

**SAI VIDHYA NIKETHAN MATRIC. HR. SEC. SCHOOL
MATHAMPALAYAM, COIMBATORE - 19**

STD : 10

**SCIENCE
PART - I**

75 M

I. Choose the most suitable answer

12 x = 12

1. d) both a and b
2. d) ohm metre
3. a) more than 83
4. c) 25 ml ethanol in 75 ml of water
5. a) increases
6. c) only ii is correct
7. c) when H₂O is splitted
8. d) both b and c
9. b) archaeopterix
10. b) diploid
11. a) leukemia
12. a) notepad

PART - II

II. i) Answer any seven questions (Q.No.22 is compulsory)

7 x2 =14

13. Why are traffic signals red in colour?

As the red light has highest wavelength, it scatters least and travels a longer distance

14. State whether the following statement is true or false,justify your answer.

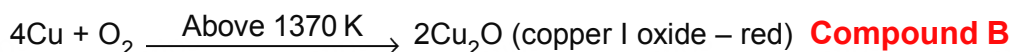
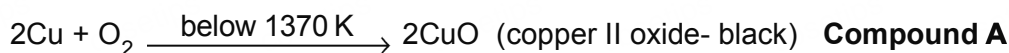
During the process of transferring heat energy,the body at lower temperature is cooled while the body at higher temperature is heated.

False. Because During the process of transferring heat energy, the body at lower temperature is heated while the body at higher temperature is cooled.

15. A source producing a sound of frequency 90 Hz is approaching a stationary listener with a speed equal to (1/10) of the speed of sound. What will be the frequency heard by the listener?

$$\begin{aligned}n' &= \left(\frac{v}{v - v_s} \right) n \\ &= \left(\frac{v}{v - \left(\frac{1}{10} \right) v} \right) n = \left(\frac{10}{9} \right) n \\ &= \left(\frac{10}{9} \right) \times 90 = 100 \text{ Hz}\end{aligned}$$

16. Copper is a reddish brown metal, which combines with O₂ at less than 1370 K to give A, a black coloured compound. At a temperature greater than 1370 K, Copper reacts with O₂ to give B which is red coloured compound. Write the balanced chemical equation for the formation of A and B.



17. Why is the teeth of rabbit called heterodont?

In rabbit the teeth are of different types. Hence, the dentition is called heterodont.

18. What are the structures involved in the protection of brain?

- i) Duramater (outer)
- ii) Arachnoid membrane (middle)
- iii) Piamater (inner membrane)

19. Differentiate between phenotype and genotype

phenotype	genotype
1) External expression of a particular trait is known as phenotype	A genotype is the genetic expression of an organism
2) Ratio is 3:1	Ratio is 1:2:1

20. Assertion: r DNA is superior over hybridisation techniques

Reason: Desired genes are inserted without introducing the undesirable genes in target organisms.

- a. Assertion is correct and reason is wrong
- b. Reason is correct and the assertion is wrong
- c. Both assertion and reason are correct
- d. Both assertion and reason are wrong

Ans: c. Both assertion and reason are correct

21. What is the importance of rainwater harvesting?

- (i) Overcome the rapid depletion of groundwater levels.
- (ii) To Meet the increase demand of water.
- (iii) Reduces flood and soil erosion.

22. From the value of ionic product of water at 25°C, find out the concentration of hydroxyl ions (At 25°C concentration of hydrogen ions in water is 10⁻⁷ mol/dm⁻³)

$$K_w = [\text{H}_3\text{O}^+] [\text{OH}^-]$$

The value of K_w at 25°C is 1 x 10⁻¹⁴.

$$\therefore [\text{OH}^-] = \sqrt{K_w}$$

$$[\text{OH}^-] = \sqrt{1 \times 10^{-14}}$$

$$[\text{OH}^-] = 1 \times 10^{-7} \text{ mol/dm}^{-3}$$

Since pure water is neutral in nature, H⁺ ion concentration must be equal to OH⁻ ion concentration.

PART - III

III. Answer any seven questions:(Q.No.32 is compulsory)

7 x 4 = 28

23. i) Use the analogy to fill the blank

- a) Opening a door ; Moment of force,Opening a water tap:.....
 b) Pushing a bus by a group of people ; Like parallel force,Tug of war.....

