

**Class: 10**  
**Subject: Science**  
**Topic: OASK1510SA101**  
**No. of Questions: 36**

**Time: 3 ½ Hrs.**

**M.M. 90**

**General Instructions**

1. The question paper comprises of two section , A and B. You are to attempt both the section.
2. All questions are compulsory.
3. There is no overall choice. However internal choice has been provided in all the three questions of five marks category. Only one option in such questions is to be attempted.
4. All questions of section A and all question of section B are to be attempted separately
5. Questions 1 to 3 in section A are one mark questions. These are to be answered in one word or one sentence
6. Questions 4 to 6 in section A are two marks questions. These are to be answered in about 30 words each.
7. Questions 7 to 18 in section A are three marks questions. These are to be answered in about 50 words each.
8. Questions 19 to 24 in section A are five marks questions. These are to be answered in about 70 words each.
9. Questions 25 to 33 sections B are multiple choice questions based on practical skills. Each question is a one mark question. You are to select one most appropriate response out of the four provided to you. Questions 34 to 36 in section B are two mark question.

**SECTION – A**

Q1. What are biocatalysts?

Sol. An enzyme, that initiates or modifies the rate of a chemical reaction in a living body; a biochemical catalyst.

Q2. Name any one metal which is found in its free state in nature.

Sol. Pt

Q3. Suggest any two reasons which make the large scale usage of nuclear energy prohibitive.

Sol. 1. It releases radioactive products as if decay which keeps on emitting harmful nuclear radiation for thousands of years.

2. There is risk of accidents in nuclear reactors and also these reactors are capable of making enough plutonium to build nuclear bombs which is a great problem.

Q4. Name the type of the reaction and product formed when magnesium reacts with air or oxygen.

Sol. type-combination reaction, type-combination reaction

Q5. (a) Name the gland which releases thyroxin.

(b) State the function of thyroxin.

Sol. (a) Thyroid gland

(b) thyroxine is also T<sub>4</sub>. T<sub>4</sub> is involved in controlling the rate of metabolic processes in the body and influencing physical development. Administration of thyroxine has been shown to significantly increase the concentration of nerve growth factor in the brains of adult mice. Thyroxine is also a pro-hormone and a reservoir for the active thyroid hormone triiodothyronine (T<sub>3</sub>), which is about four times more potent.

Q6. State two differences between artery and vein on the basis of

(a) Type of blood it carries

(b) Valves

Sol. Artery

Vein

(a) they carry oxygenated blood at higher pressure

they carry deoxygenated blood at lower pressure

(b) they have no valves in them

valves are present in them

Q7. Differentiate between renewable and non-renewable sources of energy with one example for each.

Sol. Renewable energy sources are ones which don't run out - which can be **renewed**. We can keep using them and using them, and we'll never run out. Examples of renewable sources include wind, water power (hydroelectric), and solar power (light from the sun).

Non-renewable energy sources are ones which do run out. As we use them to generate energy, they get used up, and can't be used a second time. There are three main non-renewable energy sources, which are fast running out: coal, oil and natural gas.

Q8. Resistance of three resistors are given as  $R_1 = 20 \Omega$ ,  $R_2 = 40 \Omega$  and  $R_3 = 6 \Omega$ . Calculate the effective resistance when they are connected in series. Also calculate the current flowing when the combination is connected to a 6V battery.

Sol. Resistance when connected in series,  $R = R_1 + R_2 + R_3$ , i.e.  $R = 20 + 40 + 6 = 66 \text{ ohm}$   
When connected with a battery then current,  $I = V/R$ ,  $6/66 = 0.09 \text{ Amp}$

Q9. A student while studying the force experienced by a current carrying conductor in a magnetic field records the following observations

- (a) The force experienced by the conductor increases as the current is increased
- (b) The force experienced by the conductor decreases as the strength of the magnetic field is increased.

Which of the two observations is correct and why?

