

**Class : 10**Register  
Number**COMMON HALF YEARLY EXAMINATION - 2024 - 25**

Time Allowed : 3.00 Hours]

**SCIENCE**

[Max. Marks : 75

**PART - I**

I. Note: (i) Answer all the questions.

(ii) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer. 12x1=12

1. The unit of 'g' is  $\text{ms}^{-2}$ . It can be also expressed as  
a)  $\text{Cms}^{-1}$                       b)  $\text{Nkg}^{-1}$                       c)  $\text{Nm}^2\text{kg}^{-1}$                       d)  $\text{Cm}^2\text{s}^{-2}$
2. Power of a lens is -4D, then its focal length is  
a) 4m                              b) -40m                              c) -0.25m                              d) -2.5 m
3. ----- aprons are used to Protect us from gamma radiations.  
a) Lead oxide                      b) Iron                              c) Lead                              d) Aluminium
4. The Volume occupied by 1 mole of diatomic gas at S.T.P. is  
a) 11.2 litre                      b) 5.6 litre                              c) 22.4 litre                              d) 44.8 litre
5. Which of the following is the universal solvent?  
a) Acetone                              b) Benzene                              c) Water                              d) Alcohol
6. TFM in soaps represents ----- content in soap.  
a) Mineral                              b) Vitamin                              c) Fatty acid                              d) Carbohydrate
7. Who discovered chemical pathway for photo synthesis  
a) C.N.R. Rao                              b) Kolliker                              c) Sochs                              d) Melvin Calvin
8. The brain of leech lies above the  
a) mouth                              b) Buccal cavity                              c) Pharynx                              d) Crop
9. Nerve cells do not possess  
a) neurilemma                              b) sarcolemma                              c) axon                              d) dendrites
10. Which one of the following is an IUCD?  
a) Copper T                              b) Oral pills                              c) Diaphragm                              d) Tubectomy
11. The centromere is found at the centre of the ----- chromosome.  
a) Telecentric                              b) Metacentric                              c) Sub-metacentric                              d) Acrocentric
12. All files are stored in the -----  
a) Folder                              b) box                              c) paint                              d) Scanner

**Part - II**

II. Note: (i) Answer any seven questions.

(ii) Q.No. 22 is compulsory.

13. State Newton's second law. (1) 7x2=14
14. Draw a ray diagram to show the image formed by a Convex lens when the object is placed between F and 2F. (2)
15. State Joule's law of heating. 4
16. Define atomicity. 2
17. Fill in the blanks.  
a) The general molecular formula of Alkyne is -----  
b) 100% pure Alcohol is called -----

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18. Who discovered Rh factor? Why was it named so? 14  
 19. What are Synthetic auxins? Give example? 15  
 20. Name the secondary sex organs in male. 16  
 21. What is metastasis? 21  
 22. A radon specimen emits radiations of  $3.7 \times 10^3$  G Bq per second. Convert this disintegration in term of Curie. 6)

## PART - III

III. Note: Answer any seven questions. Q.No: 32 is compulsory. 7x4 = 28

23. List any four Properties of light. 2  
 24. a) Define the unit of Current. 4  
 b) Distinguish between resistivity and conductivity of a conductor. 4  
 25. a) What is meant by alloys 9  
 b) What is meant by binary solution 9  
 26. In What way hygroscopic substances differ from deliquescent substances. 10  
 27. Difference between monocot root and Dicot root 12  
 28. How do plants absorb water? Explain. 14  
 29. Name the gaseous plant hormone. Describe its three different actions in plants. 15 16  
 30. Define Ethnobotany and write its importance. 19  
 31. Enumerate the importance of forest. 22  
 32. a) When an aqueous solution of Potassium Chloride is added to an aqueous solution of Silver Nitrate, a white Precipitate is formed. Give the chemical equation of this reaction. 9  
 b) If the  $P^H$  of a solution is 4.5, what is its  $P^{OH}$ ? 10

## PART - IV

IV. Note: Answer all the questions. 3x7=21

Draw diagram wherever necessary.