Ans: a) Moment of a couple b) Unlike parallel forces

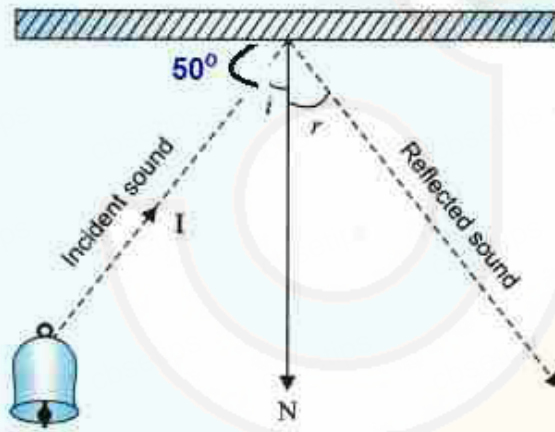
ii) The power of a lens is - 2 D Find the focal lengths of a lens.

$$P = \frac{1}{f} \text{ (in m)} \quad P = -2 \text{ D}$$

$$-2 = \frac{1}{f} \quad -2f = 1$$

$$f = \frac{1}{-2} = -0.5 \text{ m} \quad f = -0.5 \text{ m}$$

24.i) From the given figure,Calculate angle of reflection of sound



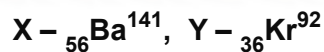
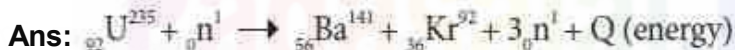
Ans:

$$i = 90^\circ - 50^\circ = 40^\circ$$

angle of incident sound (i)= angle of reflected sound (r)

Therefore, Angle of Reflection of sound (r) = 40

ii) Nuclear fission of uranium nucleus (U^{235}) as follows



25. i) Find the daughter nuclei X and Y emitted from the above reaction

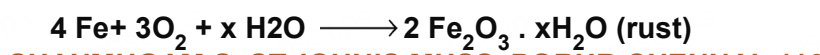
a) Atoms of different elements having same number of ----- are called isotones.

b) The number of atoms present in a molecule is called its -----

Ans: a) Neutrons b) atomicity

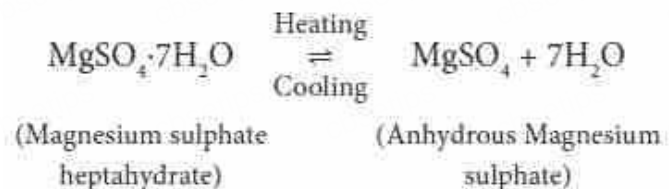
ii) What is rust? Give the equation for formation of rust.

When iron is exposed to moist air, it forms a layer of brown hydrated ferric oxide on its surface. This compound is known as rust and the phenomenon of formation of rust is known as **rusting**.



26. i) What happens when $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ is heated? Write the appropriate equation

Its water of crystallization is 7. When magnesium sulphate heptahydrate crystals are gently heated, it loses seven water molecules, and becomes anhydrous magnesium sulphate



ii) Answer the following questions using the data given below:

Assertion(A): Detergents are more effective cleansing agents than soaps in hard water.

Reason(R): Calcium and magnesium salts of detergents are water soluble.

- a) A and R are correct, R explains the A.
- b) A is correct, R is wrong.
- c) A is wrong, R is correct.
- d) A and R are correct, R doesn't explain A.

Ans: a) A & R are correct, R explains the A

27. i) The mass percentage of carbon is 27.28% and the mass percentage of oxygen is 72.73% . Calculate the molecular mass of that compound.

Mass percentage Carbon = 27.28% , Mass percentage = 72.73%

$$\text{moles of C} = 27.28\text{g} \times \frac{1 \text{ mole of C}}{12\text{g of C}} = 2.27 \approx 2$$

$$\text{moles of O} = 72.73\text{g} \times \frac{1 \text{ mole of O}}{16\text{g of O}} = 4.54 \approx 4$$

ratio of C : O

$$\frac{\text{moles of C}}{\text{moles of O}} = \frac{2}{4} = 2 : 4$$

Empirical formula = C_2O_4

$$\text{Molecular mass} = 2 \times \text{CO}_2 = (2 \times 12) + (4 \times 16) = 88\text{g}$$

ii) Copper pyrites is the prime ore of copper. It is concentrated by froth floatation method. give the reason

Reason :Lighter ores, such as sulphide ores, are concentrated by **froth floatation** method.

e.g., Zinc blende (ZnS).