Sol. Statement 'a' is correct, we know that force experience by the current carrying conductor,  $F = BIL$  Therefore, Force would a linear function of current strength, magnetic field strength and effective length of the conductor.

Q10. What is an electromagnet? How is it different from a permanent magnet? State two uses of electromagnet.

Sol. Electromagnet: a soft metal core made into a magnet by the passage of electric current through a coil surrounding it.

In an electromagnet the magnetic field is created through electric current in a wire-wound coil and strengthened by a soft-iron core. As soon as you turn off the power, the soft-iron core loses its magnetization.

A permanent magnet is made of ferromagnetic material, which is magnetized by a strong external magnetic field. The magnetically hard material that is used keeps part of its magnetization after the external magnetic field is turned off.

Q11. List (a) any three advantages and (b) any three limitations of using a solar cooker.

Sol. A **solar cooker** is an appliance similar to an oven, which uses heat from sunlight to cook food. It eliminates the need for fuel or electricity for the purpose of cooking. Solar cookers are available in several sizes and configurations, all of which have their pros and cons.

#### **Advantages of Solar Cookers**

The biggest advantage of solar cookers is their eco-friendliness.

Solar cooking is free to use once you have bought the cooker itself. For the purpose of operation, all you need is sunlight. You can save a significant amount of money over the long term. The quality of food cooked in a solar cooker is also notable. There is no danger of burning food and flavors remain intact.

Q12. Write commercial and SI units of energy. Calculate the cost electric energy consumed by a electric heater rated with 50W for 2 hours daily in the month of April. The cost of one unit of electric energy is Rs. 5.

Sol. SI unit of current is Joule and commercial unit is kilowatt hour (kWh).

Total energy consumed =  $50 \times 2 \times 30 = 3000$  watt-hr

As 1 unit = 1 kwhr, then Total cost is  $3 \times 5 = 15$  Rs.

Q13. What is corrosion? Why Aluminum sheets do not corrode easily? Write two necessary conditions for corrosion to take place.

Sol. The slow eating away of metal in the presence of air, chemicals and water is called corrosion. Aluminium sheets forms an oxide layer due to corrosion thus preventing it from further corrosion. Necessary conditions:-a) presence of air b) presence of water

Q14. Why should curd not be kept in copper or brass vessels? What is done to protect it?

Sol. Curd contains milk which contains lactic acid. Like other acid, this acid reacts with copper and brass vessels which are metals. (Brass contains copper and zinc). Copper ions are produced. Copper ions are dangerous because when they react with water in the body, they produce copper oxide which is insoluble in water and organic solvents.

Q15. (a) What is an acid? Give an example  
(b) Why do acids like HCl conduct electricity in aqueous solutions while solution of compound like alcohol and glucose do not?

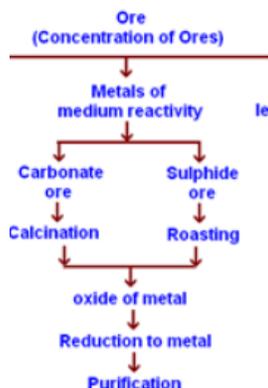
Sol. (a) An **acid** is a chemical substance whose aqueous solutions are characterized by a sour taste, the ability to turn blue litmus red, and the ability to react with bases and certain metals to form salts. Eg-HCl, HNO<sub>3</sub> etc.

(b) Because in order for a solution to conduct electricity, it must be an electrolyte - that is, it must contain free ions (charged particles). HCl, or hydrochloric acid, dissolves freely in water, with its ionic bonds releasing to create H<sup>+</sup> and Cl<sup>-</sup> ions in solution.

Glucose is not an ionic substance. The bonds that hold this molecule together are covalent, meaning that electrons are shared rather than transferred from one atom to another. This occurs because Carbon, which has 4 valence (outer shell) electrons, is able to hold onto its own electrons and share them with other atoms such as Oxygen. As a result of this sharing, when a glucose molecule dissolves, no ions are released. With no ions in solution, electricity is unable to pass through.