33. a) i) Define one Calorie. 13  
 ii) State and Prove the law of conservation of linear momentum. 4)  
 (OR)  
 b) i) Mention two cases in which there is no Doppler effect in sound? 15)  
 ii) Explain the process of controlled and uncontrolled chain reactions. 16)  
 34. a) (i) A is a Silvery White Metal. A Combines with  $O_2$  to form B at  $800^\circ C$ , the alloy of A is used in making the aircraft. Find A and B. 11)  
 (ii) Give the Salient features of "Modern Atomic Theory". 7  
 (OR)  
 b) i) Differentiate reversible and irreversible reactions. 10  
 ii) How is Ethanol manufactured from Sugar Cane? 11  
 35. a) i) Write the dental formula of rabbit. 13  
 ii) Classify neurons based on its structure with suitable diagram. 15  
 (OR)  
 b) i) State the applications of DNA finger Printing technique. 18  
 ii) How is the structure of DNA Organised? What is the biological Significance of DNA? 18

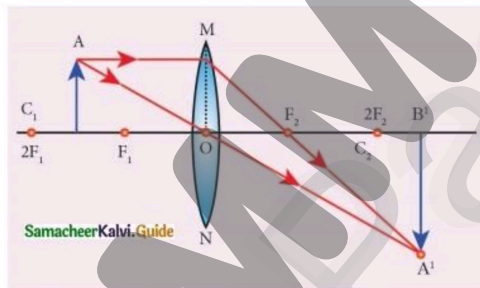
**COMMON HALF YEARLY  
EXAMINATION-2024-2025  
CHENNAI DISTRICT**

**STD: 10      SCIENCE  
PART-1**

1. d)  $\text{cm}^2\text{s}^{-2}$
2. d) -2.5m
3. c) lead
4. c) 22.4l
5. c) water
6. c) fatty acid
7. d) Melvin calvin
8. b) buccal cavity
9. b) sarcolemma
10. a) copper T
11. b) metacentric
12. a) folder

**PART=II**

13. The force acting on a body is directly proportional to the rate of change of linear momentum of the body and the change in momentum takes place in the direction of the force.



Object placed between F and C

- 14.
15. Joule's law of heating states that the heat produced in any resistor is: directly proportional to the square of the current passing through the resistor. directly proportional to the resistance of the resistor.  
directly proportional to the time for which the current is passing through the resistor.
16. The number of atoms present in the molecule is called its 'Atomicity'.
17.  $\text{C}_n\text{H}_{2n-2}$ , absolute alcohol

18. Landsteiner and Wiener discovered Rh factor of blood in 1940. Rh factor is a protein CD antigen present on the surface of the red blood cells in majority of humans. This protein is similar to the protein present in Rhesus monkey, hence the term Rh.

19. Artificially synthesized auxin which has the properties of auxins are called Synthetic Auxin. Eg: 2, 4-D
20. The secondary sex organs in the male are vas deferens, Epididymis, seminal vesicle, prostate gland and penis.
21. The cancerous cell migrate to distant Parts of the body affect new tissues. This process is called metastasis.

22. 1 Bq = one disintegration per second one curie =  $3.7 \times 10^{10}$  Bq = 1Bg =  $1/3.7 \times 10^{10}$   
 $3.7 \times 10^3$  Bq = 100 curie.

**PART-III**

23. Light is a form of energy. Light always travels along a straight line. Light does not need any medium for its propagation. It can even travel through a vacuum. The speed of light in vacuum or air is,  $c = 3 \times 10^8 \text{ ms}^{-1}$ . Since light is in the form of waves, it is characterized by a wavelength ( $\lambda$ ) and a frequency ( $\nu$ ), which are related by the following equation:  $c = \nu\lambda$  ( $c$  = velocity of light). Different coloured light has a different wavelength and frequency.
24. The current flowing through a conductor is said to be one ampere, when a charge of one coulomb flows across any cross-section of a conductor, in one second. Hence,  $1A = 1C/1S$ .

Resistivity	Conductivity
It is the resistance of a conductor of unit length and unit area of cross section. <small>SamacheerKalvi.Guide</small>	It is the reciprocal of electrical resistivity.
Its unit is ohm metre.	Its unit is mho metre <sup>-1</sup> .
$\rho = \frac{RA}{L}$	$\sigma = \frac{1}{\rho}$

25. An alloy is a homogeneous mixture of two or more metals or of one or more metals with certain non-metallic elements. **B)** A solution must at least be consisting of two components. Such solutions which are made of one solute and one solvent are called binary solutions. E.g., On adding CuSO<sub>4</sub> crystals to water.

