UNIT 12 PLANT ANATOMY AND PLANT PHYSIOLOGY

I. Choose the correct answer

1. Casparian strips are present in the _____ of the root.
a) cortex b) pith c) pericycle d) endodermis **Ans.: d) Endodermis**
2. The endarch condition is the characteristic feature of
a) root b) stem c) leaves d) flower **Ans.: b) Stem**
3. The xylem and phloem arranged side by side on same radius is called _____
a) radial b) amphivasal c) conjoint d) None of these **Ans.: c) Conjoint**
4. Which is formed during anaerobic respiration
a) Carbohydrate b) Ethyl alcohol c) Acetyl CoA d) Pyruvate **Ans.: b) Ethyl alcohol**
5. Kreb's cycle takes place in a) chloroplast b) mitochondrial matrix c) stomata
d) inner mitochondrial membrane **Ans.: b) Mitochondrial matrix**
6. Oxygen is produced at what point during photosynthesis ?
a) when ATP is converted to ADP b) when CO_2 is fixed c) when H_2O is splitted d) All of these
Ans.: c) When H_2O is splitted

II. Fill in the blanks.

1. The innermost layer of cortex in root is called _____. **Ans.: Endodermis**
2. Xylem and phloem are arranged in the alternate radii constitute a vascular bundle called _____.
Ans.: Radial vascular bundle
3. Glycolysis takes place in _____. **Ans.: Cytoplasm**
4. The source of O_2 liberated in photosynthesis is _____. **Ans.: Photolysis of water**
5. _____ is ATP factory of the cells. **Ans.: Mitochondria**

III. State whether the statements are true or false. Correct the false statement.

1.Phloem tissue is involved in the transport of water in plant. **Ans.: False**
Correct statement : Xylem tissue is involved in the transport of water in plant.
2. The waxy protective covering of a plant is called as cuticle. **Ans.: True**
3. In monocot stem cambium is present in between xylem and phloem. **Ans.: False**
Correct statement : In **dicot** stem cambium is present in between xylem and phloem.
4. Palisade parenchyma cells occur below upper epidermis in dicot root. **Ans.: False**
Correct statement : Palisade parenchyma cells occur below upper epidermis in dicot **leaf**.
5. Mesophyll contains chlorophyll. **Ans.: True**
6. Anaerobic respiration produces more ATP than aerobic respiration. **Ans.: False**
Correct statement : Aerobic respiration produces more ATP than **anaerobic** respiration.

IV. Match the following

1. Amphicribal - Dracaena
2. Cambium - Translocation of food
3. Amphivasal - Fern
4. Xylem - Secondary growth
5. Phloem - Conduction of water

Ans.:

1. Amphicribal	**- Fern**
2. Cambium	**– Secondary growth**
3. Amphivasal	**- Dracaena**
4. Xylem	**- Conduction of water**
5. Phloem	**- Translocation of food**

V. Answer in a sentence

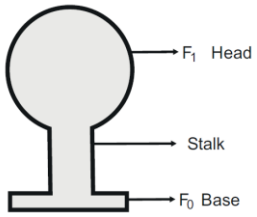
1. What is collateral vascular bundle?
Vascular bundle in which xylem lies towards the centre and phloem lies towards the periphery is known as collateral vascular bundle.
2. Where does the carbon that is used in photosynthesis come from?
Terrestrial plants obtain CO_2 from atmosphere and aquatic plants obtain dissolved CO_2 from water.
3. What is the common step in aerobic and anaerobic pathway?
Glycolysis is the common step in aerobic and anaerobic pathway.
4. Name the phenomenon by which carbohydrates are oxidized to release ethyl alcohol.
During **anaerobic respirat ion or fermentation**, carbohydrates are oxidized to release ethyl alcohol.

VI. Short answer questions

1.Give an account on vascular bundle of dicot stem.
i)Vascular bundles of dicot stem are conjoint, collateral, endarch and open.
ii)They are arranged in the form of a ring around the pith.
2. Write a short note on mesophyll.
The tissue present between the upper and lower epidermis is called mesophyll.
It is differentiated into
a)Palisade parenchyma : It is found just below the upper epidermis. The cells are elongated. These cells have more number of chloroplasts. The cells do not have intercellular spaces and they take part in photosynthesis.

b)Spongy parenchyma : It is found below the palisade parenchyma tissue. Cells are almost spherical or oval and are irregularly arranged. Cells have intercellular spaces. It helps in gaseous exchange.

3. Draw and label the structure of oxysomes.



4. Name the three basic tissues system in flowering plants.

The three basic tissues system in flowering plants are

i) Dermal or Epidermal tissue system

ii) Ground tissue system and

iii) Vascular tissue system

5. What is photosynthesis and where in a cell does it occur?

i) Photosynthesis is a process in which **carbon dioxide** combines with **water** in the presence of **sunlight** and **chlorophyll** to form **carbohydrates**. During this process **oxygen** is released as a byproduct.

$$6CO_2 + 12H_2O \xrightarrow{\text{Light}} C_6H_{12}O_6 + 6H_2O + 6O_2 \uparrow$$

Carbon dioxide + Water Chlorophyll Glucose + Water + Oxygen

ii) It occurs in the **chloroplast** of plant cell.

