

## Common Half Yearly Examination – Dec 2023

**Standard - X**

**Science**

**Marks – 75**

Part – A

I. Choose the correct answer :-

1. b ) both a & c
2. d )  $8.31 \text{ J mol}^{-1}\text{K}^{-1}$
3. d) electrical power
- 4.c ) carbon di oxide
5. b ) Hg
6. c) fatty acid
- 7.b ) stem
8. a) SA node
9. b ) sarcolemma
10. c ) Zygote
11. d ) DNA ligase
12. d) Scratch

Part – B

13.

**Differentiate convex lens and concave lens.**

S.No.	Convex lens	Concave lens
1	A convex lens is thicker in the middle than at edges	A concave lens is thinner in the middle than at edges
2	It is having converging lens	It is having diverging lens
3	It produces mostly real images	It produces virtual images
4	It is used to treat hypermeteropia	It is used to treat myopia

14.

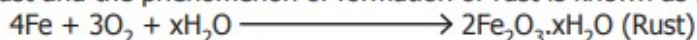
**Explain why, the ceilings of concert halls are curved.**

**Ans :** When a person is talking at one focus, his voice can be heard distinctly at the other focus. It is due to the multiple reflections of sound waves from the curved walls.

15.

**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.



16.

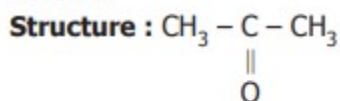
**Why does the reaction rate of a reaction increase on raising the temperature?**

Most of the reactions go faster at higher temperature. Because adding heat to the reactants provides energy to break more bonds and thus speed up the reaction.

17.

**Name the simplest ketone and give its structural formula.**

Acetone.



18.

**What is respiratory quotient?**

Respiratory quotient is the ratio of volume of carbon dioxide liberated and the volume of oxygen consumed during respiration. It is expressed as

$$\text{Respiratory Quotient (RQ)} = \frac{\text{Volume of CO}_2 \text{ liberated}}{\text{Volume of O}_2 \text{ consumed}}$$

19. a.

**Write the dental formula of rabbit.**

Dental formula of rabbit is,  $I \frac{2}{1}, C \frac{0}{0}, PM \frac{3}{2}, M \frac{3}{3}$ , which can be written as  $\frac{2033}{1023}$ .

b.

**What does CNS stand for?**

CNS stands for Central Nervous System.

20.

Identify the parts A, B, C and D



A : Exine.

B : Intine.

C : Generative cell.

D : Vegetative nucleus.

21.

**Why is Archaeopteryx considered to be a connecting link?**

Archaeopteryx is the oldest known fossil bird. It was an early bird-like form found in the Jurassic period. It had wings with feathers, like a bird. It had long tail, clawed digits and conical teeth, like a reptile. So it is considered to be a connecting link between reptiles and birds.

22.

An electric heater of resistance  $5 \Omega$  is connected to an electric source. If a current of  $6 \text{ A}$  flows through the heater, then find the amount of heat produced in 5 minutes.

**Solution:**

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-C**

23.

**Describe rocket propulsion.**

- + Propulsion of rockets is based on the law of conservation of linear momentum as well as Newton's III law of motion.
- + Rockets are filled with a fuel in the propellant tank.
- + 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.
- + To balance this momentum, an equal and opposite reaction force is produced in the combustion chamber, which makes the rocket project forward.
- + 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.
- + The mass of the rocket decreases with altitude, which results in the gradual increase in velocity of the rocket.
- + 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.

24.

**List the merits of LED bulb.****Merits of a LED bulb**

1. As there is no filament, there is no loss of energy in the form of heat. It is cooler than the incandescent bulb.
2. In comparison with the fluorescent light, the LED bulbs have significantly low power requirement.
3. It is not harmful to the environment.
4. A wide range of colours is possible here.
5. It is cost-efficient and energy efficient.
6. Mercury and other toxic materials are not used in LED bulbs.

25. A)

1	Co – 60	c	Leukemia
2	I – 131	d	Thyroid disease
3	Na – 11	b	Function of heart
4	C – 14	a	Age of fossil

B)

**Elements having atomic number greater than 83 can undergo nuclear fusion.****Ans :** False. Elements having atomic number lesser than 83 can undergo nuclear fusion.

