

**O. P. JINDAL SCHOOL, SAVITRI NAGAR**  
**HALF YEARLY EXAMINATION (2023 – 2024)**

**Class: X**  
**Subject: Science**

**MM: 80**  
**Time: 3 Hours.**

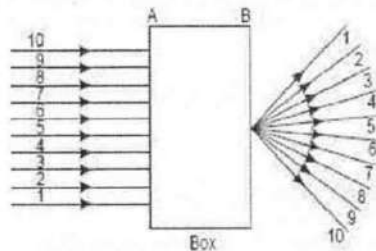
(Fifteen minutes extra will be given for reading the question paper.)

**General Instructions:**

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

**SECTION-A**

**Q1.** A beam of light is incident through the holes on side A and emerges out of the hole on the other face of the box as shown in the figure. Which of the following could be inside the box?



- (a) Concave lens                      (b) Rectangular glass slab                      (c) Prism                      (d) Convex lens

**Q2.** The ability of eye lens to adjust its focal length to form a sharp image of the object at varying distances on the retina is called

- (a) Power of observation of the eye                      (b) Power of adjustment of the eye  
(c) Power of accommodation of the eye                      (d) Power of enabling of the eye

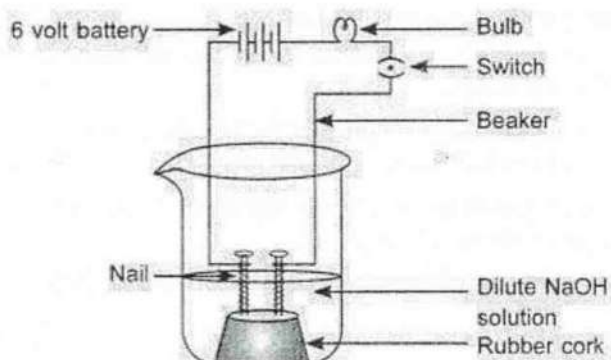
**Q3.** In a double displacement reaction such as the reaction between sodium sulphate solution and barium chloride solution:

- (a) exchange of atoms takes place                      (b) exchange of ions takes place  
(c) a precipitate is produced                      (d) an insoluble salt is produced

**Q4.** A substance 'X' is used in white-washing and is obtained by heating limestone in the absence of air. Identify 'X'.

- (a)  $\text{CaOCl}_2$                       (b)  $\text{Ca(OH)}_2$                       (c)  $\text{CaO}$                       (d)  $\text{CaCO}_3$

- Q5.** The process in which loss of water takes place in the form of water vapour through stomata is called-
- (a) transportation                      (b) transpiration                      (c) guttation                      (d) translocation
- Q6.** Which part of alimentary canal receives bile from the liver ?
- (a) stomach                      (b) small intestine                      (c) large intestine                      (d) oesophagus
- Q7.** What prevents backflow of blood inside the heart during contraction?
- (a) Valves                      (b) thick muscular walls of ventricles
- (c) Thin walls of atria                      (d) inner lining of the heart
- Q8.** The apparatus given in the adjoining figure was set up to demonstrate electrical conductivity.

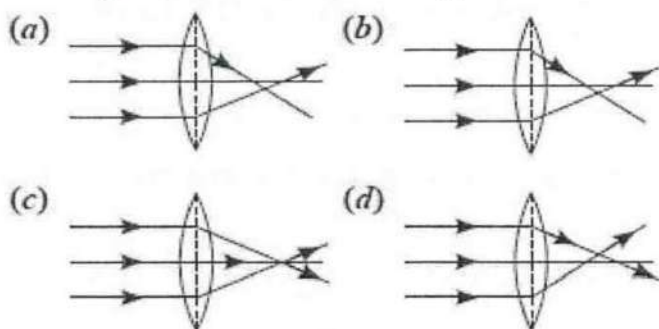


Which of the following statement(s) is (are) correct?

