



**TAMIL NADU SSLC EXAMINATION, MARCH – 2022**  
**SCIENCE**

**Time: 3 Hours**

**Marks : 75**

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- Instructions:** (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.  
(2) Use Blue or Black ink to write and underline and pencil to draw diagrams.

**Note :** This question paper contain four parts

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**PART - I**

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

**12x1=12**

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

1. Where should an object be placed so that a real and inverted image of same size is obtained by a convex lens?  
(a) f                      (b) infinity                      (c) 2f                      (d) between f and 2f

**Answer:** (c) 2f

2. If a molecule is made of similar kind of atoms, then it is called \_\_\_\_\_ molecule.  
(a) Mono atomic              (b) hetero atomic              (c) homo atomic              (d) poly atomic

**Answer:** (c) homo atomic

3. The number of components in a binary solution is \_\_\_\_\_.  
(a) 2                      (b) 3                      (c) 4                      (d) 5

**Answer:** (a) 2

4. A charge of 12 coulomb flows through a bulb in 5 second. What is the current through the bulb?  
(a) 60 A                      (b) 17 A                      (c) 2.4 A                      (d) 24 A

**Answer:** (c) 2.4 A

5. Rectified spirit is an aqueous solution which contains about \_\_\_\_\_ of ethanol.  
(a) 95.5%                      (b) 75.5%                      (c) 55.5%                      (d) 45.5%

**Answer:** (a) 95.5%



6. The endarch condition is the characteristic feature of \_\_\_\_\_.  
(a) root                      (b) stem                      (c) leaves                      (d) flowers

**Answer:** (b) stem

7. The heart of fishes possess \_\_\_\_\_ chambers.  
(a) 3                      (b) 4                      (c) 2                      (d) 5

**Answer:** (c) 2

8. Male gametes in angiosperms are formed by the division of \_\_\_\_\_.  
(a) Generative cell  
(b) Vegetative cell  
(c) Pollen grain mother cell  
(d) Microspore

**Answer:** (a) Generative cell

9. Which one is referred as "Master Gland"?  
(a) Pineal gland  
(b) Pituitary gland  
(c) Thyroid gland  
(d) Adrenal gland

**Answer:** (b) Pituitary gland

10. Himgiri developed by hybridization and selection for disease resistance against rust pathogens is a variety of \_\_\_\_\_.  
(a) chilli                      (b) maize                      (c) sugarcane                      (d) wheat

**Answer:** (d) wheat

11. Match the following:  
(1) Solar Energy                      (i) Flowing water  
(2) Petroleum                      (ii) Mobile phone  
(3) Hydropower                      (iii) Inexhaustible energy  
(4) Electronic device                      (iv) Exhaustible energy resource

- (a) (1) - (iv), (2) - (iii), (3) - (ii), (4) - (i)  
(b) (1) - (iii), (2) - (iv), (3) - (i), (4) - (ii)  
(c) (1) - (iii), (2) - (i), (3) - (iv), (4) - (ii)  
(d) (1) - (i), (2) - (iv), (3) - (ii), (4) - (iii)

**Answer:** (b) (1) - (iii), (2) - (iv), (3) - (i), (4) - (ii)



12. Find the correct pair
- (a) Gregor Johann Mendel - Theory of Natural Selection  
(b) Waldeyer - Chromosomes  
(c) Watson and Crick - Theory of Evolution  
(D) Jean Baptoste Lamarch - Law of Heredity

**Answer:** (b) Waldeyer - Chromosomes

### PART-II

**Note:** Answer any seven questions. Question No. 22 is compulsory.

7x2=14

13. State Newton's second law.

**Answer:**

**Newton's second law:**

"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".

$$F = m \times a$$

Force mass  $\times$  acceleration

14. Write any two applications of echo.

**Answer:**

**Applications of echo: (any 2 points)**

- The principle of echo is used in obstetric ultrasonography, which is used to create real-time visual images of the developing embryo or fetus in the mother's uterus. This is a safe testing tool, as it does not use any harmful radiations.
- Some animals communicate with each other over long distances and also locate objects by sending the sound signals and receiving the echo as reflected from the targets.
- Echo is used to determine the velocity of sound waves in any medium.