28. i) Why are the rings of cartilages found in trachea of rabbit?

Tracheal walls are supported by rings of cartilage which help in the free passage of air.

ii) Define reflex arc.

The pathway taken by nerve impulse to accomplish reflex action is called **reflex arc**.

29. What are synthetic auxins? Give examples.

Synthetic Auxins:

Artificially synthesized auxins that have properties like auxins are called as synthetic auxins.

Example: 2,4D(2,4 Dichlorophenoxy Acetic Acid).

30. i) How can menstrual hygiene be maintained during menstrual days?

1. Sanitary pads should be changed regularly, to avoid infections due to microbes from vagina and sweat from genitals.
2. Use of warm water to clean genitals helps to get rid of menstrual cramps
3. Wearing loose clothing rather than tight fitting clothes will ensure the airflow around the genitals and prevent sweating.

ii) Name three improved characteristics of wheat that helped India to achieve high productivity.

Sonalika, Kalyan Sona - varieties

Characteristics

- i) high-yielding, ii) semi-dwarf, iii) fertilizer responsive disease resistant varieties

31. i) How is a cancer cell different from a normal cell ?

Normal Cells	Cancer Cells
Contact inhibition	No contact inhibition
Controlled growth	Uncontrolled growth (tumor)
Specialized cells	Nonspecialized cells
Normal chromosomes	Abnormal chromosomes
Undergo apoptosis	No apoptosis

ii) Why fossil fuels are to be conserved?

The formation of fossil fuels is a very slow process and takes very long period of time for renewal. so, fossil fuels are to be conserved

32. i) The power lines which are made up of metals expands on heating during hot summer, this makes the lines to hang low

The power lines which are made up of metals expands on heating (during hot summer), this makes the lines to hang low.

ii) An electric heater of resistance 5Ω is connected to an electric source. If a current of 6 A flows through the heater, then find the amount of heat produced in 5 minutes.

Given resistance $R = 5 \Omega$, Current $I = 6 \text{ A}$,

Time $t = 5 \text{ minutes} = 5 \times 60 \text{ s} = 300 \text{ s}$

Amount of heat produced, $H = I^2Rt$,

$H = 6^2 \times 5 \times 300$. Hence, $H = 54000 \text{ J}$

PART - IV

i) Answer all the questions

3 x 7 = 21

ii) Each question carries seven marks.

iii) Draw the diagram wherever necessary.

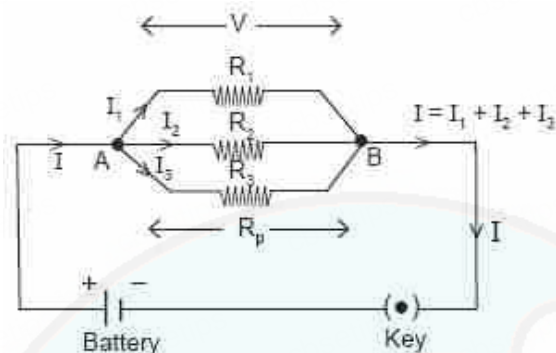
33 A. Describe rocket propulsion.

- 1) Propulsion of rockets is based on the law of conservation of linear momentum as well as Newton's III law of motion.
- 2) Rockets are filled with a fuel (either liquid or solid) in the propellant tank.
- 3) When the rocket is fired, this fuel is burnt and a hot gas is ejected with a high speed from the nozzle of the rocket, producing a huge momentum.
- 4) To balance this momentum, an equal and opposite reaction force is produced in the combustion chamber, which makes the rocket project forward.
- 5) While in motion, the mass of the rocket gradually decreases, until the fuel is completely burnt out. Since, there is no net external force acting on it, the linear momentum of the system is conserved.

- 6) The mass of the rocket decreases with altitude, which results in the gradual increase in velocity of the rocket.
- 7) At one stage, it reaches a velocity, which is sufficient to just escape from the gravitational pull of the Earth. This velocity is called *escape velocity*.

(OR)

33B. With the help of a circuit diagram derive the formula for the resultant resistance of three resistances three resistors in parallel .