26. a

**Define Alloy.**

An Alloy is a homogeneous mixture of two or more metals or of one or more metals with contain non-metallic elements.

**B : 1) Bauxite 2) Atomic number**

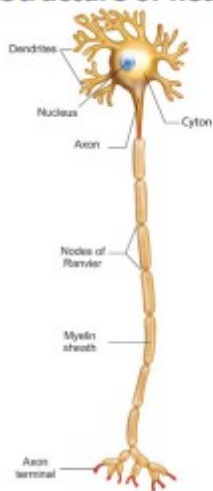
27.

**Differentiate reversible and irreversible reactions.**

REVERSIBLE REACTION	IRREVERSIBLE REACTION
It can be reversed under suitable conditions.	It cannot be reversed.
Both forward and backward reactions take place simultaneously.	It is unidirectional. It proceeds only in forward direction.
It attains equilibrium.	Equilibrium is not attained.

REVERSIBLE REACTION	IRREVERSIBLE REACTION
The reactants cannot be converted completely into products.	The reactants can be completely converted into products.
It is relatively slow.	It is fast.

28. Label the following diagram.

**Structure of neuron.**

28.

**With a neat labelled diagram explain the structure of a neuron.**

A neuron typically consists of three basic parts: Cyton, Dendrites and Axon.

- i) **Cyton :**
1. Cyton is also called cell body or perikaryon.
  2. It has a central nucleus with abundant cytoplasm called **neuroplasm**.
  3. The cytoplasm has large granular body called **Nissl's granules** and the other cell organelles like mitochondria, ribosomes, lysosomes, and endoplasmic reticulum.
  4. Neurons do not have the ability to divide.
  5. Several neurofibrils are present in the cytoplasm that help in transmission of nerve impulses to and from the cell body.
- ii) **Dendrites:**
1. These are the numerous branched cytoplasmic processes that project from the surface of the cell body. They conduct nerve impulses towards the cyton.
  2. The branched projections increase the surface area for receiving the signals from other nerve cells.

- 
- Axon:**
1. The axon is a single, elongated, slender projection.
  2. The end of axon terminates as fine branches which terminate into knob like swellings called **synaptic knob**.
  3. The plasma membrane of axon is called **axolemma**, while the cytoplasm is called **axoplasm**. It carries impulses away from the cyton.
  4. The axons may be covered by a protective sheath called **myelin sheath** which is further covered by a layer of **Schwann cells** called **neurilemma**.
  5. Myelin sheath breaks at intervals by depressions called **Nodes of Ranvier**.
  6. The region between the nodes is called as **internode**.
  7. Myelin sheath acts as insulator and ensures rapid transmission of nerve impulses.

29. A

**What is bolting? How can it be induced artificially?**

- ❖ **Bolting :** Treatment of rosette plants with gibberellin induces sudden shoot elongation followed by flowering. This is called bolting.
- ❖ It is induced by artificial treatment with plant hormone gibberellin. It causes stem elongation in plants under normal condition.

B.

**What are chemical messengers?**

Hormones are powerful messengers that control and coordinate essential processes such as growth, metabolism and fertility by carrying messages from endocrine glands to target cells and tissues.

30.

A.

**State the applications of DNA fingerprinting technique.**

Applications of DNA Fingerprinting

- ❖ DNA fingerprinting technique is widely used in forensic applications like crime investigation such as identifying the culprit. It is also used for paternity testing in case of disputes.
- ❖ It also helps in the study of genetic diversity of population, evolution and speciation.

B.

**Differentiate between outbreeding and inbreeding.**

S.No.	Outbreeding	Inbreeding
1	It is the breeding of unrelated animals.	It refers to the mating of closely related animals with the same breed.
2	The hybrids are stronger and vigorous than their parents.	It helps in the accumulation of superior genes and elimination of genes which are undesirable.
3	Cross between two different species with desirable features of economic value are mated. Male donkey + Female Horse = Mule.	Superior males and superior females of the same breed and identified and mated in pairs. Bikaneri (Magra) ewes + Australian Marino rams sheep = Hissardale Sheep.

31.

