Register Number :

# QUARTERLY EXAMINATION - 2023

## SCIENCE

Std: 10

Marks : 75

Time : 3.00 hr

## PART – I

**I. Choose the correct answer :** **12x1=12**

1. One kilogram force equals to .....
   a) 9.8 dyne b) $9.8 \times 10^4$ N c) $98 \times 10^4$ dyne d) 980 dyne
2. The eye defect 'Presbyopia' Can be corrected by .....
   a) convex lens b) concave lens c) convex mirror d) Bi focal linese
3. The value of Avogadro number ..... a) $6.23 \times 10^{23}$/mol
   b) $6.023 \times 10^{23}$/mol c) $6.023 \times 10^{-23}$/mol d) $6.028 \times 10^{23}$/mol
4. SI unit of resistance is ..... a) mho b) joule c) ohm d) ohm meter
5. The gram molecular mass of oxygen molecule is
   a) 16g b) 18g c) 32 g d) 17g
6. _____ is an important metal to form amalgam a) Ag b) Hg c) Mg d) Al
7. Deliquescence is due to ..... a) Strong affinity to water
   b) Less affinity to water c) strong hatred to water d) inertness to water
8. Kreb's cycle takes place in ..... a) Chloroplast b) mitochondrial matrix
   c) stomata d) inner mitochondrial membrane
9. Mammals are _____ animals
   a) cold blooded b) warm blooded c) poikilothermic d) all the above
10. Vomiting centre is located in .....
    a) medulla oblongata b) stomach c) cerebrum d) hypothalamus
11. Syngamy results in the formation of .....
    a) zoospores b) conidia c) zygote d) chlomydospores
12. Okasaki fragments are joined together by .....
    a) Helicase b) DNA polymerase c) DNA primer d) DNA ligase

## PART – II

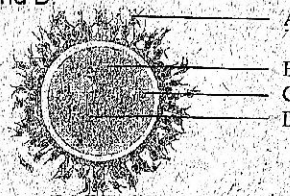
**II. Answer any 7 questions. Question no 22 compulsory** **7x2=14**

13. True or False. If false correct it.
    1. Increase in the converging power of eye lens cause 'hypermetropia'
    2. The convex lens always gives small virtual image.
14. Distinguish between ideal gas and real gas?
15. Name any two devices, which are working on the heating effect of the electric current?
16. Find the percentage of nitrogen in ammonia?
17. Match the following :

| | | |
|---|---|---|
| 1. Galvanisation | – | Noble gas elements. |
| 2. Calcinations | – | coating with 'zn' |
| 3. Dental filling | – | Heating in the absence of air |
| 4. Group 18 elements | – | silver - tine amalgam. |

18. Vinu dissolves 50g of sugar in 250 mal of hot water sarath dissolves 50g of same sugar in 250ml of cold water. Who will get faster dissolution of sugar? and why?
19. Where do the light dependent reaction and the Calvin cycle occur in the chloroplast?
20. When any dry plant material is kept in water, they swell up. Name and define the phenomenon involved in this change.

21. Write the physiological effects of gibberellins.
22. Identify the parts A, B, C, and D




## PART -III

**III. Answer any 7 question. Question No. 32 compulsory.** **7x4=28**

23. What are the types of inertia? Give an example for each type?
24. Distinguish between linear, Arial and superficial expansion.
25. Calculate the number of moles in
    i) 27 g of Al ii) $1.51 \times 10^{23}$ molecules of $NH_4Cl$
26. A is a silvery white metal. A combines with $O_2$ to
    a) from B at $800^0$c, the alloy of A is used in making the aircraft. Find A and B.
    b) The aquatic animals live more in cold region why?
27. a) Differentiate the following.
    Aerobic and Anaerobic respiration.
    b) Match columns I, II and III correctly

| Organs | Membranous covering | Location |
|---|---|---|
| 1. Brain - | Pleura - | abdominal cavity |
| 2. Kidney - | Capsule - | mediastinum |
| 3. Heart - | meanings - | enclosed in thoracic cavity |
| 4. Lungs - | pericardium - | cranial cavity |

28. What is transpiration? Give the importance of transpiration?
29. Classify neurons based on its structure.
30. a) What are chemical messengers? b) Define triple fusion?
31. How is the structure of DNA organized?
    What is the biological significance of DNA?
32. Three resistors of 1Ω, 2 Ω, 3 Ω are connected in paroled in a circuit. If a 1 Ω register draw a current of 1 A, find the current through the other two resistors.