According to the Ohm's law, you have,

$$I_1 = \frac{V}{R_1}, \dots \dots \dots 1$$

$$I_2 = \frac{V}{R_2}, \dots \dots \dots 2$$

$$I_3 = \frac{V}{R_3}, \dots \dots \dots 3$$

The total current through the circuit is given by

$$I = I_1 + I_2 + I_3$$

Using equations (1), (2) and (3), you get

$$I = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3} \dots \dots \dots 4$$

Let the effective resistance of the parallel combination of resistors be R_p . Then,

$$I = \frac{V}{R_p} \dots \dots \dots 5$$

Combining equations (4) and (5), you have

$$\frac{V}{R_p} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3} \quad \frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

When 'n' resistors of equal resistances R are connected in parallel, the equivalent resistance is $\frac{R}{n}$

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \dots \dots \dots + \frac{1}{R} = \frac{R}{n}$$

$$R_p = \frac{R}{n}$$

The equivalent resistance in a parallel combination is less than the lowest of the individual resistances.

ji Give the uses of radio isotopes in industries

- 1) Radio phosphorous (P^{32}) is used in the treatment of skin diseases.
- 2) Radio – Iodine (I^{131}) is used to cure goiter.
- 3) Radiations are used to sterilize the surgical devices as they can kill the germs and microbes.

34A.i) How many grams are there in the following?

- | | |
|--|---|
| a) 2 moles of hydrogen molecule, H_2 | b) 3 moles of chlorine molecule, Cl_2 |
| c) 5 moles of sulphur molecule, S_8 | d) 4 moles of phosphorous molecule, P_4 |

Ans:

a) 2 moles of hydrogen molecule, H_2

Mass = No. of moles \times atomic mass

$$\begin{aligned}\text{So, mass of } H_2 &= 2 \times 2(1) \\ &= 2 \times 2 \\ &= 4 \text{ g}\end{aligned}$$

b) 3 moles of chlorine molecule, Cl_2

Mass = No. of moles \times atomic mass

$$\begin{aligned}\text{So, mass of } Cl_2 &= 3 \times 2(35.5) \\ &= 3 \times 71 \\ &= 213 \text{ g}\end{aligned}$$

c) 5 moles of sulphur molecule, S_8

Mass = No. of moles \times atomic mass

$$\begin{aligned}\text{So, mass of } S_8 &= 5 \times 8(32) \\ &= 5 \times 256 \\ &= 1280 \text{ g}\end{aligned}$$

d) 4 moles of phosphorous molecule, P_4

Mass = No. of moles \times atomic mass

$$\begin{aligned}\text{So, mass of } P_4 &= 4 \times 4(31) \\ &= 4 \times 124 \\ &= 496 \text{ g}\end{aligned}$$

ii) True or False: (If false give the correct statement)

- a) In a solution the component which is present in lesser amount is called solvent.
- b) Sodium chloride dissolved in water forms a non-aqueous solution.
- c) When Silica gel is kept open, it absorbs moisture from the air, because it is hygroscopic in nature

Ans: a) False :

In a solution the component which is present in lesser amount is called Solute.

b) False

Sodium chloride dissolved in water forms a aqueous solution.

c) True

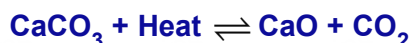
(OR)



Analyse the above chemical reaction .At what condition(s) these reactions are feasible?



Thermal decomposition reaction, It is a irreversible reaction



In thermal decomposition reaction,

And if the reaction is carried out in a closed vessel, it reaches a chemical equilibrium.

b) Which of the following chemical reactions is a neutralization reaction? Reason out



Ans: $\text{NaOH}(\text{aq}) + \text{HCl}(\text{aq}) \longrightarrow \text{NaCl}(\text{aq}) + \text{H}_2\text{O}(\text{l})$ This reaction is a neutralization reaction.

Reason : reaction of NaOH with HCl is a typical neutralization reaction.

Here, sodium replaces hydrogen from hydrochloric acid forming sodium chloride, a neutral soluble salt.

