20 objective type questions carrying 1 mark each.***

iv. ***Section B consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should in the range of 30 to 50 words.***

v. ***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***

vi. ***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.***

vii. ***Section E consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.***

SECTION – A

Q1. 10 mL of a solution of NaOH found to be completely neutralised by 8 mL of given solution of HCl. If we take 20 mL of same solution of NaOH, the amount of HCl solution (the same solution as before) required to neutralise it, will be: 1

(*a*) 4 mL (*b*) 8 mL (*c*) 12 mL (*d*) 16 mL

Q2. What happens when dilute hydrochloric acid is added to iron filings? Tick the correct answer. 1

(*a*) Hydrogen gas and iron chloride are produced. (*b*) Chlorine gas and iron hydroxide are produced.

(*c*) No reaction takes place. (*d*) Iron salt and water are produced.

Q3. Barium chloride on reacting with ammonium sulphate forms barium sulphate and ammonium chloride. Which of the following correctly represents the type of the reaction involved? 1

I. Displacement reaction II. Precipitation reaction

III. Combination reaction IV. Double displacement reaction

(*a*) I only (*b*) II only (*c*) IV only (*d*) II and IV

Q4. Study the following table and choose the correct option: 1

	Salt	Parent Acid	Parent Base	Nature of Salt
(*a*)	Sodium Chloride	HCl	NaOH	Base
(*b*)	Sodium Carbonate	H_2CO_3	NaOH	Neutral
(*c*)	Sodium Sulphate	H_2SO_4	NaOH	Acidic
(*d*)	Sodium Acetate	CH_3COOH	NaOH	Basic

Q5. The correct order of increasing chemical reactivity is— 1

(*a*) Zn < Fe < Mg < K (*b*) Fe < Mg < Zn < K (*c*) Fe < Mg < K < Zn (*d*) Fe < Zn < Mg < K

Q6. In the given reaction, alkaline $KMnO_4$ acts as 1

$$CH_3CH_2OH \xrightarrow{\text{Alkaline } KMnO_4 + \text{heat}} CH_3COOH$$

(*a*) reducing agent (*b*) oxidising agent (*c*) catalyst (*d*) dehydrating agent

Q7. Acetic acid was added to a solid (X) kept in a test tube. A colourless and odourless gas was evolved. The gas was passed through lime water which turned milky. It was concluded that. 1

(*a*) Solid X is sodium hydroxide and the gas evolved is CO_2

(*b*) Solid X is sodium bicarbonate and the gas evolved is CO_2

(*c*) Solid X is sodium acetate and the gas evolved is CO_2

(*d*) Solid X is sodium chloride and the gas evolved is CO_2

Q8. The correct statements with reference to single celled organisms are 1

(I) Complex substances are not broken down into simpler substances.

(II) Simple diffusion is sufficient to meet the requirement of exchange of gases.

(III) Specialised tissues perform different functions in the organism.

(IV) Entire surface of the organism is in contact with the environment for taking in food.

(*a*) (I) and (III) (*b*) (II) and (III) (*c*) (II) and (IV) (*d*) (I) and (IV)

Q9. In a synapse, chemical signal is transmitted from

(*a*) dendritic end of one neuron to axonal end of another neuron

(*b*) axon to cell body of the same neuron

(*c*) cell body to axonal end of the same neuron

(*d*) axonal end of one neuron to dendritic end of another neuron

Q10. Offspring formed by asexual method of reproduction have greater similarity among themselves because 1

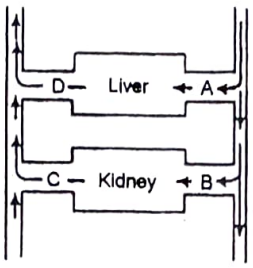
(I) asexual reproduction involves only one parent (II) asexual reproduction does not involve gametes

(III) asexual reproduction occurs before sexual reproduction

(IV) asexual reproduction occurs after sexual reproduction

(*a*) (I) and (II) (*b*) (I) and (III) (*c*) (II) and (IV) (*d*) (III) and (IV)

Q11. The diagram given below represents the liver, kidney and some associated blood vessels. Identify the vessel from the labelled parts A-D in which the blood will contain the lowest concentration of urea. 1



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

Q12. Two pea plants one with round green seeds (RRyy) and another with wrinkled yellow (rrYY) seeds produce F_1 progeny that have round, yellow (RrYy) seeds. When F_1 plants are selfed, the F_2 progeny will have new combination of characters. Choose the new combination from the following. 1

(*i*) Round, yellow (*ii*) Round, green (*iii*) Wrinkled, yellow (*iv*) Wrinkled, green

(*a*) (*i*) and (*ii*) (*b*) (*i*) and (*iv*) (*c*) (*ii*) and (*iii*) (*d*) (*i*) and (*iii*)