## PART - IV

**IV. Answer all the questions, each questions carries seven marks. Draw diagram where necessary.** **7x3=21**

33. a) What are the advantages of LED TV over the normal TV?
    b) List the merits of LED bulb **(or)** a) List any five properties of light.
    b) The eyes of the nocturnal birds like owl are having a large cornea and a large pupil. How does it help them?
34. a) Give the salient features of "Modern atomic theory"
    b) Calcium carbonate is decomposed on heating in the following reaction
    $CaCO_3 \rightarrow CaO+CO_2$
    i) How many moles of calcium carbonate are involved in this reaction?
    ii) Calculate the gram molecular mass of calcium carbonate involved in this reaction.
    iii) How many moles of $CO_2$ are there in this equation? **(or)**
    a) What is rust? Give the equation for formation of rust.
    b) In what way hygroscopic substances differ from deliquescent substances.
35. a) Differentiate between systole and diastole.
    Explain the conduction of heart beat.
    b) Which hormone requires iodine for its formation? What will happen if intake of iodine in our diet is low? **(or)**
    a) With a neat labeled diagram describe the parts of a typical angiosperm ovule?
    b) Why are family planning methods not adopted by all the people of our country?

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ARIYALUR (DISTRICT).

QUARTERLY EXAMINATION – 2023

SCIENCE KEY ANSWER.

PART-1.

| | | |
|---|---|---|
| 1. | C | $98 \times 10^4$ dyne. |
| 2. | D. | Bi focal lense. |
| 3. | B. | $6.023 \times 10^{23}$/mol. |
| 4. | C. | Ohm. |
| 5. | C. | 32g |
| 6. | B. | Hg |
| 7. | A. | Strong affinity to water. |
| 8. | B. | Mito chondrial matrix. |
| 9. | B. | Warm blooded. |
| 10. | A. | Medulla oblongata |
| 11. | C. | Zygote. |
| 12. | D. | DNA ligase. |

(13) Increase in the converging power of eye lens cause 'hypermetropia' ※※

**Ans: False**

**Decrease** in the converging power of eye lens cause 'hypermetropia'

The convex lens always gives small virtual image.

**Ans: False**

The **concave** lens always gives small virtual image.

(14) **Distinguish between ideal gas and real gas.** ※※

| | Ideal Gases | | Real Gases |
|---|---|---|---|
| 1. | The atoms or molecules of a gas do not interact with each other. | 1. | The molecules or atoms of a gases interact with each other. |
| 2. | At low pressure or high temperature the interatomic or intermolecular forces of attraction are weak. | 2. | At very high temperature or low pressure, a real gas behaves as an ideal gas because of the lack of inter atomic or intermolecular force of attraction. |

(15) **Name any two devices, which are working on the heating effect of the electric current.**

1. Electric heater
2. Electric Iron

(16) **Find the percentage of nitrogen in ammonia.** ※※ **(PTA - 1)**

**Solution:**

Molar mass of $NH_3$ = (1 × atomic mass of nitrogen) + (3 × atomic mass of hydrogen)

$= (1 \times 14) + (3 \times 1)$

$= 14 + 3$

$= 17g$

Percentage of N in $NH_3$ $= \frac{\text{mass of nitrogen}}{\text{molar mass of } NH_3} \times 100$

$= \left(\frac{14}{17}\right) \times 100$

$= 0.8235 \times 100$

The percentage of nitrogen in ammonia= **82.35%**

(17) Match.

1. Galvanisation — Coating with zn.
2. Calcination — Heating in the absence of air
3. Dental filling — Silver-tin amalgam.
4. Group 18 elements — Noble gas elements.

(18)

**Vinu dissolves 50g of sugar in 250ml of hot water, Sarath dissolves 50g of same sugar in 250ml of cold water. Who will get faster dissolution of sugar? and Why?** **(PTA - VI)**

**Ans:** Vinu will get a faster dissolution of sugar.

**Reason:**

1. Solubility of a solid solute in a liquid solvent increases with the increase in temperature.
2. Hence, a greater amount of sugar will dissolve in warm water than in cold water.