**How will you prevent soil erosion?**

- i) Retain vegetation cover, so that soil is not exposed.
- ii) Cattle grazing should be controlled.
- iii) Crop rotation and soil management improve soil organic matter.
- iv) Runoff water should be stored in the catchment.
- v) Reforestation, terracing and contour ploughing.
- vi) Wind speed can be controlled by planting trees in form of a shelter belt.

32

**The hydroxide ion concentration of a solution is  $1 \times 10^{-11}$ M. What is the pH of the solution?**

**Solution : A**

$$pOH = 1 \times 10^{-11}M.$$

$$p[OH] = -\log [OH^-]$$

$$pOH = -\log (1 \times 10^{-11})M$$

$$= -\log_{10} (1.0 \times 10^{-11})$$

$$pOH = -(-11)$$

$$pOH = 11.$$

$$pH + pOH = 14$$

$$pH = 14 - pOH$$

$$pH = 14 - 11$$

$$pH = 3.$$

**PART – D****33 . A ) i)****4. State Boyle's law.**

When the temperature of a gas is kept constant, the volume of a fixed mass of gas is inversely proportional to its pressure.

$$P \propto 1/V$$

In other words, for an invariable mass of a perfect gas, at constant temperature, the product of its pressure and volume is a constant.

(i.e)  $PV = \text{constant}$

**ii) ANY 4 POINTS.****Differentiate the eye defects: Myopia and Hypermetropia.****Ans :**

S.No.	Myopia	Hypermetropia
1	It is also known as short sightedness occurs due to the lengthening of eye ball	It is also known as long sightedness, occurs due to the shortening of eye ball
2	With this defect, nearby objects can be seen clearly but distant objects cannot be seen clearly	With this defect, distant objects can be seen clearly, but nearby objects cannot be seen clearly
3	The focal length of eye lens is reduced or the distance between eye lens and retina increases	The focal length of eye lens is increased or the distance between eye lens and retina decreases
4	The far point will not be infinity for such eyes and the far point has come closer	The near point will not be at 25 cm for such eyes and the near point has moved farther
5	Due to this the image of distant objects are formed before the retina	Due to this, the image of nearby objects are formed behind the retina
6	This defect can be corrected by using a concave lens	This defect can be corrected by using a convex lens
7	A suitable focal length of the concave lens to be used to correct this defect	A suitable focal length of the convex lens to be used to correct this defect

**B)**



Compare the properties of alpha, beta and gamma radiations.

Properties	$\alpha$ rays	$\beta$ rays	$\gamma$ rays
What are they? (Nature)	Helium nucleus ( ${}^4_2\text{He}^{4+}$ ) consisting of two protons and two neutrons.	They are electrons ( ${}_{-1}e^0$ ), basic elementary particle in all atoms.	They are electromagnetic waves consisting of photons.
Charge	Positively charged particles. Charge of each alpha particle = $+2e$	Negatively charged particles. Charge of each beta particle = $-e$	Neutral particles. Charge of each gamma particle = zero
Ionising power	100 time greater than $\beta$ rays and 10,000 times greater than $\gamma$ rays	Comparatively low	Very less ionization power

Properties	$\alpha$ rays	$\beta$ rays	$\gamma$ rays
Penetrating power	Low penetrating power (even stopped by a thick paper)	Penetrating power is greater than that of $\alpha$ rays. They can penetrate through a thin metal foil.	They have a very high penetrating power greater than that of $\beta$ rays. They can penetrate through thick metal blocks.
Effect of electric and magnetic field	Deflected by both the fields. (in accordance with Fleming's left hand rule)	Deflected by both the fields; but the direction of deflection is opposite to that for alpha rays. (in accordance with Fleming's left hand rule)	They are not deflected by both the fields.
Speed	Their speed ranges from $1/10$ to $1/20$ times the speed of light.	Their speed can go up to $9/10$ times the speed of light.	They travel with the speed of light.

34. A)

Give the salient features of "Modern atomic theory".