- (i) Bulb will not glow because electrolyte is not acidic.
- (ii) Bulb will glow because NaOH is a strong base and furnishes ions for conduction.
- (iii) Bulb will not glow because circuit is incomplete.
- (iv) Bulb will not glow because it depends upon the type of electrolytic solution.
- (a) (i) and (iii)                      (b) (ii) and (iv)                      (c) (ii) only                      (d) (iv) only
- Q9.** Which hormone is responsible for the development of female characteristics?
- (a) Adrenaline                      (b) Estrogen                      (c) Thyroxine                      (d) Adrenaline
- Q10.** Which of the following is not associated with growth of plant?
- (a) Auxin                      (b) gibberellins                      (c) cytokinin                      (d) abscisic acid
- Q11.** The clear sky appears blue because
- (a) blue light gets absorbed in the atmosphere.
- (b) Ultraviolet radiations are absorbed in the atmosphere
- (c) Violet and blue lights get scattered more than lights of all other colours by the atmosphere .
- (d) Light of all other colours is scattered more than the violet and blue colour lights by the atmosphere.

- Q12.** A piece of wire of resistance R is cut into five equal parts. These parts are then connected in parallel. If the equivalent resistance of this combination is R', then the ratio R/R' is :
- (a) 1/25                      (b) 1/5                      (c) 5                      (d) 25

**Q13.** The distance between the optical center and point of convergence is called focal length in which of the following cases?



**Q14.**  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ : In this Compound, the water molecule is called –

- (a) Pure water      (b) Water of crystallization      (c) Soda water      (d) none of these

**Q15.** The metals that float when treated with water are:

- (a) Manganese and sodium      (b) Sodium and calcium  
(c) Magnesium and sodium      (d) Magnesium and calcium

**Q16.** Which of the following can undergo a chemical reaction?

- (a)  $\text{MgSO}_4 + \text{Fe}$       (b)  $\text{ZnSO}_4 + \text{Fe}$       (c)  $\text{MgSO}_4 + \text{Pb}$       (d)  $\text{CuSO}_4 + \text{Fe}$

**Note:** Questions 17 to 20 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 but 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:** Zinc oxide is amphoteric in nature.

**Reason:** Zinc oxide reacts with both acids and bases.

**Q18.Assertion:** The resistivity of a substance does not depend on the nature of the substance and temperature.

**Reason:** The resistivity of a substance is a characteristic property of the material.

**Q19.Assertion:** Cerebrum acts as the main thinking part of brain.

**Reason:** Cerebrum is responsible for reasoning, speech, intelligence, sight, hearing, usage of information.

**Q20.Assertion:** Voltmeter is always connected in series in a circuit.

**Reason:** Voltmeter measures electric current in circuit.

### SECTION B ( 2 Marks Questions)

**Q21.** Why is it said that kidney help in the process of osmoregulation? Explain.

OR

Why is it necessary to separate oxygenated and deoxygenated blood in mammals and birds?

**Q22.** How can three resistors of resistances  $2\Omega$ ,  $3\Omega$ , and  $6\Omega$  be connected to give a total resistance of

- (i)  $4\Omega$ ,      (ii)  $1\Omega$

**Q23.** A wire of given material having length  $L$  and area of cross-section  $A$  has a resistance of  $4\ \Omega$ . What would be the resistance of another wire of the same material having length  $L/2$  and area of cross-section  $2A$

**Q24.** Draw a schematic diagram of a circuit consisting of a battery of three cells of  $2\text{ V}$  each, a  $5\ \Omega$  resistor, a  $8\ \Omega$  resistor, and a  $12\ \Omega$  resistor, and a plug key, all connected in series.

**OR**

Will current flow more easily through a thick wire or a thin wire of the same material, when connected to the same source? Why?

**Q25.** What is observed when carbon dioxide gas is passed through lime water?

(i) For a short duration?

(ii) For a long duration? Also write the chemical equations for the reactions involved.

**Q26** Write the chemical formula of Bleaching powder. How is bleaching powder prepared? For what purpose is it used in drinking water?

**OR**

When zinc metal is treated with a dilute solution of a strong acid, a gas is evolved, which is utilized in the hydrogenation of oil. Name the gas evolved. Write the chemical equation of the reaction involved and also write a test to detect the gas formed.