(19) **Where do the light dependent reaction and the Calvin cycle occur in the chloroplast?**

1. The Light dependent reaction takes place in the **thylakoid membranes (grana)** of the chloroplast.
2. The Calvin cycle takes place in the **stroma** of the chloroplast.

(20) **When any dry plant material is kept in water, they swell up. Name and define the phenomenon involved in this change.**

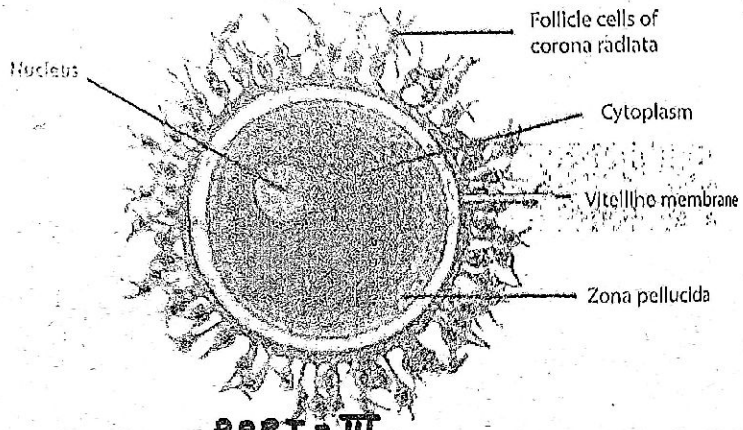
1. The phenomenon involved in the given demonstration is **imbibition.**
2. Imbibition is a type of diffusion in which a solid absorbs water and gets swelled up.

E.g: Absorption of water by the seeds.

(21) **Write the physiological effects of gibberellins.**

1. Application of gibberellins on plants stimulate extraordinary elongation of internodes.
2. Treatment of rosette plants with gibberellins induce sudden shoot elongation followed flowering. This is called bolting.
3. Gibberellins promote the production of male flowers in monoecious plants (Cucurbits)
4. Gibberellins break dormancy of potato tubers.
5. Gibberellins are efficient than auxin in inducing the formation of seedless fruits.

(22)




## PART - III

(23) **What are the types of inertia? Give an example for each type.**

**Definition:**

The inherent property of a body to resist any change in its state of rest or the state of uniform motion, unless it is influenced upon by an external unbalanced force, is known as **inertia.**

Inertia is of three types,

i. Inertia of rest
ii. Inertia of motion
iii. Inertia of direction

**I. Inertia of rest:**

The resistance of a body to **change** its state of **rest** is called inertia of rest.

**Example:** When we vigorously shake the branches of a tree, some of the leaves and fruits are detached and they fall down.

**II. Inertia of motion:**

The resistance of a body to change its state of **motion** is called inertia of motion.

**Example:** An athlete runs some distance before jumping. Because, this will help him jump longer and higher.

**III. Inertia of direction:**

The resistance of a body to change its **direction of motion** is called inertia of direction.

**Example:** Making a sharp turn while driving a car, we tend to lean sideways.

(24)

| | Ideal Gases | | Real Gases |
|---|---|---|---|
| 1. | The atoms or molecules of a gas do not interact with each other. | 1. | The molecules or atoms of a gases interact with each other. |
| 2. | At low pressure or high temperature the interatomic or intermolecular forces of attraction are weak. | 2. | At very high temperature or low pressure, a real gas behaves as an ideal gas because of the lack of inter atomic or intermolecular force of attraction. |

(25) **Calculate the number of moles in** (PTA - V)

(i) **27 g of Al**

$$\text{Number of mole} = \frac{\text{Mass of the element}}{\text{Atomic mass of the element}}$$

$$= \frac{27}{27} \quad (\because \text{Atomic mass of aluminium} = 27)$$

$$= 1 \text{ mole}$$

(ii) **$1.51 \times 10^{23}$ molecules of $NH_4Cl$** (PTA - V)

$$\text{Number of moles} = \frac{\text{Number of molecules of } NH_4Cl}{\text{Avogadro Number}}$$

$$= \frac{1.51 \times 10^{23}}{6.023 \times 10^{23}}$$

$$= \frac{1}{4}$$

$$= 0.25 \text{ moles of } NH_4Cl$$

(26)