6. 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

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

7. Why should the light dependent reaction occur before the light independent reaction?

The light dependent reaction (Light reaction) should occur before light independent reaction (Dark reaction). Because, the dark reaction depends upon the organic energy molecules (ATP and $NADPH_2$) produced in light reaction to reduce CO_2 into carbohydrate.

8. Write the reaction for photosynthesis.

$$6CO_2 + 12H_2O \xrightarrow{\text{Light}} C_6H_{12}O_6 + 6H_2O + 6O_2 \uparrow$$

Carbon dioxide + Water Chlorophyll Glucose + Water + Oxygen

VII. Long answer questions

1. Differentiate a) Monocot Root and Dicot Root b) Aerobic and Anaerobic respiration .

a) Monocot Root and Dicot Root

S. No.	Tissues	Dicot Root	Monocot Root
1	Number of Xylem	Tetrarch	Polyarch
2	Cambium	Present (During secondary growth only)	Absent
3	Secondary Growth	Present	Absent
4	Pith	Absent	Present
5	Conjunctive Tissue Ex.	Parenchyma Bean	Sclerenchyma Maize

b) Aerobic and Anaerobic respiration

Aerobic Respiration	Anaerobic Respiration
1.It takes place in **higher plants and animals**.	1.It takes place in **lower plants.(Yeast and Bacteria).**
2.Oxygen is **utilized** for respiration.	2.Oxygen is **not utilized** for respiration.
3.Glucose is **completely** oxidized.	3.**Incomplete** oxidation of Glucose takes place.
4.**More energy** is produced. (38 ATP)	4.**Less energy** is produced. (2 ATP)
5.The end products are **CO_2 , H_2O and Energy**	5.The end products are **Ethenol or Lactic acid , CO_2 and Energy.**

2. Describe and name three stages of cellular respiration that aerobic organisms use to obtain energy from glucose.

Stages of Aerobic respiration

a.Glycolysis (Glucose splitting): i) It is the breakdown of one molecule of glucose (6 carbon) into two molecules of pyruvic acid (3 carbon).

ii) Glycolysis takes place in cytoplasm of the cell.

iii) It is the first step of both aerobic and anerobic respiration.

b. Krebs Cycle: i) This cycle occurs in mitochondria matrix.

ii)At the end of glycolysis, 2 molecules of pyruvic acid enter into mitochondria.
iii)The oxidation of pyruvic acid into CO_2 and water takes place through this cycle. It is also called **Tricarboxylic Acid Cycle** (TCA).
c. Electron Transport Chain: i) This is accomplished through a system of electron carrier complex called **electron transport chain** (ETC) located on the inner membrane of the mitochondria.
ii) $NADH_2$ and $FADH_2$ molecules formed during glycolysis and Krebs cycle are oxidised to NAD^+ and FAD^+ to release the energy via electrons.
iii) The electrons, as they move through the system, release energy which is trapped by ADP to synthesize ATP. This is called **oxidative phosphorylation**.
iv) In this process, O_2 the ultimate acceptor of electrons gets reduced to water.

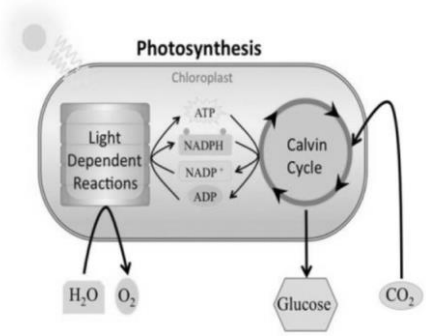
3. How does the light dependent reaction differ from the light independent reaction? What are the end product and reactants in each? Where does each reaction occur within the chloroplast?

	Light dependent reaction	Light independent reaction
Important Differences	1.It takes place in the **presence of light.**	1. 1.It takes place in the **absence of light**.
	2.It is also known as **Hill reaction** or **Light reaction.**	2. It is also known as **Calvin Cycle** or **Dark reaction.**
	3. It is named as Hill reaction after its discoverer **Hill.**	3. It is named Calvin Cycle after its discoverer **MelvinCalvin**.
Reactants	Light, Water, ADP and NADPH.	CO_2 , ATP and $NADPH_2$
End Product	O_2 , ATP and $NADPH_2$	Carbohydrate.
Location	It takes place in the **thylakoid membranes (Grana)** of the chloroplast.	It takes place in the **stroma** of the chloroplast.