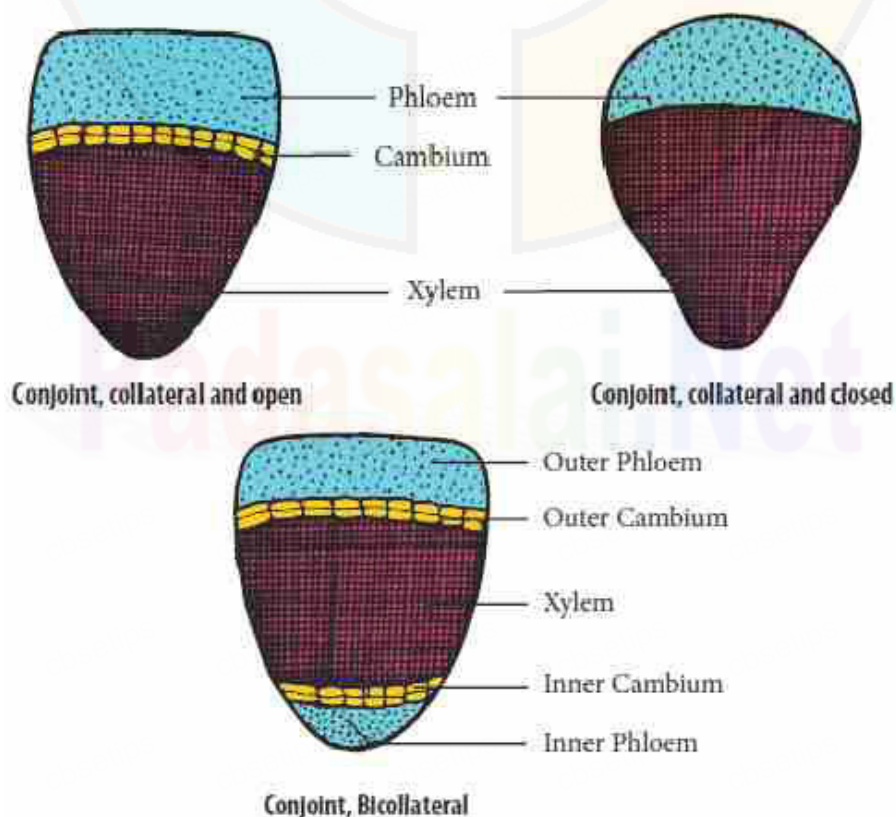
ii) Read and categorize the following statement that are suitable for ethanol and ethanoic acid

- a) 95% of this compound's water solution is called rectified spirit
- b) Pure form of this compound change into ice like crystals on freezing
- c) This compound undergoes decarboxylation on heating with sodalime.

Ans: a) Ethanol, b) Ethanoic acid c) sodium salt of ethanoic acid

(OR)

35A. i) Draw and label the different types of Conjoint vascular bundles



ii) Give reasons for the following statements.

a) The movement of food substance in the phloem can be in all direction.

The source-sink relationship is variable, the direction of movement in the phloem can be upwards or downwards, i.e., **bidirectional**.

b) Mature RBC in mammals do not have cell organelles.

Mammalian RBC lack nucleus and makes the cells biconcave and increase surface area for oxygen binding, loss of mitochondria allows the RBC to transport all the oxygen to tissues, and loss of endoplasmic reticulum allows more flexibility for RBC to move through the narrow capillaries.

(OR)

35B. i) What are Okazaki fragments?

Short segments of DNA are synthesized. This strand is called **lagging strand**. The short segments of DNA are called **Okazaki fragments**.

ii) Octopus, cockroach and frog all have eyes. Can we group these animals together to establish a common evolutionary origin. Justify your answer.

(i) No. These animals cannot be grouped together to establish a common evolutionary origin

(ii) Frog belongs to phylum Eye Similar to the parts of human eye.

(iv) Octopus eye is superior to man.

iv) Cockroach eye is a compound eye with simple units called ommatidium.

iii) Differentiate between Type-1 and Type-2 diabetes mellitus .

iii) Differentiate between Type-1 and Type-2 diabetes mellitus

Factors	Type-1 Insulin dependent diabetes mellitus (IDDM)	Type-2 Non-insulin dependent diabetes mellitus (NIDDM)
Prevalence	10-20%	80-90%
Age of onset	Juvenile onset (< 20 years)	Maturity onset (>30 years)
Body weight	Normal or Underweight	Obese
Defect	Insulin deficiency due to destruction of β -cells	Target cells do respond to insulin
Treatment	Insulin administration is necessary	Can be controlled by diet, exercise and medicine

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