Q16. Suppose you have to extract metal M from its enriched carbonate ore. If M is in the middle of the reactivity series. Write various steps used in the extraction of his metal. Also give balanced chemical equations.

Sol.

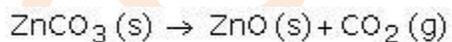


- Concentration-hydraulic washing
- Calcination- Metals such as iron, zinc, lead, copper, etc., are in the middle of the reactivity series. These are moderately reactive metals and are usually present as carbonates.

A metal is obtained from its ore by the processes of reduction or by electrolysis. In the reduction process, it is the oxide ore that is reduced.

It is easier to reduce an oxide ore as compared to its carbonates. If the ore is not an oxide ore, it is first converted to the oxide by the process of calcinations

In this process the ore is heated to a high temperature in the absence of air, or where air does not take part in the reaction. Usually, carbonate ores or ores containing water are calcined to drive out carbonate and moisture impurities..eg



- Reduction-Smelting with the help of carbon

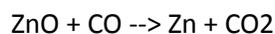


- Refining

Q17. Write chemical equations for the reactions taking place when

- (a) ZnO is heated with coke (C)
- (b) Zinc carbonate is calcined
- (c) Zinc sulphide is roasted

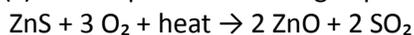
Sol. (a)  $ZnO + C \rightarrow Zn + CO$



(b) In calcination process the carbonate ore is heated strongly in the absence of air to convert it into metal oxide. As obtaining metal from metal oxide is easy process.



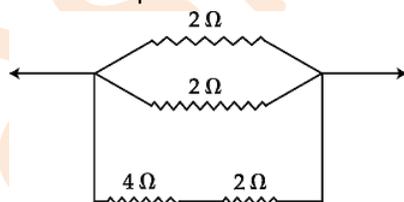
(c) Zinc sulphide on heating in presence of air forms zinc oxide and sulphur dioxide.



Q18. Mention the two main components of the transport system in plants. State one specific function of each one of these components.

Sol. Highly organized plants have two important tissues for their transport system one is Xylem and other is Phloem. Xylem transports water and minerals from roots to aerial parts of the plant and Phloem transport food from leaves to other parts of the plants.

Q19. (a) Calculate the Equivalent Resistance of the following combination of resistors



(b) An electric bulb draws a current of 0.8 A from 250 V mains. The bulb is used on an average 10 hours a day. If energy costs Rs 3 per KWH, calculate the monthly bill for 30 days.

Sol. (a) Equivalent resistance will be,  $6/7$  ohm.

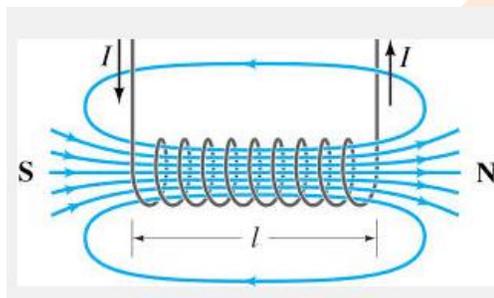
(b) Total numbers of hours in a month is  $30 \times 10 = 300$  hrs.

$$\text{Energy consumed} = V I t = 250 \times 0.8 \times 300 = 60000 \text{ watt-hr} = 60 \text{ kwhr}$$

$$\text{Total cost} = 60 \times 3 = \text{Rs } 180$$

Q20. Why can't two magnetic field lines cross each other? Draw the magnetic field lines (including field directions) of the magnetic field due to a long straight solenoid. What important property of this field is indicated by this field line pattern? Name any two factors on which the magnitude of the magnetic field due to this solenoid depends.

Sol. Magnetic field lines are just a representation of the field itself. The lines are not real in that sense, but they tell us where the field is pointing at any chosen point in space. Now if the lines cross, that would mean that the field at the crossing point is pointing in two directions which would be contradicting our original idea.