VIII. Higher Order Thinking Skills(HOTS)
1. The reactions of photosynthesis make up a biochemical pathway.
A) What are the reactants and products for both light and dark reactions.
B) Explain how the biochemical pathway of photosynthesis recycles many of its own reactions and identify the recycled reactants.
A) The reactants and products for both light and dark reactions

	Light reaction	Dark reaction
Reactants	Light, Water, ADP and NADP.	CO_2 , ATP and $NADPH_2$
End Product	O_2 , ATP and $NADPH_2$	Carbohydrate.

B) **i)The biochemical pathway of photosynthesis which recycles many of its own reactions.**



ii)Name of the recycled reactants. :
Light reaction
ADP and NADP+ ⟶ ATP and NADPH
Calvin cycle
ATP and NADPH ⟶ ADP and NADP+
2. Where do the light dependent reaction and the Calvin cycle occur in the chloroplast.

	Light dependent reaction	Calvin cycle
Location	It takes place in the **thylakoid membranes (Grana)** of the chloroplast.	It takes place in the **stroma** of the chloroplast.

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UNIT 13 STRUCTURAL ORGANIZATION OF ANIMALS

I. Choose the correct answer

1. In leech locomotion is performed by
   a) Anterior sucker b) Parapodia c) Setae **d) Contraction and relaxation of muscles**
2. The segments of leech are known as
   a) Metameres (somites) b) Proglottids c) Strobila d) All the above
3. Pharyngeal ganglion in leech is a part of
   a) Excretory system **b) Nervous system** c) Reproductive system d) Respiratory system
4. The brain of leech lies above the
   a) Mouth b) Buccal Cavity **c) Pharynx** d) Crop
5. The body of leech has
   a) 23 segments **b) 33 segments** c) 38 segments d) 30 segments
6. Mammals are _____ animals.
   a) Cold blooded **b) Warm blooded** c) Poikilothermic d) All the above
7. The animals which give birth to young ones are
   a) Oviparous **b) Viviparous** c) Ovoviviparous d) All the above

II. Fill in the blanks

1. The posterior sucker is formed by the fusion of the _____ segments. (Last 7)
2. The existence of two sets of teeth in the life of an animal is called _____ dentition. (Diphyodont)
3. The anterior end of leech has a lobe-like structure called _____. (Anterior sucker)
4. The blood sucking habit of leech is known as _____. (Sanguivorous)
5. _____ separate nitrogenous waste from the blood in rabbit. (Kidney)
7. _____ spinal nerves are present in rabbit. (37 pairs)

III. Identify whether the statements are True or False. Correct the false statement

1. An anticoagulant present in saliva of leech is called heparin. **False**
Corrected Statement : An anticoagulant present in saliva of leech is called **hirudin**.
2. The vas deferens serves to transport the ovum. **False**
Corrected Statement : The vas deferens serves to transport the **Sperm**.
3. Diastema is a gap between premolar and molar teeth in rabbit. **False**
Corrected Statement : Diastema is a gap between **incisor and premolar** teeth in rabbit.
4. The cerebral hemispheres of rabbit are connected by band of nerve tissue called corpora quadrigemina. **False**
Corrected Statement : The cerebral hemispheres of rabbit are connected by band of nerve tissue called **corpus callosum.**

IV. Match columns I, II and III correctly ANSWER

I.Organs	II.Membranous Covering	III. Location
Brain	Meninges	Cranial cavity
Kidney	Capsule	Abdominal cavity
Heart	Pericardium	Mediastinum
Lungs	Pleura	Enclosed in thoracic cavity

V. Book Exercise – Answer in a sentence (1 mark)

1. Give the common name of the Hirudinaria granulosa.
The common name of the Hirudinaria granulosa is Indian Cattle Leech.

2. How does leech respire?
Leech respires through the skin.

3. Write the dental formula of rabbit.
Dental formula is $\left(I \frac{2}{1}, C \frac{0}{0}, PM \frac{3}{2}, M \frac{3}{3}\right) \times 2$ in rabbit which is written as $\frac{2033}{1023}$.

4. **How many pairs of testes are present in leech?**
Eleven pairs of testes are present in leech.

5. How is diastema formed in rabbit?
The gap between incisors and premolar forms the diastema. Diastema helps in mastication and chewing of food in rabbit.

6. What organs are attached to the two bronchi?
Lungs are attached to the two bronchi.

7. Which organ acts as suction pump in leech?
Pharynx acts as suction pump in leech.

8. What does CNS stand for?
CNS stands for Central Nervous System.

9. Why is the teeth of rabbit called heterodont?
As there are three different kinds of teeth (Incisors, Premolars and Molars)` in rabbit, the dentition is called heterodont.

10. How does leech suck blood from the host?
Leech attaches itself to the body of the host by suckers. Jaws of mouth causes wound. Then the blood is sucked by pharynx.

VI. Book Exercise – Short answer question (2 mark)

1. Why are the rings of cartilages found in trachea of rabbit?

Tracheal walls are supported by rings of cartilage. Cartilage is flexible tissue. They help in the free passage of air.