(a) **A is a silvery white metal. A combines with $O_2$ to form B at 800°C, the alloy of A is used in making the aircraft. Find A and B.** (PTA - II)

**Ans:**

1. **A - silvery white metal – Aluminium**

$$\underset{A}{4Al} + 3O_2 \xrightarrow{800^\circ C} \underset{B}{2Al_2O_3}$$

(b) 2. **B - Aluminium oxide**

**The aquatic animals live more in cold region. Why?** (PTA - V)

Aquatic animals live more in cold regions because,

1. More amount of dissolved oxygen is present in the water of cold regions.
2. The solubility of oxygen in water is more at low temperatures.

27 Aerobic and Anaerobic respiration. ※※ (GMQ - 2019, SEP - 21 & 22)

(a)

| | Aerobic Respiration | | Anaerobic Respiration |
|---|---|---|---|
| 1. | Aerobic respiration is a type of cellular respiration that takes place **with** the help of **oxygen.** | 1. | Anaerobic respiration takes place **without oxygen.** |
| 2. | The organic food is completely oxidized with $O_2$ into carbon - di - oxide, water and energy. It occurs most in plants and animals. | 2. | Glucose is converted into **ethanol** in plants or **lactate** in some bacteria. |
| 3. | $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + ATP$ | 3. | $C_6H_{12}O_6 \longrightarrow 2CO_2 + 2C_2H_5OH$ + Energy (ATP) |

(b)

| | Organs | | Membranous covering | | Location |
|---|---|---|---|---|---|
| 1. | Brain | - | c. meninges | - | D. cranial cavity |
| 2. | Kidney | - | b. capsule | - | A. abdominal cavity |
| 3. | Heart | - | d. pericardium | - | B. mediastinum |
| 4. | Lungs | - | a. pleura | - | C. enclosed in thoracic cavity |

28 **What is transpiration? Give the importance of transpiration.** (SEP - 22)

**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.**

## Classify neurons based on its structure. (SEP - 2020)

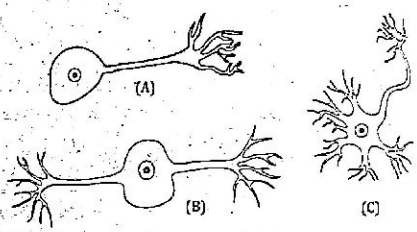
(29) Neurons are classified into three types based on their structure. They are,

1. **Unipolar neurons:**

   Only **one nerve process** arises from the cyton which acts as both axon and Dendron.

   **Location:**

   Found in early embryos but not in adult.




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

2. **Bipolar neurons:**

   The cyton gives rise to **two** nerve processes of which one acts as an axon while another as a Dendron.

   **Location:**

   Found in retina of eye and olfactory epithelium of nasal chambers.



3. **Multipolar neurons:**

   The cyton gives rise to **many dendrons** and an axon.

   **Location:**

   Found in cerebral cortex of brain.

(30) **What are chemical messengers?**

(a)

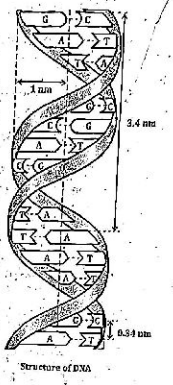
1. The chemical messengers are known as **hormones** which are produced by endocrine glands.
2. Physiological processes such as digestion, metabolism, growth, development and reproduction are controlled by hormones.
   **E.g:** Growth hormone

(b) **Define triple fusion.** ※※※ (GMQ - 2019, MAY - 22)

1. During double fertilization one sperm fuses with the egg and forms a diploid zygote.
2. The other sperm fuses with the **secondary nucleus** to form the **primary endosperm** nucleus which is **triploid** in nature. This is called triple fusion.