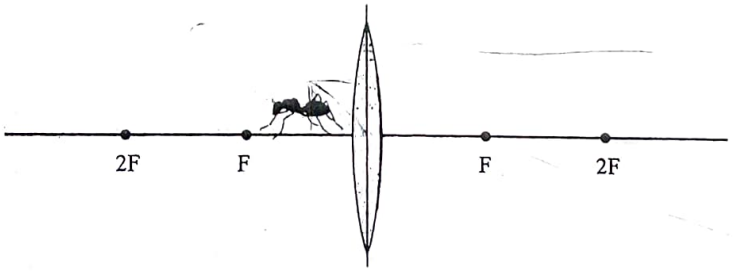
Q13. Stablizers are used to protect electrical devices from 1

(*a*) short circuit (*b*) overloading (*c*) overvoltage (*d*) Induced Current

Q14. Two conducting wires of the same material and of equal lengths and equal diameter are first connected in series and then in parallel in a circuit across the same potential difference. The ratio of heat produced in series and parallel combinations would be 1

(*a*) 1:2 (*b*) 2:1 (*c*) 1:4 (*d*) 4:1

Q15. An ant was in front of a convex lens as shown below. 1



Which of the following shows the image of the ant observed through the convex lens?

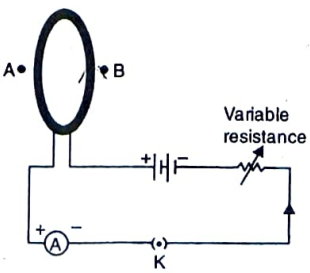
(*a*)  (*b*)  (*c*)  (*d*) 

Q16. A circular loop placed in a plane perpendicular to the plane of paper carries a current when the key is ON. The current as seen from points A and B (in the plane of paper and on the axis of the coil) is anti clockwise and clockwise respectively. The magnetic field lines point from B to A. The N-pole of the resultant magnet is on the face close to 1

(*a*) A (*b*) B

(*c*) A if the current is small, and B if the current is large

(*d*) B if the current is small and A if the current is large



17 to 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**

Q17. Assertion: In electrolysis of water volume of hydrogen is twice the volume of oxygen.
Reason: H_2 gas is liberated at cathode and O_2 at anode. 1

Q18. Assertion: Haemoglobin is the respiratory pigment in human beings.
Reason: It transports oxygen in the human body. 1

Q19. Assertion: Dominant traits express itself with or without the presence of recessive trait.
Reason: Recessive trait can express itself only in absence of dominant trait. 1

Q20. Assertion: Earth wire should be of green insulation.
Reason: Main fuse is connected with the neutral wire. 1

SECTION – B

Q21. In a monohybird cross between tall pea plants denoted by TT and short pea plant by tt, Sehaj Anant obtained only tall plants denoted by Tt in F_1 generation. However in F_2 generation she obtained both tall and short plants. Using the above information explain the law of dominance. 2

Q22. Explain how mercury is extracted from its sulphide ore, Cinnabar. Give equations for the reaction involved. 2

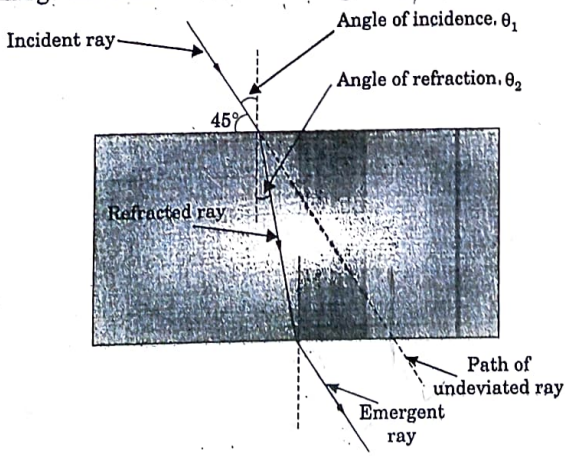
Q23. Sex determination in man depends upon 23rd pair of chromosomes, called the sex chromosomes. If it were a homologous pair-XX, it would be a female. If it were a heterologous pair – XY, it would be a male. Based on this statement, answer these questions: 2

(*a*) How many types of eggs/ova and how many type of sperms female and male human being will produce respectively ?

(*b*) Which parent's contribution of sex chromosomes determines sex of the child?

Q24. Assume you are a veterinary surgeon and you removed a good length of small intestine of a bear that was suffering from a intestinal tumour. Now, would you suggest a plant based or meat based diet for bear after its recovery? Give reason for your answer. 2

Q25. The diagram shows a ray of light entering a glass of refractive index 1.41 at an angle of incidence of 45°. By how many degrees light ray change the direction while entering the glass? 2



OR

Sudha finds out that a sharp image of the window pane of her science laboratory is formed at a distance of 15 cm from the lens. She now tries to focus the building visible to her outside the window instead of the **window pane** without disturbing the lens. In which direction will she move the screen to obtain the sharp image of the building? What is the approximate focal length of this lens?