#### 26. HYGROSCOPIC SUBSTANCE

Hygroscopic substances	Deliquescent substances
When exposed to the atmosphere at ordinary temperature, they absorb moisture and do not dissolve.	When exposed to the atmospheric air at ordinary temperature, they absorb moisture and dissolve.
Hygroscopic substances do not change its physical state on exposure to air. <small>SamacheerKalvi.Guide</small>	Deliquescent substances change its physical state on exposure to air.
Hygroscopic substances may be amorphous solids or liquids.	Deliquescent substances are crystalline solids.

#### 27. MONO & DICOT

Monocot Root	Dicot Root
Xylem is poly arch.	Xylem is usually tetrarch.
Pith is usually large at the centre.	Pith is usually absent.
Conjunctive tissue is made up of sclerenchyma. <small>SamacheerKalvi.Guide</small>	Conjunctive tissue is made up of parenchyma.
There is no secondary growth.	Secondary growth is generally present.

28. Water present in the soil must reach the xylem of roots. Root hair is in contact with soil water. Their cell wall is thin and water easily diffuses in the passage of water from the soil to leaf is Soil water → Root hair → Epidermis → Cortex → Endodermis → Pericycle → Xylem → Stem and leaf. Once water is absorbed by the root hairs, it can move deeper into root layers by two pathways. Apoplast and Symplast.

1. Apoplast : This is the non living path in plants. It occurs through the intercellular spaces and walls

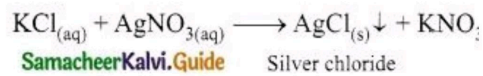
of the cells. This movement dependent on the gradient.

2. Symplast : This is the living passage. The movement of water from cell to cell through plasmodesmata and cytoplasm, Movement is again down a potential gradient.

29. GASEOUS PLANT: Ethylene is a gaseous plant hormone. It is a growth inhibitor. The different actions of ethylene are as follows: Ethylene promotes the ripening of fruits, eg. Tomato, Apple, Mango, Banana and etc. Ethylene inhibits the elongation of stem and root in dicots. Ethylene hastens the senescence of leaves and flowers. Ethylene stimulates the formation of Abscission zone in leaves, flowers and fruits. This leads to premature shedding. Ethylene breaks the dormancy of buds, seeds and storage organs.

30. Ethnobotany is the study of a region's plants and their practical uses through the traditional knowledge of the local culture of people.

31. Forests are an important component of our environment. There are microorganisms, flowering plants, shrubs, climbers and dense trees in the forest. Forests provide a vast habitat for wild animals. Forests help for the economic development of our country. Forests are the source for a wide range of renewable natural resource. Forests provide wood, food, fodder, fibre and medicine. They act as a carbon sink, regulate climatic conditions, increase rainfall and reduce global warming. The natural hazards like flood and landslides are prevented. Wildlife is protected. It acts as a catchment for water conservation. Forests maintain ecological balance.



32. Curdy white precipitate  
 $\text{pH} = \text{pOH} = 14$ ,  $\text{pOH} = 14 - 4.5$ ,  $\text{pOH} = 9.5$

### PART-IV

33. One calorie is defined as the amount of heat energy required to rise the temperature of 1 gram of water through  $1^\circ\text{C}$ . **(B)** Let two bodies A and B having masses  $m_1$  and  $m_2$  move with initial velocity  $u_1$  and  $u_2$  in a straight line. Let the velocity of the first body be higher than that of the second body, i.e.,  $u_1 > u_2$ . During an interval of time  $t$  second, they tend to have a collision. After the impact, both of them move along the same straight line with a velocity  $v_1$  and  $v_2$  respectively.

Force on body B due to A,

$$F_B = m_2(v_2 - u_2)/t$$

Force on body A due to B,

$$F_A = m_1(v_1 - u_1)/t$$

By Newton's III law of motion,

Action force = Reaction force

$$F_A = -F_B \quad m_1(v_1 - u_1)/t = -m_2(v_2 - u_2)/t$$

$$m_1 v_1 + m_2 v_2 = m_1 u_1 + m_2 u_2$$

The above equation confirms in the absence of an external force, the algebraic sum of the momentum after collision is numerically equal to the algebraic sum of the momentum before collision.

Hence the law of conservation of linear momentum is proved.

**(OR)**

When source (S) and listener (L) both are at rest. When S and L move in such a way that distance between them remains constant.