(31) **How is the structure of DNA organised? What is the biological significance of DNA?** **(SEP - 2020)** ※※※

1. DNA molecule consists of two polynucleotide chains.
2. These chains form a double helix structure.
3. Nitrogenous bases in the centre are linked to sugar - phosphate units which form the backbone of the DNA.
4. Pairing between the nitrogenous bases is very specific and is always between purine and pyrimidine linked by hydrogen bonds.
5. Hydrogen bonds between the nitrogenous bases make the DNA molecule stable.
6. Each turn of the double helix is 34 A° (3.4nm). There are ten base pairs in a complete turn.
7. The nucleotides in a helix are joined together by phosphodiester bonds.



Structure of DNA

**Significance of DNA:**

1. It is responsible for the transmission of hereditary information from one generation to next generation.
2. It contains information required for the formation of proteins.
3. It controls the development process and life activities of an organism.

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(32) 4. Three resistors of 1 Ω, 2 Ω and 4 Ω are connected in parallel in a circuit. If a 1 Ω resistor draws a current of 1 A, find the current through the other two resistors.

**Solution:**

$R_1 = 1\ \Omega, R_2 = 2\ \Omega, R_3 = 4\ \Omega$ Current $I_1 = 1$ A

The potential difference across the 1 Ω resistor $= I_1 R_1 = 1 \times 1 = 1$ V

Since, the resistors are connected in parallel in the circuit, the same potential difference will exist across the other resistors also.

So, the current in the 2 Ω resistor, $\frac{V}{R_2} = \frac{1}{2} = 0.5$ A

Similarly, the current in the 4 Ω resistor,

$$\frac{V}{R_3} = \frac{1}{4} = 0.25 \text{ A}$$

PART - IV

33 a. **What are the advantages of LED TV over the normal TV? (PTA - VI)**

1. It has **brighter** picture quality.
2. It is **thinner** in size.
3. It uses **less power** and consumes very less energy.
4. Its **lifespan** is more.
5. It is more **reliable.**

b. **List the merits of 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, it has 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 required.

(OR)

33 a. **List any five properties of light.** ※※ **(MAY - 2022)**

**Properties of light:**

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

b. **The eyes of the nocturnal birds like owl are having a large cornea and a large pupil. How does it help them?**

The eyes of nocturnal birds like owl has large cornea and a large pupil, these features increase their field of vision and an increase retinal surface and help them to collect more ambient light during night.

34 **Give the salient features of "Modern atomic theory".** ※※※

(a) **Salient features of Modern atomic theory:** (SEP - 20 & 22, PTA - V)

1. An atom is no longer indivisible (after the discovery of the electron, proton and neutron).
2. The mass of an atom can be converted into **energy** ($E = mc^2$).
3. Atom is the **smallest particle** that takes part in a chemical reaction.
4. Atoms of the same element may have different atomic mass. (discovery of **isotopes** ${}_{17}Cl^{35}$, ${}_{17}Cl^{37}$).
5. Atoms of different elements may have same atomic masses. (discovery of **Isobars** ${}_{18}Ar^{40}$, ${}_{20}Ca^{40}$).
6. Atoms of one element can be transmuted into atoms of other elements. In other words, atom is no longer indestructible (discovery of **artificial transmutation**).
7. Atoms may not always combine in a simple whole number ratio. (**E.g:** Glucose $C_6H_{12}O_6$ C:H:O = 6:12:6 or 1:2:1 and Sucrose $C_{12}H_{22}O_{11}$ C:H:O = 12:22:11)

(b) **Calcium carbonate is decomposed on heating in the following reaction.**

$CaCO_3 \longrightarrow CaO + CO_2$

**Ans:** $CaCO_3 \xrightarrow{\Delta} CaO + CO_2$

i. **How many moles of Calcium carbonate are involved in this reaction?**

**Ans:** 1 mole

ii. **Calculate the gram molecular mass of calcium carbonate involved in this reaction**

Molecular mass of $CaCO_3$

Atomic mass of Ca -40, C -12, O -16

$= CaCO_3$

$= (1\times 40) + (1\times 12) + (3\times 16)$

$= 40 + 12 + (48)$

$= 52 + 48$

$= 100 g/mole$

iii. **How many moles of $CO_2$ are there in this equation?**

**Ans:** One mole of $CO_2$

34 (OR)