Q26. Accumulation of harmful chemicals in our body can be avoided. Explain how this can be achieved. 2

OR

Energy flow is unidirectional in food chain? Explain.

SECTION – C

Q27. A reddish brown metal 'X' does not react with dilute sulphuric acid but reacts with conc. H_2SO_4 on heating and liberates a pungent smelling gas (Y) and the solution becomes blue in colour 'Z'. Identify 'X', 'Y' and 'Z' and write the balanced chemical equation involved. 3

Q28. Suggest a method of reduction for the following metals during the metallurgical process.

(*a*) Metal 'A' with one of the last position in the reactivity series.

(*b*) Metal 'B' gives vigorous reaction even with cold water and air.

(*c*) Metal 'C' which is kept in the middle of reactivity series.

Q29. Design an activity to show that CO_2 is produced during breathing. **3**

OR

A variegated leaf with green and yellow patches in used for an experiment to prove that chlorophyll is required for photosynthesis. Before the experiment the green portions (A), and the pale yellow portions (B), are observed. What will be the colour of 'A' just before and after the starch test? Also write the equation of photosynthesis and mark, as well as validate from which molecule the by-product is obtained.

Q30. The power of a combination of two lenses 'X' and 'Y' is 4 D. If the focal length of 'X' is 12 cm **3**

(*a*) Calculate the focal length of lens 'Y'. (*b*) Determine the nature of lens 'Y'.

Q31. The image of a candle flame placed at a distance of 30 cm from a mirror is formed on a screen placed in front of the mirror at a distance of 60 cm from its pole. What is the nature of the mirror? Find its focal length. If the height of the flame is 2.4 cm, find the height of its image. State whether the image formed is erect or inverted. **3**

Q32. (*a*) Electric fuse is an important component of all domestic curcuit, why?

(*b*) An electric oven of rating 2 kW, 220 volt is operated on domestic circuit that has a current rating of 5A. What results do you expect? Explain. **3**

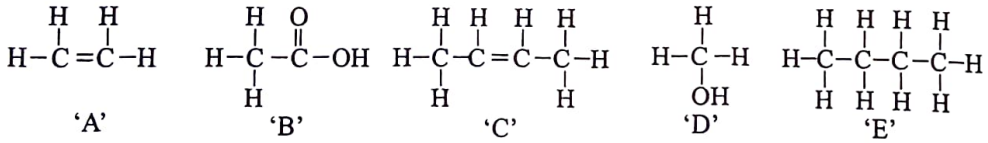
OR

Can a freely suspended current carrying solenoid stay in any direction? Justify your answer. What will happen when the direction of current in the solenoid is reversed? Explain

Q33. Plastic cups were used to serve tea in trains in early days- these could be returned to the vendors, cleaned and reused. Later,Kulhads were used instead of plastic cups. Now, paper cups are used for serving tea. What are the reasons for the shift from Plastic to Kulhads and then finally to paper cups? **3**

SECTION – D

Q34. The structural formulae of five compounds are given below **5**



'A' 'B' 'C' 'D' 'E'

(*a*) Which two compounds belong to the same homologous series?

(*b*) Which compound belongs to the same homologous series as ethanol?

(*c*) Which compound on hydrogenation produces E?

(*d*) Which compound when dissolved in water turns blue litmus red?

(*e*) What will be the compound formed by the reaction of 'B' with 'D'? Write the chemical reaction.

OR

Soaps and detergents are both types of salts. State the difference between the two. Write the mechanism of the cleansing action of soaps. Why do soaps not form lather (foam) with hard water? Mention any two problems that arise due to the use of detergents instead of soaps.

Q35. What is vegetative propagation? Give examples of plants which can be propagated by their: **5**

(*a*) Stem (*b*) Roots (*c*) Leaves

OR

(*a*) Draw the diagram of female reproductive system and match and mark the part (s):

(*i*) Where block is created surgically to prevent fertilization.

(*ii*) Where CuT is inserted?

(*iii*) Inside which sperms can be placed.

(*b*) Why do more and more people prefer to use condoms? What is the principle behind use of condoms?