15. State Boyle's Law.

**Answer:**

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.

$$P \propto 1/V$$

16. Write the functional group and the suffix used for the following class of compounds.

Class of Compounds	Functional Group	Suffix used
Alcohol		
Aldehyde		
Ketone		
Carboxylic Acid		

**Answer:**

Class of Compounds	Functional Group	Suffix used
Alcohol	-OH	-ol
Aldehyde	-CHO	-al
Ketone	$O    - C -$	-one
Carboxylic Acid	-COOH	-oic acid

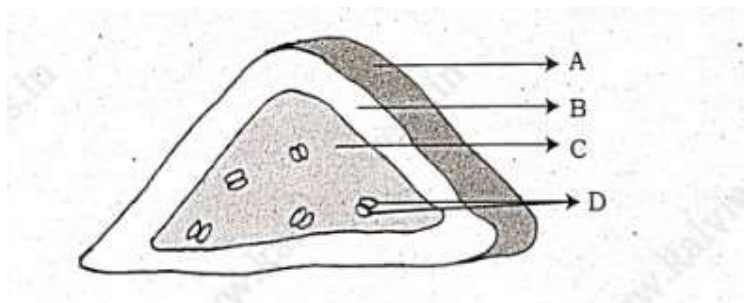
17. What is the importance of rainwater harvesting?

**Answer:**

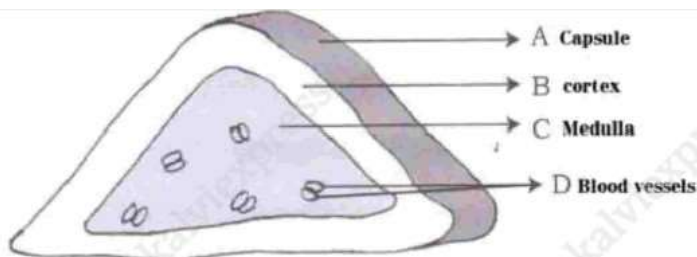
Importance of rainwater harvesting:

- Rainwater harvesting helps to Overcome the rapid depletion of groundwater levels.
- To meet the increase demand of water.
- Reduces flood and soil erosion
- Water stored in ground is not contaminated by human and animal wastes and hence can be used for drinking purpose.

18. Identify the parts A, B, C, D in the given figure.



**Answer:**



19. What is evolution? Who proposed the theories of evolution?

**Answer:**

Evolution:



- Evolution is the gradual change occurring in living organisms over a period of time. Formation of new species due to changes in specific characters over several generations as response to natural selection is called evolution.
- Lamarck and Darwin proposed the theories of evolution

20. Name the two maize hybrids rich in amino acid lysine.

**Answer:**

Two maize hybrids rich in amino acid lysine:

- Shakti
- Rathna
- Protina are maize hybrids rich in amino acid lysine

21. What is the importance of valves in the heart?

**Answer:**

Importance of valves in the heart:

- The valves are muscular flaps that regulate the flow of blood in a single direction.
- They prevent back flow of blood.

22. A person with myopia can see objects placed at a distance of 4 m. If he wants to see objects at a distance of 20 m, what should be the focal length and power of the concave lens he must wear?

**Answer:**

Given that  $x = 4\text{m}$  and  $y = 20\text{m}$

Focal length of the correction lens is

$$f = \frac{-xy}{x-y}$$

$$f = \frac{-4 \times 20}{4-20} = \frac{-80}{-16} = -5\text{m}$$

Power of the correction lens

$$= \frac{-1}{f} = \frac{-1}{-5} = 0.2\text{D}$$

### PART - III

**Note:** Answer any seven questions. Question No. 32 is compulsory.

7x4=28

23. Differentiate mass and weight.

**Answer:**

Sl. No.	Mass	Weight
1	It is the quantity of matter contained in the body	It is the gravitational force exerted on a body due to the earth's gravity alone
2	Mass is a scalar quantity	Weight is a vector quantity
3	It's unit is kg (kilogram)	It's Unit is N (newton)

24. List any four properties of light,

**Answer:**

Properties of light: (any 4 points)

1. Light is a form of energy.

2. Light always travels along a straight line.
  3. Light does not need any medium for its propagation. It can even travel through vacuum,
  4. The speed of light in vacuum or air is,  $c = 3 \times 10^8 \text{ ms}^{-1}$ .
  5. 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).
  6. Different coloured light has different wavelength and frequency.
  7. Among the visible light, violet light has the lowest wavelength and red light has the highest wavelength.
  8. When light is incident on the interface between two media, it is partly reflected and partly refracted.
25. Explain why the ceilings of concert halls are curved?

**Answer:**

The ceilings of concert halls are curved:

- Ceilings of concert halls are curved so that the sound after reflection reaches every corner hall and the audience can listen the sound clearly.
  - When the sound waves are reflected from the curved surface the intensity of the reflected waves is changed.
  - It is due to the multiple reflections of sound waves from the curved walls
26. (a) What is an alloy?  
(b) Give the reasons for alloying.

**Answer:**

(a) Alloy: An alloy is a homogeneous mixture of two or more metals or of one or more metals with certain non-metallic elements.