**CONTROLLED CHAIN REACTION:** In the controlled chain reaction the number of neutrons released is maintained to be one. This is achieved by absorbing the

extra neutrons with a neutron absorber leaving only one neutron to produce further fission. Thus, the reaction is sustained in a controlled manner. The energy released due to a controlled chain reaction can be utilized for constructive purposes. Controlled chain reaction is used in a nuclear reactor to produce energy in a sustained and controlled manner.

**UNCONTROLLED CHAIN REACTION:** In the uncontrolled chain reaction the number of neutrons multiplies indefinitely and causes fission in a large amount of the fissile material. This results in the release of a huge amount of energy within a fraction of a second. This kind of chain reaction is used in the atom bomb to produce an explosion.

34.

A - Silvery white metal - Aluminium  
 $4\text{Al} + 3\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3$

An atom is no longer indivisible.

Atoms of the same element may have different atomic mass.

Atoms of different elements may have the same atomic masses.

Atoms of one element can be transmuted into atoms of other elements. In other words, an atom is no longer indestructible.

Atoms may not always combine in a simple whole-number ratio.

Atom is the smallest particle that takes part in a chemical reaction. The mass of an atom can be converted into energy [ $E = mc^2$ ].

**(OR)**

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.
The reactants cannot be converted completely into products.	The reactants can be completely converted into products.
It is relatively slow.	It is fast. <a href="#">SamacheerKalvi.Guide</a>

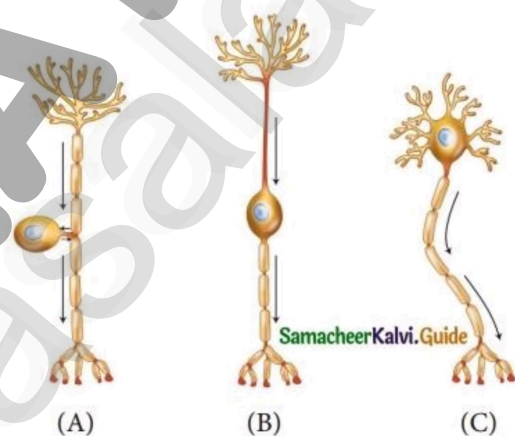
Ethanol is manufactured in industries by the fermentation of molasses, which is a by-product obtained during the manufacture of sugar from sugarcane. Molasses is a dark coloured syrupy liquid left after the crystallization of sugar from the concentrated sugarcane juice. Molasses contain about 30% of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

**DILUTION OF MOLASSES :** Molasses is first diluted with water to bring down the concentration of sugar to about 8 to 10 percent.

**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. **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. **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. The dental formula of rabbit is 2033/1023. The neurons may be of different types based on their structure and functions. Structurally the neurons may be of the following types:



(A) Unipolar (A), Bipolar (B) and multipolar (C) neurons

- (I) **UNIPOLAR NEURONS:** Only one nerve process arises from the cyton which acts as both axon and dendron.
- (II) **BIPOLAR NEURONS:** The cyton gives rise to two nerve processes of which one acts as an axon while another as a dendron.
- (III) **MULTIPOLAR NEURONS:** The cyton gives rise to many dendrons and an axon.

(OR)

DNA is the genetic material of almost all the organisms. One of the active functions of DNA is to make its copies which are transmitted to the daughter cells. Replication is the process by which DNA

makes exact copies of itself. Replication is the basis of life and takes place during the inter phase stage. During replication of DNA, two complementary strands of DNA unwind and separate from one end in a zipper like fashion. The enzyme helicase unwinds the two strands of the DNA. The enzyme called topoisomerase separates the double helix above the replication fork and removes the twists formed during the unwinding process. For the synthesis of new DNA, two things are required. One is RNA primer and enzyme primase. The DNA polymerase moves along the newly formed RNA primer nucleotides, which leads to the elongation of DNA. In the other strand DNA is synthesized in small fragments called Okazaki fragments. These fragments are linked by the enzyme called ligase. In the resulting DNA, one of the strands is parental and the other is the newer strands which is formed discontinuously.

#### **SIGNIFICANCE OF DNA:**

- (i) It is responsible for the transmission of hereditary information from one generation to next generation.
- (ii) It contains information required for the formation of proteins.
- (iii) It controls the developmental process and life activities of an organism.