2. List out the parasitic adaptations in leech.

Leeches lead a parasitic mode of life by sucking the blood of vertebrates and show several important adaptations in their structure.

1. Blood is sucked by pharynx.
2. Anterior and posterior ends of the body are provided with suckers by which the animal attaches itself to the body of the host.
3. The three jaws inside the mouth, causes a painless Y-shaped wound in the skin of the host.
4. The salivary glands produce hirudin which does not allow the blood to coagulate. Thus, a continuous supply of the blood is maintained.
5. Parapodia and setae are completely absent
6. Blood is stored in the crop. It gives nourishment to the leech for several months. Due to this reason there is no elaborate secretion of the digestive juices and enzymes.

VII. Book Exercise – Long answer question (5 mark)

1. How is the circulatory system designed in leech to compensate the heart structure?

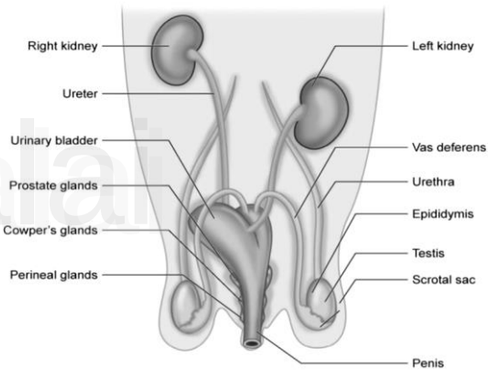
i) In leech, circulation is brought about by haemocoelic system.
ii) There are no true blood vessels. The blood vessels are replaced by channels called haemocoelic channels or canals filled with blood like fluid.
iii) There are four longitudinal channels. One channel lies above (dorsal) the alimentary canal, one below (ventral) alimentary canal.
iv) The other two channels lie on either (lateral) side of the alimentary canal which serve as heart and have inner values.
v) All four channels are connected together posteriorly in the 26th segment.

2. How does locomotion take place in leech?

Locomotion in leech takes place by (i) Looping or crawling movement and (ii) Swimming movement.
i) **Looping or crawling movement :** This type of movement is brought about by the contraction and relaxation of muscles. The two suckers serve for attachment during movement on a substratum.
ii) **Swimming movement :** Leeches swim very actively and perform undulating movements in water.

3. Explain the male reproductive system of rabbit with a labelled diagram.

1.The male reproductive system of rabbit consists of a pair of testes which are ovoid in shape.
2.Testes are enclosed by scrotal sacs in the abdominal cavity.
3.Each testis consists of numerous fine tubules called **seminiferous tubules**.
4.This network of tubules lead into a coiled tubule called **epididymis,** which lead into the sperm duct called **vas deferens**.
5.The vas deferens join in the urethra just below the urinary bladder.
6. The urethra runs backward and passes into the penis.
7.There are three accessory glands namely prostate gland, cowper's gland and perineal gland. Their secretions are involved in reproduction.



VIII. Book Exercise – Higher Order Thinking Skills (HOTS)

1. Arjun is studying in tenth standard. He was down with fever and went to meet the doctor. As he went to the clinic he saw a patient undergoing treatment for severe leech bite. Being curious, Arjun asked the doctor why leech bite was not felt as soon as it attaches to the skin ? What would have been the reply given by the doctor?

Leech bite could not be felt as soon as it attaches to the skin, because leech injects a substance, which works to be a local anaesthetic and the person can't feel the bite.

2. Shylesh has some pet animals at his home. He has few rabbits too, one day while feeding them he observed something different with the teeth. He asked his grandfather, why is it so? What would have been the explanation of his grandfather?

Shylesh's grandfather explained about the teeth of rabbit as follows :
i) The rabbit has two sets of teeth (Diphyodont dentition).
ii) The two types of teeth are; a) Milk teeth (yound ones) and b) Permanent teeth (in adults).
iii) In rabbit the teeth are of three different kinds (Heterodont). They are; a)Incisors. b) Premolars andc) Molars.
iv) Diastema is the gap between the incisors and premolar which helps in mastication and chewing of food.

IX. Book Exercise – Value based questions

1. Leeches do not have secretion of digestive juices and enzymes -Why ?

The leech feeds by sucking the blood of cattle and other domestic animals. Then the blood is stored in the crop. It gives nourishment to the leech for several months. Due to this reason there is no elaborate secretion of digestive juices and enzymes.

2. How is the digestive system of rabbit suited for herbivorous mode of feeding?

i) The digestive system of rabbit is uniquely designed to consume large amounts of plant materials.
ii) The teeth are of three types viz incisors, premolars and molars (Heterodont).
iii) Diastema, a gap between incisors and premolar, helps in mastication and chewing of food in herbivorous animals.
iv) The plants that rabbits eat are high in fibre, which is indigestible to mammalian digestive enzymes.
So alimentary canal contains bacteria that help in digestion of cellulose.