(b) Reason for alloying:

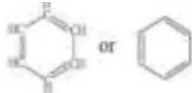
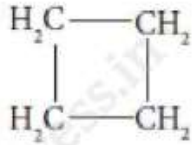
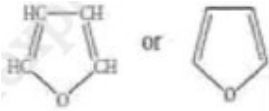
- To modify appearance and colour
- To modify chemical activity
- To lower the melting point.
- To increase hardness and tensile strength.
- To increase resistance to electricity.

27. Classify the following compounds based on the pattern of carbon chain and give their structural formula:

- (i) Propane
- (ii) Benzene
- (iii) Cyclobutane
- (iv) Furan

**Answer:**

<b>(i) Propane</b>	-	Acyclic compound	-	$\text{CH}_3\text{CH}_2\text{CH}_3$ <b>(or)</b> 
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(ii) Benzene	-	Cyclic Aromatic Compound	-	
(iii) Cyclobutane	-	Alicyclic Compound	-	
(iv) Furan	-	Heterocyclic Compound	-	

28. (a) What is respiratory quotient?  
 (b) Write the overall reaction for photosynthesis.

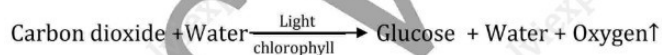
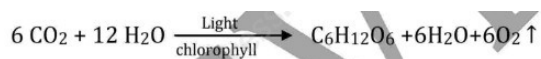
**Answer:**

(a) 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

$$RQ = \frac{\text{Volume of } CO_2 \text{ liberated}}{\text{Volume of } O_2 \text{ consumed}}$$

(b) Overall reaction for photosynthesis:



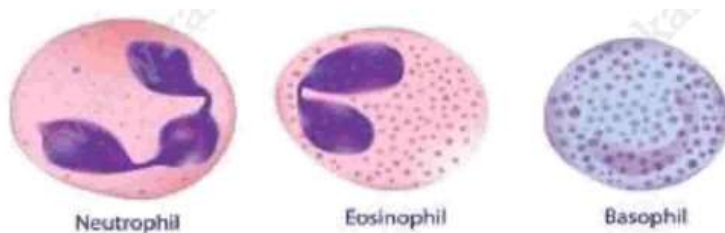
29. (a) Draw and label the parts of process of transpiration.  
 (b) Draw the pictures of Granulocytes.

**Answer:**

(a) Process of Transpiration:



(b) Granulocytes:



30. (a) List of theories postulated to explain the origin of life  
 (b) Who coined the term Ethnobotany?

**Answer:**

**(a) Theories postulated to explain the origin of life:**

Many theories have been postulated to explain the origin of life. The views on the origin of life has been put forth as

**Special creation:**

- This idea embodies that life on Earth is a divine creation and also attributes to supernatural event at a particular time in the past. It also emphasizes that life has not changed ever since its origin.

**Spontaneous generation (Abiogenesis):**

- According to this theory life originated spontaneously from lifeless matter.
- It was believed that fishes originated from mud, frogs from moist soil and insects from decaying matter.

**Biogenesis:**

- It was speculated by Louis Pasteur (1862) that life originates from pre-existing life.
- He showed that pre-sterilised flasks kept closed airtight, with killed yeast, did not give rise to any life form, while in another flask kept open to air living organisms arose from killed yeast.

**Extraterrestrial or Cosmic origin:**

- Some scientists still believe that life came from outer space. This states that units of life called spores (Panspermia) were transferred to different planets including earth. This is still an idea of some astronomers

**Chemical Evolution of Life:**

- This idea was developed by Oparin (1922) and Haldane (1929). They proposed that with the conditions prevailing on earth, life arose by a series of sequential chemical reactions.
- The first form of life could have come from pre-existing non-living inorganic molecules which gave rise to formation of diverse organic molecules which are transformed into colloid system to produce life. The modern concept on chemical evolution regarding origin of life was accepted.





(b) Coined the term 'Ethnobotany': J.W. Harsbberger

31. Discuss the importance of biotechnology in the field of medicine.

**Answer:**

Importance of biotechnology in the field of medicine:

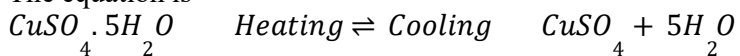
- Insulin used in the treatment of diabetes
- Human growth hormone used for treating children with growth deficiencies
- Blood clotting factors are developed to treat haemophilia
- Tissue plasminogen activator is used to dissolve blood clots and prevent heart attack
- Development of vaccines against various diseases like Hepatitis B and rabies

32. 'A' is a blue coloured crystalline salt. On heating it loses blue colour and gives 'B'. When water is added, 'B' gives back 'A'. Identify 'A' and 'B'. Write the equation.