The strength of the magnetic field produced by a current carrying solenoid depends on:

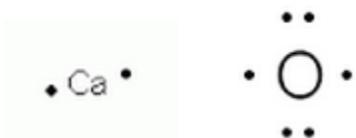
- The number of turns - larger the number of turns, greater is the magnetism produced
- The strength of the current - when current increases, magnetism also increases
- Nature of 'core-material' used in making the solenoid - if we use soft-iron as a core for the solenoid, then it produces the strongest magnetism

Q21. (a) Write the electron dot structure for calcium and oxygen. The atomic numbers of calcium and oxygen are 20 and 8 respectively.

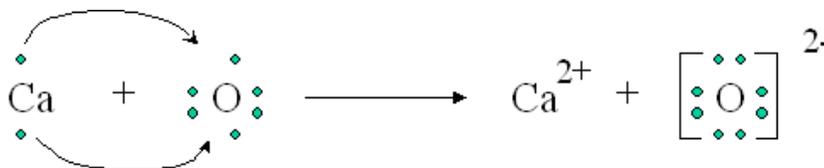
(b) Show the formation of calcium oxide by the transfer of electrons.

(c) Ionic compounds are high melting solids. Give reason.

Sol. (a)



(b)



(c) In ionic compounds, the electrostatic interactions between cations and anions holds the compound together. Because these are very strong interactions, it takes lots and lots of energy to separate the ions. Because that's how ionic compounds melt, they have higher melting points

Q22. (a) Why does medium become acidic in mouth?

(b) What is the ill effect of acidic medium?

(c) How can this be prevented?

Sol. (a) Due to formation of lactic acid, which formed in our mouth by a bacteria named lactobacillus. This bacteria decomposes the food particles which are present in our mouth after eating and due to that lactic acid is formed.

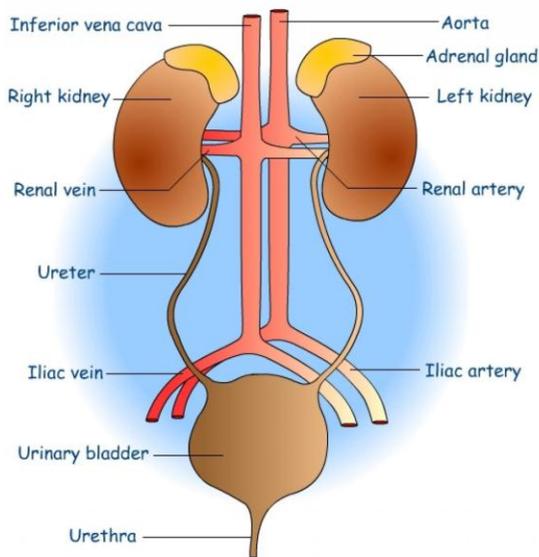
(b) Tooth decay is the result of tooth demineralization, a process where an acidic environment leaches some of the mineral content out of a tooth's calcified tissues (enamel and dentin).

(c) The primary food source for these bacteria is dietary sugars. This includes sucrose (table sugar), glucose, fructose, lactose and cooked starches. Thus this can be prevented by:-

- Using artificial sweeteners rather than natural sugars.
- Don't linger when snacking on or sipping sugary foods and beverages. Consume these items fairly quickly and be done with them.
- Minimize how long sugars are allowed to remain in your mouth. Brush and floss, or at least rinse, promptly after consuming foods.

- Q23. (a) Draw a labeled diagram of excretory system in human beings and label the following:
- (i) Left kidney
  - (ii) Renal artery
  - (iii) Urinary bladder
  - (iv) urethra
- (b) Name the functional unit of kidney.
- (c) Name two nitrogenous wastes released from kidney.

Sol. (a)



- (b) Nephron
- (c) Urea and uric acid

- Q24. (a) State the functions of mid brain and hind brain respectively.
- (b) How is the brain and spinal cord protected?
- (c) Why do tendrils coil around a support?

Sol. (a) Mid brain

Connects the forebrain and hind brain., Controls reflex movement of head, neck, and trunk in response to visual and auditory stimuli.