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CHAPTER 14 TRANSPORTATION IN PLANTS AND CIRCULAION IN ANIMALS

I.Choose the correct answer.

1. Active transport involves
a) Movement of molecules from lower to higher concentration b) Expenditure of energy
c) It is an uphill task **d) All of the above**

2. Water which is absorbed by roots is transported to aerial parts of the plant through
a) Cortex b) Epidermis c)Phloem **d) Xylem**

3.During transpiration there is loss of
a) Carbon di oxide b) Oxygen **c) Water** d) None of the above

4.Root hairs are
a) Cortical cell b) Projection of epidermal cell c) Unicellular **d) Both b and c**

5. Which of the following process requires energy?
a) Active transport b) Diffusion c) Osmosis d) All of them

6. The wall of human heart is made up of
a)Endocardium b) Epicardium c) Myocardium **d) All of the above**

7. Which is the sequence of correct blood flow
a) Ventricle – atrium – vein – arteries b) Atrium – ventricle – veins – arteries
c) Atrium – ventricle – arteries – vein d) Ventricles – vein – atrium - arteries

8. Apatient with blood group O was injured in an accident and has blood loss. Which blood group the doctor should effectively use for transfusion in this condition?
a) O group b) AB group c) A or B group d) All blood group

9. 'Heart of heart' is called
a) SA node b) AV node c) Purkinje fibres d) Bundle of His

10. Which one of the following regarding blood composition is correct
a) Plasma – Blood + Lymphocytes b) Serum – Blood + Fibrinogen
c) Lymph – Plasma + RBC + WBC **d) Blood – Plasma + RBC + WBC + Platelets**

II.Fill in the blanks.

1._____ involves evaporative loss of water from aerial parts. **Ans :Transpiration**

2.Water enters the root cell through a _____ plasma membrane. **Ans :Semi-permeable**

3. Structures in roots that help to absorb water are _____. **Ans :Root hairs**

4. Normal blood pressure is _____. **Ans :120 mm / 80 mm Hg**

5. The normal human heartbeat rate is about _____ time per minute. **Ans :70 -90**

III.Match the following.

Section I

1.Symolastic pathway - Leaf
2.Transpiration - Plasmodesmata
3.Osmosis - Pressure in xylem
4.Root pressure - Pressure gradient

1.Symolastic pathway	**- Plasmodesmata**
2.Transpiration	**- Leaf**
3.Osmosis	**- Pressure gradient**
4.Root pressure	**- Pressure in xylem**

Section II

1. Leukemia - Thrombocytes
2. Platelets - Phagocyte
3. Monocytes - Decrease in leucocytes
4. Leucopenia - Blood cancer
5. AB blood group - Allergic condition
6. O blood group - Inflammation
7. Eosinophil - Absence of antigen
8. Neutrophils - Absence of antibody

1. Leukemia	**- Blood cancer**
2. Platelets	**- Thrombocytes**
3. Monocytes	**- Phagocyte**
4. Leucopenia	**- Decrease in leucocytes**
5. AB blood group	**- Absence of antibody**
6. O blood group	**- Absence of antigen**
7. Eosinophil	**- Allergic condition**
8. Neutrophils	**- Inflammation**

IV. State whether True or False. If false write the correct statement.

1. The phloem is responsible for the translocation of food. **Ans :True**

2. Plants lose water by the process of transpiration. **Ans :True**

3. The form of sugar transported through the phloem is glucose. **Ans :False**

Corrected statement : The form of sugar transported through the phloem is **Sucrose**.

4. In apoplastic movement the water travels through the cells membrane and enter the cell. **Ans :False**

Corrected statement : In **symplastic** movement the water travels through the cell membrane and enter the cell.

5. When guard cells lose water the stoma opens. **Ans :False**

Corrected statement : When the guard cells lose water the stoma **closes**.

6. Initiation and stimulation of heart beat take place by nerves. **Ans :False**

Corrected statement : Initiation and stimulation of heart beat takes place by **Sino – atrial (SA) node**.

7. All veins carry deoxygenated blood. **Ans :False**

Corrected statement : All veins, **except pulmonary vein,** carry deoxygenated blood.

8. WBC defend the body from bacterial and viral infection. **Ans :True**

9. The closure of mitral and tricuspid valves at the start of the ventricular systole produces the first sound ' LUBB'. **Ans :True**

V. Answer in a word or sentence. (1 Mark)

1.Name two layered protective covering of human heart.

Two layered protective covering of human heart is **Pericardium**.

2.What is the shape of RBC in human blood?

RBCs of human blood are **biconcave** or **disc-shaped**.

3. Why is the colour of the blood red?

The blood is red because of the presence of red coloured respiratory pigment **haemoglobin**.

4.Which kind of cells are found in the lymph?

Blood cells escaped through the pores present in the walls of capillaries are found in the lymph.

5.Name the heart valve associated with the major arteries leaving the ventricles.

Semilunar valves are associated with the major arteries (Pulmonary artery and aorta) leaving the ventricles.