#### **SECTION -C (3 Marks Questions)**

**Q27.** Salt  $A$  is commonly used in bakery products on heating gets converted into another salt  $B$ , which is used to remove the hardness of water, and a gas  $C$  is evolved. The gas  $C$ , when passed through lime water, turns it milky. Identify  $A$ ,  $B$  and  $C$ .

**OR**

To a solution of sodium hydroxide in a test tube, two drops of phenolphthalein are added.

(i) State the colour change observed

(ii) If dil.  $\text{HCl}$  is added drop wise to the solution, what will be the colour change?

(iii) On adding few drops of  $\text{NaOH}$  solution to the above mixture the colour of the solution reappears. Why?

**Q28 .** When copper powder is heated in a China dish, the reddish brown surface of copper powder becomes coated with a black substance.

(i) Why has this black substance formed?

(ii) What is the black substance?

(iii) Write the chemical equation of the reaction that takes place.

(iv) How can the black coating on the surface be turned reddish brown?

**Q29.**(i) Which gland secretes digestive enzymes as well as hormones?

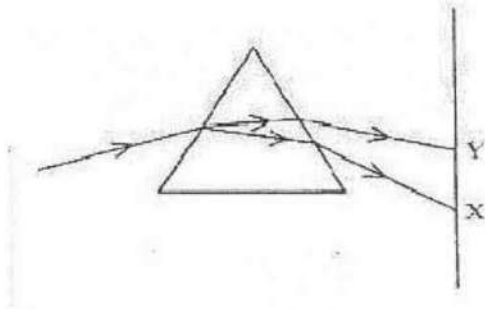
(ii) Pituitary gland is also known as the master gland. Why?

(iii) Name the sensory receptors found in the nose and on the tongue?

**Q30. Give reasons:**

- (i) Ventricles have thicker muscular walls than atria.
- (ii) Circulation of blood in aquatic vertebrates differs from those terrestrial vertebrates.
- (iii) Veins have valves whereas arteries do not.

**Q31.** In the figure given below, a narrow beam of white light is shown to pass through a triangular glass prism. After passing through the prism, it produces a spectrum XY on the screen.

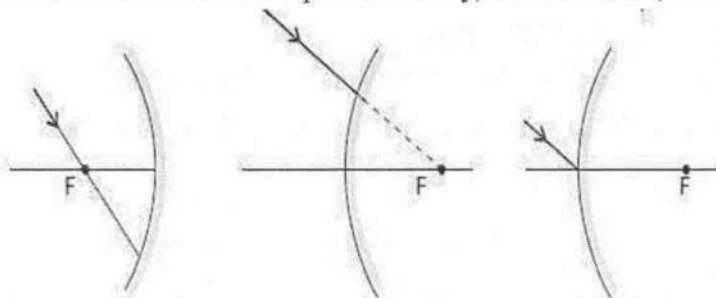


- (i) Name the phenomenon.
- (ii) State the colours seen at X and Y
- (iii) Why do different colours of white light bend at different angles through a prism?

**OR**

- (i) The distance of an object of height 6 cm from a concave lens is 20 cm. If its focal length is 10 cm, calculate the size and position of the image formed.
- (ii) Why is red used as the stopping light at traffic signals?
- (iii) State the function of each of the following parts of the human eye :
  - (a) Cornea
  - (b) Pupil

**Q32.** Draw the following diagram in which a ray of light is incident on a concave/convex mirror on your answer sheet. Show the path of this ray, after reflection, in each case



- Q33.(i)** Why is the flow of signals in a synapse from axonal end of one neuron to dendrite end of another neuron, but not the reverse ?
- (ii)** Which part of the brain maintains posture and equilibrium of the body?
- (iii)** What is meant by reflex action?