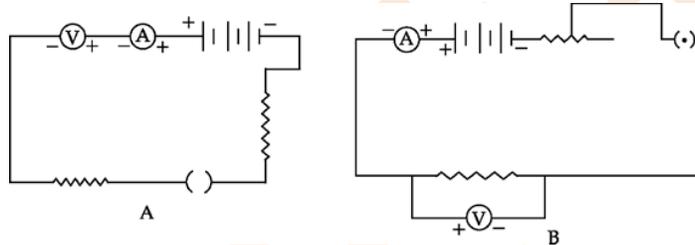
Hind brain: Maintains posture, equilibrium and muscle tone. Controls respiration. Control heart beat, breathing movements, regulates blood pressure, swallowing coughing, sneezing and vomiting.

(b) The brain is protected not only by the rigid skull but also by three membranes, or meninges, that surround the brain. The outer membrane, called the dura mater (literally, hard mother), is tough and fibrous. The intermediate membrane, called the arachnoid (cobweb), is a thin, weblike tissue. The inner covering, called the pia mater (tender mother), is a delicate membrane that is molded to the surface of the brain.

(c) a **tendrils** is a specialized stem, leaf or petiole with a threadlike shape that is used by climbing plants for support, attachment and cellular invasion by parasitic plants, generally by twining around suitable hosts. They do not have a lamina or blade, but they can photosynthesize. They can be formed from modified shoots, modified leaves, or auxiliary branches and are sensitive to airborne chemicals, often determining the direction of growth, as in species of Cuscuta.

**SECTION – B**

Q25. Which of the following experimental set up is correct for verification of Ohm's law?



- (a) A
- (b) B
- (c) Both A and B
- (d) Neither A nor B

Sol. (D)  
 Ammeter should be connected in series and voltmeter in parallel.

Q26. A student has to connect 4 cells of 1.5 V each to form a battery of 6V



The correct way of connecting these cells is shown in figure:

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

Sol. (a)  
In series emf of the cells be added.

Q27. A Voltmeter has a least count of 0.05 volt. While doing Ohm's law experiment, a student observed that the pointer of the voltmeter coincides with 15<sup>th</sup> division. The observed reading is:

- (a) 0.75V
- (b) 0.075V
- (c) 7.5V
- (d) 75V

Sol. (a)  
No of significant figures

Q28. When a coiled wire of iron is placed in copper sulphate solution, the reddish-brown substance formed is

- (a) Soft and dull
- (b) Hard and flaky
- (c) Smooth and shining
- (d) Rough and granular

Sol. (a)

Q29. Ferrous sulphate crystals on heating strongly in a test tube give a suffocating gas. This gas turns acidified potassium dichromate paper green. The gas evolved is

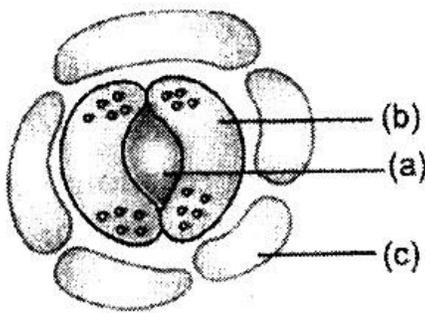
- (a) Sulphur dioxide
- (b) Hydrogen sulphide
- (c) Chlorine
- (d) Oxygen

Sol. (a)

- Q30. When small quantity of iron filling are placed in a solution of copper sulphate a reddish brown solid substance (a) is separated and the solution turns light green (b) the substance A and B are
- (a) Copper , sulphuric acid
  - (b) Copper, iron sulphate
  - (c) Iron sulphate, copper sulphate
  - (d) Copper, copper sulphate

Sol. (b)

- Q31. Which of the following cells possess well defined nucleus?