6.Mention the artery which supplies blood to the heart muscles.

Coronary artery supplies blood to the heart muscles.

VI. Short answer questions. (2 Marks)

1.What causes the opening and closing of guard cells of stomata during transpiration?

The opening and closing of the stomata is due to the **change in turgidity** of the **guard cells**.

a) When **turgidity increases** within the two guard cells **stoma opens**.
b) When the guard cells lose water, it becomes **flaccid** and the **stoma closes**.

2.What is cohesion?

The **force of attraction between molecules of water** is called cohesion.

3.Trace the pathway followed by water molecules from the time it enters a plant root to the time it escapes into the atmosphere from a leaf.

a) Once the water enters the root hairs, the concentration of water molecules in the root hair cells become more than that of the cortex.

b)Thus water from the root hair moves to the cortical cells by osmosis and then reaches the xylem

c) From there the water is transported to the stem and leaves and then to atmosphere by transpiration.

ROOT HAIR ⟶ CORTICAL CELLS⟶ XYLEM⟶ STEM⟶ LEAVES ⟶ ATMOSPHERE

4.What would happen to the leaves of a plant that transpires more water that its absorption in the roots?

When transpiration exceeds water absorption by the roots , the plant **dehydrates**. Dehydration **affects growth, photosynthesis** etc. which can result in **wilting** and **dying** of the plant.

5.Describe the structure and working of the human heart. (5 Mark)

a) The heart is enclosed in a double walled sac called **pericardium**.

b)The human heart is **four chambered**.

c)The two **upper thin walled** chambers of the heart are called **auricle or atria**.

d) The two **lower thick walled** chambers are called **ventricles**.

e) The **right atrium receives deoxygenated blood** from different parts of the body through main veins **superior vena cava, inferior vena cava and coronary sinus**.

d) **Pulmonary veins** bring **oxygenated blood** to the left atrium from the **lungs**.

e)The right and left auricles pump blood into the right and left ventricles respectively.

f) **From the right ventricle** arises the pulmonary trunk which bifurcates to form right and left **pulmonary arteries**.

g) The right and left **pulmonary arteries** supply **deoxygenated** to the **lungs** of the respective side.

h) The **left ventricle** gives rise to **aorta**.

i) The **oxygenated blood** is supplied by the **aorta** to various organs of the body.

j)The **coronary arteries** supply blood to the **heart**.

6.Why is the circulation in man referred to as double circulation?

When the **blood circulates twice** through the heart in one complete cycle it is called double circulation.

7.What are heart sounds ? How are they produced?

The rhythmic closure and opening of the valves cause the sound of the heart.

a) The first sound **LUBB** is of longer duration and is produced by the closure of the **tricuspid and bicuspid valves** after the **beginning of ventricular systole**.
b) The second sound **DUPP** is of a shorter duration and produced by the closure of **semilunar valves** at the **end of ventricular systole**.

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

Valves **regulate the flow of blood** in a single direction and prevent back flow of blood.

9.Who discovered Rh factor? Why was it named so?

1.Rh factor was discovered by **Landsteiner** and **Wiener** in 1940.

2. The Rh factor is named after the **Rhesus monkey**, which is the animal where it was first identified.

10. How are arteries and veins structurally different from one another?

No.	Arteries	No.	Veins
1.	Wall of artery is **strong , thick and elastic.**	1.	Wall of vein is **weak, thin and non – elastic.**
2.	Internal valves are **absent**.	2.	Internal valves are **present**.

11.Differentiate between systemic circulation and pulmonary circulation.

No.	Systemic circulation	No.	Pulmonary circulation
1.	It occurs **between** the **heart** and the **entire body.**	1.	It occurs **between** the **heart** and the **lungs**.
2.	It carries **oxygenated blood** from the heart around the body then carries the **deoxygenated blood** from the body back to the heart.	2.	It carries **deoxygenated blood** from the heart to the lungs and **oxygenated blood** from lungs to the heart.

12.Why is the Sinoatrial (SA) node called the pacemaker of heart?

Sino-atrial (SA) node acts as the **'pacemaker'** of the heart because it is capable of initiating impulse which can stimulate the heart muscles to contract.

13.The complete events of cardiac cycle last for 0.8 sec. What is the timing for each event?

Each cardiac cycle, or heartbeat, takes about 0.8 seconds to complete the cycle.

The events during a single cardiac cycle involves

a) **Strial systole:** Contraction of auricles : 0.1 sec.
b) **Ventricular systole :** Contraction of ventricles : 0.3 sec.
c) **Ventricular diastole :** Relaxation of ventricles : 0.4 sec.

VII. Give reasons for the following statements.(2 Marks)

1.Minerals cannot be passively absorbed by the roots.

Minerals cannot be passively absorbed by the roots because

a)Minerals are present in the soil as **charged particles** which cannot move across the cell membranes. b)The **concentration of minerals** in the soil is usually **lower** than the concentration of minerals in the root.

c) Most of the minerals enter the root by **active absorption**.