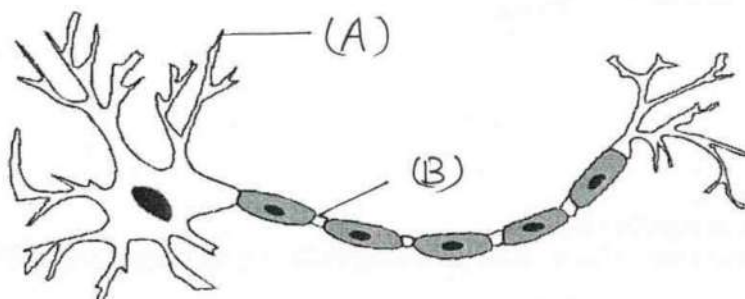
**SECTION- D (5 Marks Questions)**

- Q34.(i)** An ore of zinc metal on heating in air produces sulphur dioxide. Which process would you suggest for its concentration? Describe briefly any two steps involved in the conversion of this concentrated ore into related metal.
- (ii)** NaCl is not a conductor of electricity in solid-state, whereas it does conduct electricity in aqueous solution as well as in the molten state
- (iii)** A green layer is gradually formed on a copper plate left exposed to air for a week in a bathroom. What could this green substance be?

**OR**

- (i)** Show the formation of  $\text{Na}_2\text{O}$  by the transfer of electrons between the combining atoms.
- (ii)** Of the three metals, X, Y and Z. X react with cold water, Y with hot water and Z with steam. Identify X, Y and Z and also arrange them in order of increasing reactivity.
- (iii)** Metals like Na, K, Ca and Mg are never found in their free state in nature. Why?

**Q35**



- (i)** Name the parts labelled as A and B in the diagram given above.
- (ii)** Which part acquires the information in the neuron?
- (iii)** Through which part does the information travel?
- (iv)** In what form does the information travel?
- (v)** Where is the impulse converted into a chemical signal for onward transmission?

**OR**

- (i)** Define excretion.
- (ii)** Name the basic filtration unit present in the kidney.
- (iii)** Draw human excretory system and label the following organs which perform the following functions (a) Form urine (b) Is a long tube which collects urine from kidney (c) Stores urine until it is passed out

- Q.36.(i)** A current of 0.5 A is drawn by a filament of an electric bulb for 10 minutes. Find the amount of electric charge that flows through the circuit.
- (ii)** How much work is done in moving a charge of 2 C across two points having a potential difference 12 V?
- (iii)** Name a device that helps to maintain a potential difference across a conductor.

**OR**

An electric lamp of  $100 \Omega$ , a toaster of resistance  $50 \Omega$ , and water filter of resistance  $500 \Omega$  are connected in parallel to a 220 V source. What is the resistance of an electric iron connected to the same source that takes as much current as all three appliances, and what is the current through it? 100 J of heat are produced each second in a  $4 \Omega$  resistance. Find the potential difference across the resistor.

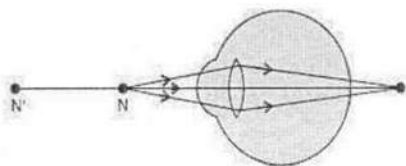
**SECTION -E (4 Marks Questions)**

**Q.37.** On heating gypsum at 373 K, it loses water molecules and becomes calcium sulphate hemihydrates ( $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$ ). This is called Plaster of Paris. Plaster of Paris is a white powder and on mixing with water, it changes to gypsum once again giving a hard solid mass. Water of crystallization is the fixed number of water molecules present in one formula unit of a salt. Five water molecules are present in one formula unit of copper sulphate. Chemical formula for hydrated copper sulphate is  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ .

**Answer the following questions on the basis of the above paragraph:**

- (i) What is the molecular formula of gypsum?
- (ii) Write the equation of formation of plaster of Paris by heating gypsum?
- (iii) What are the uses of Plaster of Paris?
- (iv) Give the equation when POP is mixed with water?

**Q38.** Study the diagram given below and answer the questions that follow it.



- (i) Identify the defect of vision. Give reason for your answer.
- (ii) State two possible causes of this defect.
- (iii) How can we rectify this defect? Explain with a diagram

**Q39.** Rahul saw an advertisement about iodised salt while watching TV. In the advertisement it was stated that one should take only iodised salt. He also remembered that the doctor has advised his elder sister to eat iodised salt when she had developed swollen neck. His teacher has also taught them about various animal hormones.

- (i) Name the disease from which Rahul's sister suffered. Why has the doctor advised her to eat iodized salt
- (ii) Which hormone is known as emergency hormone? How it helps in coping during emergency?

**OR**

Why are some diabetes patients treated by giving insulin injections? What is common in both insulin and glucagon?