(a) **What is rust? Give the equation for formation of rust.** ※※※

**Rust:** (PTA - IV, SEP - 2021)

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

$$4Fe + 3O_2 + xH_2O \longrightarrow \underset{\text{rust}}{2Fe_2O_3 \cdot xH_2O}$$

(b) **In what way hygroscopic substances differ from deliquescent substances.**

| Hygroscopic substances | Deliquescence substances |
|---|---|
| 1. When exposed to the atmosphere at ordinary temperature, they **absorb moisture** and **do not dissolve.** | 1. When exposed to the atmospheric air at ordinary temperature, they **absorb moisture** and **dissolve.** |
| 2. They **do not change** its physical state on exposure to air. | 2. They **change** their physical state on exposure to air. |
| 3. They may be **amorphous solids** or liquids. | 3. They are **crystalline** solids. |
| 4. They are used as drying agents. | 4. They dissolve in water forming saturated solutions. |
| 5. E.g: Quick lime, silica gel | 5. E.g: Caustic soda, Caustic potash |

35

(a) **Differentiate between systole and diastole. Explain the conduction of heart beat.**

| Systole | Diastole |
|---|---|
| 1. Systole is the contraction phase of the heart. | 1. Diastole is the relaxation phase of the heart. |
| 2. The blood pressure of 120 mm is considered normal in systolic pressure. | 2. The blood pressure of 80 mm is considered normal in diastolic pressure. |
| 3. It consists of two events,<br>1. Atrial systole<br>2. Ventricular systole | 3. It consists of two events,<br>1. Atrial diastole<br>2. Ventricular diastole |

**Initiation and conduction of Heart beat:**

1. The human heart is myogenic in nature.
2. Contraction is initiated by a specialized portion of the heart muscle, the sino - atrial (SA) node which is situated in the wall of the right atrium near the opening of the superior vena cava.
3. The SA node is broader at the top and tapering below and it is made up of thin fibres.
4. Sino - atrial node acts as the 'pacemaker' of the heart as it is capable of initiating impulse which can stimulate the heart muscles to contract.

(b) **Which hormone requires iodine for its formation? What will happen if intake of iodine in our diet is low?**

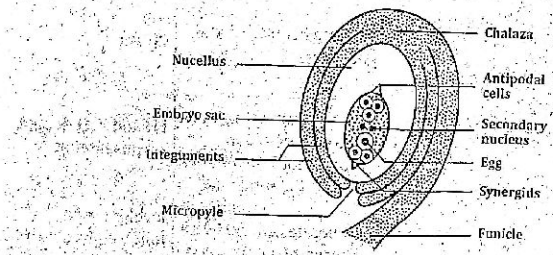
1. **Thyroid hormone** - requires iodine for its formation.
2. If intake of iodine in our diet is low, it leads to the enlargement of thyroid gland which protrudes as a marked swelling in the neck and is called as **goitre.**

35 (a) **With a neat labelled diagram describe the parts of a typical angiospermic ovule.** (PTA - V)

(OR)

**Structure of the ovule:**

1. The main part of the ovule is the **nucellus** which is enclosed by two integuments leaving an opening called as **micropyle.**
2. The ovule is attached to the ovary wall by a stalk known as **funiculus.**
3. **Chalaza** is the basal part.
4. The embryo sac contains **seven** cells and the **eighth nuclei** located within the nucellus.




**Structure of an Ovule**

5. Three cells at the microphylar end form the egg apparatus.
6. The three cells at the chalaza end are the **antipodal cells.**
7. The remaining two nuclei are called **polar nuclei** found in the centre.
8. In the egg apparatus one is the egg cell (female gamete) and the remaining two cells are the **synergids.**

(b) **Why are family planning methods not adopted by all the people of our country?**

1. Lack of awareness among the people of our country is the foremost reason for not adopting family planning.
2. **Hormonal methods:**

   It creates hormonal imbalance and can cause side effects to our body.
3. **Intra - Uterine Devices:**

   Devices like Lippe's Loop and copper - T causes irritation in the uterus.
4. **Surgical methods:**

   These cause infections and other problems if not performed properly.

So family planning methods are not adopted by all the people of our country.