2.Guard cells are responsible for opening and closing of stomata.

The opening and closing of the stomata is due to the **change in turgidity** of the **guard cells**.

a) When **turgidity increases** within the two guard cells **stoma opens**.
b) When the guard cells lose water, it becomes **flaccid** and the **stoma closes**.

3.The movement of substances in the phloem can be in any direction.

a)During the growth of a plant, its leaves act as the **source of food** as they carry out **photosynthesis.**

b)The phloem conducts the food from the **source to the sink** (the part of the plant requiring or storing food).

c)**During spring**, this process is reversed as the food stored in the sink is transported toward the growing buds of the plant, through the phloem.

d)Thus, the movement of food in the phloem is **bidirectional** (i.e., upward and downward).

4.Minerals in the plants are not lost when the leaf falls.

In deciduous plants, minerals like phosphorus, suphur, nitrogen and potassium are remobilized from older dying leaves to younger leaves. So minerals in the plants are not lost when the older leaf falls.

5.The walls of the right ventricle are thicker than the right auricles.

Usually walls of the ventricles are **thicker** than auricles because the ventricles have to pump out **blood with force** away from the heart.

6.Mature RBC in mammals do not have cell organelles.

a)The lack of cell organelles and nucleus in mature RBC is an **adaptation** to be better equipped for its task.

b)The lack of cell organelles and nucleus **accommodates more haemoglobin** and **allows** it to **carry more oxygen.**

VIII. Long answer questions. (5 Marks)

1.How do plants absorb water? Explain.

1.Water is absorbed along with minerals, by the **root hairs**, purely by **diffusion**.

2. Root hairs are thin walled, **slender extension** of **epidermal cell** that increase the surface area of absorption.

3.Once the water enters the root hairs, the **concentration** of water molecules in the root hair cells become **more than** that of the **cortex**.

4.Thus water from the root hair moves to the **cortical cells** by **osmosis** and then reaches the xylem. From there the water is **transported** to the **stem and leaves**.

5.Once water is absorbed by the root hairs, it can move deeper into root layers by two distinct pathways:

a)**Apoplast Pathway** **:** The **apoplastic** movement of water occurs exclusively **through the intercellular spaces** and the walls of the cells. Apoplastic movement does not involve crossing the cell membrane. This movement is dependent on the gradient.

b) **Symplast Pathway** **:** In **symplastic** movement, the water travels through the cells i.e. their cytoplasm; intercellular movement is **through the plasmodesmata**. Water enters the cells through the cell membrane. Movement is again down a potential gradient.

2. 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**

3. Why are leucocytes classified as granulocytes and agranulocytes? Name each cell and mention its functions.

Based on the presence or absence of granules , leucocytes are classified into two types.

1.Granulocytes : They contain granules in their cytoplasm.
2.**Agranulocytes :**Granules are not found in the cytoplasm of these cells.

I.Types of Granulocytes and their functions :

Name	Functions
1.Neutrophils	Their numbers are increased during **infection** and **inflammation**.
2.Eosinophils	Their number increases during conditions of **allergy** and **parasitic infections.** It brings about detoxification of toxins.
3.Basophils	They release chemicals during the process of **inflammation.**

II.Types of Agranulocytes and their functions :

Name	Functions
1.Lymphocytes	They produce **antibodies** during bacterial and viral infections.
2.Monocytes	They are the largest of the leucocytes and are amoeboid in shape. They are **phagocytic** and can **engulf bacteria.**

4. Differentiate between systole and diastole. Explain the conduction of heart beat.

I. Differences between Systole and Diastole.

Systole	Diastole
1.It is the **contraction** of atrium and ventricles.	1. It is the **relaxation** of atrium and ventricles.
2.Due to systole, the auricles and ventricles **push** the blood out of heart.	2.Due to diastole, the auricles are **filled** with blood.
3.**Atrial systole** lasts about **0.1 seconds.** **Ventricular systole** lasts about **0.3 seconds**.	3. **Ventricular diastole** lasts about **0.4 seconds**.

II. The conduction of heart beat

1.Sino-atrial node acts as the **'pacemaker'** of the heart because it is capable of initiating impulse which can stimulate the heart muscles to contract.

2.The impulse from the sinoatrial node spreads as a wave of contraction over the right and left atrial wall pushing the blood through the **atrioventricular** valves into the ventricles.

3.The wave of contraction from SA node reaches the **atrioventricular** (AV) **node** which is stimulated to emit an impulse of contraction spreading to the ventricular muscle via the **atrioventricular bundle** and **the Purkinje fibres**.

5. Enumerate the functions of blood.

1.Transport of respiratory gases (Oxygen and CO_2).
2.Transport of digested food materials to the different body cells.
3.Transport of hormones.
4.Transport of nitrogenous excretory products like ammonia, urea and uric acid.
5.It is involved in protection of the body and defense against diseases.
6.It acts as buffer and also helps in regulation of pH and body temperature.
7.It maintains proper water balance in the body.