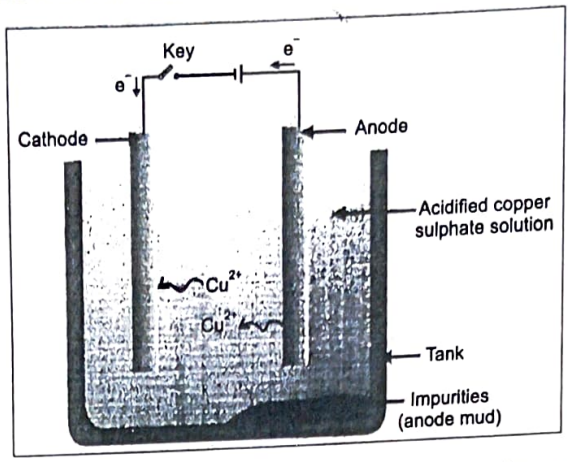
Q36. What is meant by magnetic force? Name and explain the rule to determine the direction of force experienced by a current carrying conductor in a magnetic field. How does this force gets affected on: **5**

(*a*) doubling the magnitude of current. (*b*) reversing the direction of flow of current.

(*c*) reversing the direction of magnetic field.

SECTION – E

7. Many metals, such as copper, zinc, tin, nickel, silver, gold, etc., are refined electrolytically. In this process, the impure metal is made the anode and a thin strip of pure metal is made the cathode. A solution of the metal salt is used as an electrolyte. The apparatus is set up as shown in figure. On passing the current through the electrolyte, the pure metal from the anode dissolves into the electrolyte. An equivalent amount of pure metal from the electrolyte is deposited on the cathode. The soluble impurities go into the solution, whereas the insoluble impurities settle down at the bottom of the anode and are known as anode mud.



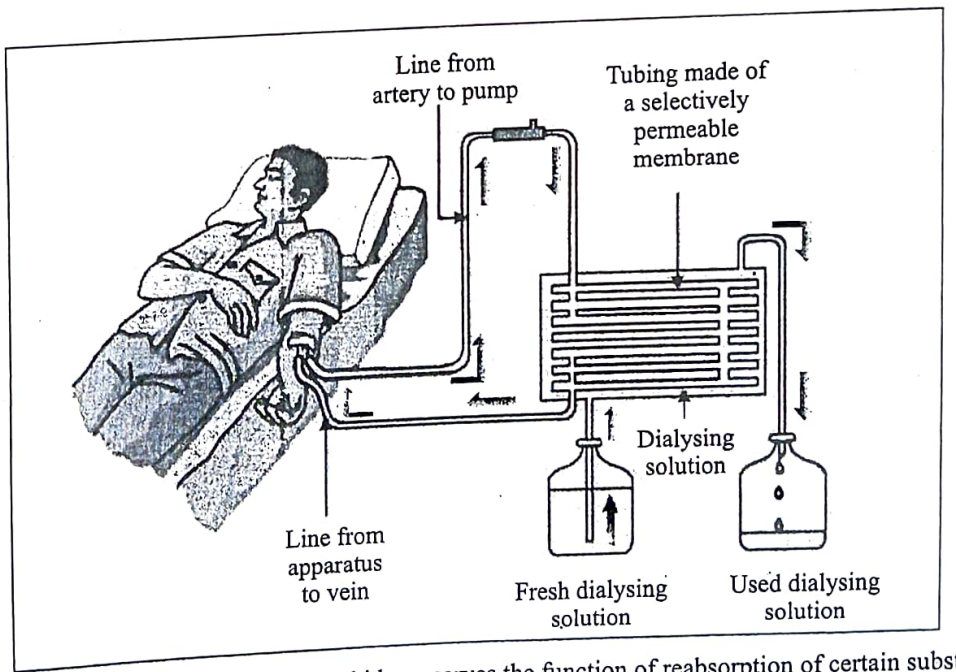
(*a*) What happens if by mistake an impure rod of Cu is made the cathode and a pure metal strip is made the anode?

(*b*) Define cathode in the electrolytic refining.

OR

Which type of metals require to be refined by electrolytic refining and why?

8. The figure shown below represents a common type of dialysis called as Haemodialysis. It removes waste products from the blood. Such as excess salts, and urea which are insufficiently removed by the kidney in patients with kidney failure. During the procedure, the patient's blood is cleaned by filtration through a series of semi-permeable membranes before being returned to the blood of the patient. On the basis of this, answer the following questions: **4**



(*a*) Which part of the nephron in human kidney, serves the function of reabsorption of certain substances?

(*b*) Name the things which are present in high concentration in the 'used dialysing' solution.

(*c*) What are the functions of Artificial Kidney?

OR

How an artificial kidney works?

Q39. Study these tables related to refractive index and answer the questions that follow:

Material medium	Refractive index
Air	1.0003
Ice	1.31
Water	1.33
Kerosene	1.44
Crown glass	1.52
Rock salt	1.54
Dense flint glass	1.65
Diamond	2.42

(*a*) What is the value of the ratio, $\frac{\text{Speed of light in air}}{\text{Speed of light in water}}$?

(*b*) Which solid in the table is optically rarer than water?

(*c*) What happens to ray, when it enters a denser medium from rarer medium?

OR

What is the speed of light in crown glass?