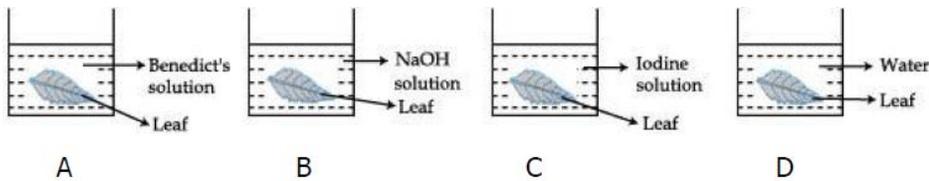


- (a) (a) and (b)
- (b) (a) and (c)
- (c) (c) and (b)
- (d) (a) , (b) and (c)

Sol. (c)  
Fact

- Q32. Figures A, B, C and D show leaves that have been boiled in alcohol, placed in four beakers containing liquids as labeled.

In which one of the above a positive test for presence of starch would be obtained?



- (a) A
- (b) B
- (c) C

(d) D

Sol.

(c)  
 With iodine starch gives blue colour.

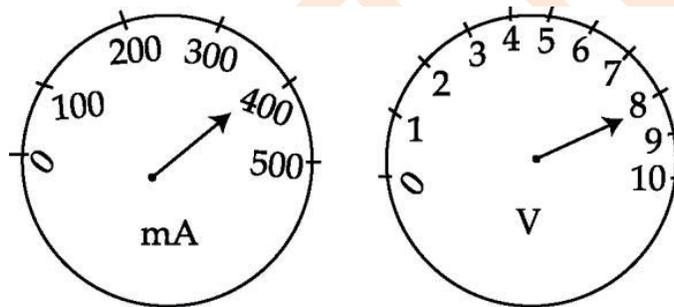
Q33. A student sets up the apparatus for the experiment to show that  $\text{CO}_2$  is released during respiration. After 2 hours, he would observe that:

- (a) KOH turns milky.
- (b) Water level rises in the bent tube in the beaker.
- (c) Water level decreased in the bent tube in the beaker
- (d) Water turns turbid in the beaker.

Sol.

(b)  
 Water level rises because of the vacuum created.

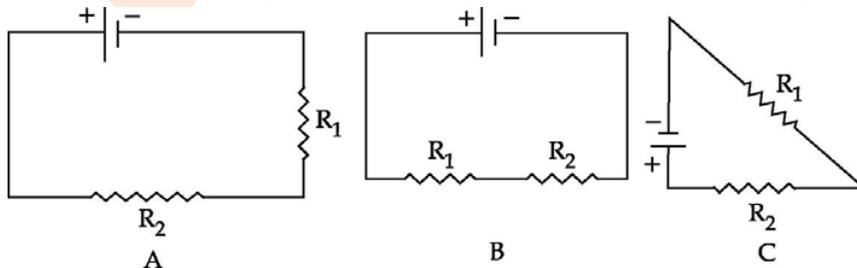
Q34. The reading of current flowing through a conductor and the potential difference across its two ends are shown in the ammeter and voltmeter given below. What will be the value of resistance in it?



Sol.

$$R = V/I, 8 \text{ V} / 400 \text{ mA} = 20 \text{ kohm}$$

Q35. Two resistances  $R_1 = 10 \text{ ohm}$  and  $R_2 = 10 \text{ ohm}$  are to be connected with 20V battery. Out of which of the following maximum current will flow. Calculate its magnitude.



Sol.

Current through first circuit,  $I = 20/20 = 1 \text{ Amp}$

Current through second circuit,  $I = 20 / 20 = 1$  Amp

Current through third circuit,  $I = 20 / 20 = 1$  Amp

Q36. Match the important chemical given in Column (A) with the chemical formulae given in column (B)

Column (A)	Column (B)
(a) Plaster of parts	(i) $\text{Ca(OH)}_2$
(b) Gypsum	(ii) $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$
(c) Bleaching powder	(iii) $\text{CaSO}_4 \cdot 2 \text{H}_2\text{O}$
(d) Slaked lime	(iv) $\text{CaOCl}_2$

Sol. a-ii  
b-iii  
c-iv  
d-i