**Answer:**

A is a blue coloured crystalline salt → Copper sulphate Penta hydrate  
 $CuSO_4 \cdot 5H_2O$  (blue vitriol)

The equation is



(Copper sulphate pentahydrate)

(Anhydrous copper sulphate)

#### PART-IV

**Note:** Answer all the questions. Draw diagrams wherever necessary.

3x7=21

33. (a) (i) What is meant by electric current ?

(ii) Name and define its unit.

(iii) Which instrument is used to measure the electric current? How should it be connected in a circuit ?

OR

(b) (i) Who discovered natural radioactivity ?

(ii) Write any three features of natural and artificial radioactivity.

(iii) Give any three uses of radio isotopes in the field of agriculture.

**Answer:**

(a) (i) Electric current:

- Electric current is often termed as 'current' and it is represented by the symbol 'I'.
- It is defined as the rate of flow of charges in a conductor
- $I = Q/t$

(ii) Name and define its unit.

- SI unit of electric current is ampere.
- 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,



- $1 \text{ ampere} = \frac{1 \text{ coulomb}}{1 \text{ second}}$

iii) Ammeter is used to measure electric current its should be connected in series in a circuit.

**OR**

(b) (i) Henri Becquerel.

(ii) Features of natural and artificial radioactivity: (any 3 points)

Sl. No.	Natural Radioactivity	Artificial Radioactivity
1	Emission of radiation due to self-disintegration of a nucleus.	Emission of radiation due to disintegration of a nucleus through induced process.
2	Alpha, beta and gamma radiations are emitted.	Mostly elementary particles such as neutron, positron, etc. are emitted.
3	It is a spontaneous process.	It is an induced process.
4	Exhibited by elements with atomic number more than 83.	Exhibited by elements with atomic number less than 83.
5	This cannot be controlled	This can be controlled

(iii) Uses of radio isotopes: (any 3 points)

- To kill the insects and parasites and prevent the wastage of agricultural products.
- Certain perishable cereals exposed to radiations remain fresh beyond their normal life, enhancing the storage time.
- Very small doses of radiation prevent sprouting and spoilage of onions, potatoes and gram.

34. (a) (i) Define Atomicity. Give an example.

(ii) Consolidate the major differences between atoms and molecules.

**OR**

(b) (i) Define combination reaction.

(ii) Give an example for combination reaction.

(iii) Differentiate reversible and irreversible reaction.

**Answer:**

(a) (i) Atomicity:

The number of atoms present in the molecule is called its 'atomicity.

(ii) The major Differences between atoms and molecules:

Atom	Molecule
An atom is the smallest particle of an element	A molecule is the smallest particle of an element or compound.



Atom does not exist in free state except in noble gas	Molecule exists in a free a state
Except some of noble gas, other atoms are highly reactive	Molecules are less reactive
Atom does not have a chemical bond	Atoms in a molecule are held by chemical bonds

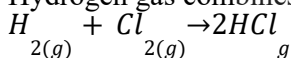
OR

(i) Combination reaction:

A combination reaction is a reaction in which two or more reactants combine to form a compound. It is otherwise called 'synthesis reaction' or 'composition reaction'.

(ii) Example:

Hydrogen gas combines with chlorine gas to form hydrogen chloride gas.



(iii) Reversible and irreversible reaction:

REVERSIBLE REACTION	IRREVERSIBLE REACTION
It can be reversed under suitable condition	It be cannot 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

35. (a) (i) What are synthetic auxins? Give examples.  
(ii) Define triple fusion.  
(iii) Name the secondary sex organs in male.

OR

- (b) (i) Why did Mendel select pea plant for his experiment ?  
(ii) Suggest measures to overcome the problems of an alcoholic.

**Answer:**

**(a) (i) Synthetic auxins:**

- Artificially synthesized auxins that have properties like auxins are called as synthetic auxins.
- Example: 2, 4 D (2,4 Dichlorophenoxy Acetic Acid).

**(ii) Triple fusion:**

- One sperm fuses with the egg (syngamy) and forms a diploid zygote.



- The other sperm fuses with the secondary nucleus (Triple fusion) to form the primary endosperm nucleus which is triploid in nature.

**(iii) Secondary sex organs in male:**

Vas deferens, epididymis, seminal vesicle, prostate gland and penis.

**OR**

(b) (i) Mendel select pea plant for his experiment:

- It is naturally self- pollinating and is very easy to raise pure breeding individuals.
- It has a short life span as it is an annual and so it was possible to follow several generations.
- It is easy cross pollinate.
- It has deeply defined contrasting characters.
- The flowers are bisexual.

**(ii) Problems of an alcoholic:**

- Education and counselling: Education and proper counselling will help the alcoholics to overcome their problems and stress, to accept failures in their life.
- Physical activity: Individuals undergoing rehabilitation should be channelized into healthy activities like reading, music, sports, yoga and meditation.
- 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.
- 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.