Modern Atomic Theory:

- + **An atom is no longer indivisible** (after the discovery of the electron, proton and neutron).
- + Atoms of the same element may have different atomic mass (discovery of **Isotopes**  ${}_{17}\text{Cl}^{35}$ ,  ${}_{17}\text{Cl}^{37}$ ).
- + Atoms of different elements may have same atomic masses (discovery of **Isobars**  ${}_{20}\text{Ar}^{40}$ ,  ${}_{20}\text{Ca}^{40}$ ).
- + Atoms of one element can be transmuted into atoms of other elements. In other words, atom is no longer indestructible (discovery of **artificial transmutation**).
- + Atoms may not always combine in a simple whole number ratio (Eg. Glucose  $\text{C}_6\text{H}_{12}\text{O}_6$  C:H:O = 6:12:6 or 1:2:1 and Sucrose  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$  C:H:O = 12:22:11).
- + Atom is the **smallest particle that take part in a chemical reaction**.
- + The mass of an atom can be converted into energy ( $E=MC^2$ ).

B)

**How is ethanol manufactured from sugarcane?**

Ethanol is manufactured in industries by the fermentation of molasses, which is a by product obtained during the manufacture of sugar from sugarcane. Molasses is a dark coloured syrupy liquid left after the crystallisation of sugar from the concentrated sugarcane juice. Molasses contain about 30% of sucrose, which cannot be separated by crystallisation. It is converted into ethanol by the following steps.

i) **Dilution of Molasses :**

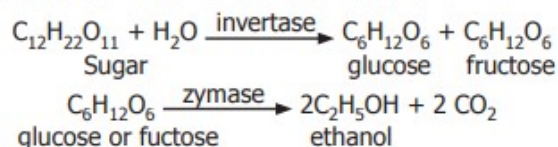
Molasses is first diluted with water to bring down the concentration of sugar to about 8 to 10 percent.

ii) **Addition of Nitrogen source :**

Molasses usually contains enough nitrogenous matter to act as food for yeast during the fermentation process. If the nitrogen content of the molasses is poor, it may be fortified by the addition of ammonium sulphate or ammonium phosphate.

iii) **Addition of Yeast :**

The solution obtained in step (ii) is collected in large 'fermentation tanks' and yeast is added to it. The mixture is kept at about 303K for a few days. During this period, the enzymes invertase and zymase present in yeast, bring about the conversion of sucrose into ethanol.



The fermented liquid is technically called wash.

iv) **Distillation of 'Wash' :**

The fermented liquid (i.e. wash), containing 15 to 18 percent alcohol, is now subjected to fractional distillation. The main fraction drawn is an aqueous solution of ethanol which contains 95.5% of ethanol and 4.5% of water. This is called rectified spirit. This mixture is then refluxed over quicklime for about 5 to 6 hours and then allowed to stand for 12 hours. On distillation of this mixture, pure alcohol (100%) is obtained. This is called absolute alcohol.

35 .A)

**What is transpiration? Give the importance of transpiration.**

Transpiration is the **evaporation of water** in plants through stomata in the leaves.

**Importance of Transpiration**

1. Creates transpirational pull for **transport of water**.
2. Supplies water for photosynthesis.
3. **Transports minerals** from soil to all parts of the plant.
4. **Cools** the surface of the leaves by evaporation.
5. Keeps the **cells turgid**; hence, maintains their **shape**.

B)

**Suggest measures to overcome the problems of an alcoholic.**

- i) **Education and counselling:** Education and proper counselling will help the alcoholics to overcome their problems and stress, to accept failures in their life.
- ii) **Physical activity:** Individuals undergoing rehabilitation should be channelized into healthy activities like reading, music, sports, yoga and meditation.
- iii) **Seeking help from parents and peer groups:** When a problematic situation occurs, the affected individuals should seek help and guidance from parents and peers. This would help them to share their feeling of anxiety, wrong doing and get rid of the habit.
- iv) **Medical assistance:** Individual should seek help from psychologists and psychiatrists to get relieved from this condition and to lead a relaxed and peaceful life.  
Alcohol de-addiction and rehabilitation programmes are helpful to the individual so that they could get rid of the problem completely and can lead a normal and healthy life.

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**--Best wishes for Public Exam--**

**Read**

**Revise**

**Rectify**

*It is easy to Score centum in Science.*

*Concentrate more on one marks , All the numerical problems and Biological diagrams.*

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