IX. Assertion and Reasoning. (2 Marks)

Direction: In each of the following questions, a statement of Assertion is given and a corresponding statement of Reason is given just below it. Of the statements given below, mark the correct answer as

a. If both A and R are true and R is the correct explanation of A.
b. If both A and R are true but R is not the correct explanation of A.
c. If A is true but R is false. d. If both A and R are false.

1. **Assertion :** RBC plays an important role in the transport of respiratory gases.
Reason : RBC do not have cell organelles and nucleus.
Ans: a. Both A and R are true and R is the correct explanation of A.

2. **Assertion :** Persons with AB blood group are called an universal recipients, because they can receive blood from all groups.
Reason : Antibodies are absent in persons with AB blood group.
Ans: a. Both A and R are true and R is the correct explanation of A.

X. High Order Thinking Skills (HOTS).

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

a)Any dry plant material kept in water absorbs water and swells up. This phenomenon is known as **imbibition**.

b) **Imbibition** is defined as the **uptake of water** by substances that do not dissolve in water, so that the process results in swelling of the substance.

2.Why are the walls of the left ventricle thicker than the other chambers of the heart?

The **left ventricle** has a **thicker** muscular **wall** than the other chambers. This is due to the **higher pressure** needed to **pump oxygenated blood** through the **aorta** towards all the parts of the body.

3.Doctors use stethoscope to hear the sound of the heart. Why?

a) The stethoscope is an instrument used by doctors to listen the sound of the heart.
b) The heart sound is heard by placing the stethoscope on the chest.
c) It is useful diagnostic tool to identify and localize health problems and diagnose disease.

4.How does the pulmonary artery and pulmonary vein differ in their function when compared to a normal artery and vein?

a) Differences between pulmonary artery and normal artery.

No.	Pulmonary Artery	No.	Normal Artery
1.	It carries blood from **heart to lungs**.	1.	It carries blood from **heart to other parts of the body.**
2.	It carries **deoxygenated** blood.	2.	It carries **oxygenated** blood.

b) Differences between pulmonary vein and normal vein.

No.	Pulmonary Vein	No.	Normal Vein
1.	It carries blood from **lungs to heart.**	1.	It carries blood **other parts of the body to the heart.**
2.	It carries **oxygenated** blood.	2.	It carries **deoxygenated** blood.

5. Transpiration is a necessary evil in plants. Explain.

a) The **loss of excess water** in the form of **vapor** from the aerial parts of the plant is known as transpiration.
b) Transpiration is essential for the **movement of water** and **minerals** from the root **to the healthy parts** of the plant.
c) But **excess transpiration** may result in **drying up** of the leaves or **wilting** and **loss of soil water**. Hence it is termed as a necessary evil.

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UNIT 15 NERVOUS SYSTEM

I. Choose the best answer

1. Bipolar neurons are found in

a) retina of eye b) cerebral cortex c) embryo d) respiratory epithelium Ans.: a) Retina of eye

2. Site for processing of vision, hearing, memory, speech, intelligence and thought is

a) kidney b) ear **c) brain** d) lungs

3. In reflex action, the reflex arc is formed by

a) brain, spinal cord, muscle b) receptor, muscle, spinal cord

c) muscle, receptor, brain **d) receptor, spinal cord, muscle**

4. Dendrites transmit impulse cell body and axon transmit impulse cell body.

a) away from, away from **b) towards, away from**

c) towards, towards d) away from, towards

5. The outer most of the three cranial meninges is

a) arachnoid membrane b) piamater **c) duramater** d) myelin sheath

6. There are pairs of cranial nerves and pairs of spinal nerves.

a) 12, 31 b) 31, 12 c) 12, 13 d) 12, 21

7. The neurons which carries impulse from the central nervous system to the muscle fibre.

a) afferent neurons b) association neuron **c) efferent neuron** d) unipolar neuron

8. Which nervous band connects the two cerebral hemispheres of brain?

a) thalamus b) hypothalamus **c) corpus callosum** d) pons

9. Node of Ranvier is found in

a) muscles **b) axons** c) dendrites d) cyton

10. Vomiting centre is located in

a) medulla oblongata b) stomach c) cerebrum d) hypothalamus

11. Nerve cells do not possess

a) neurilemma **b) sarcolemma** c) axon d) dendrites

12. A person who met with an accident lost control of body temperature, water balance, and hunger. Which of the following part of brain is supposed to be damaged?

a) Medulla oblongata b) cerebrum c) pons **d) hypothalamus**

II. Fill in the blanks

1. _____ is the longest cell in our body. Ans.: Neuron / Nerve cell

2. Impulses travels rapidly in _____ neurons. Ans.: Myelinated

3. A change in the environment that causes an animal to react is called _____. Ans.: Stimulus

4. _____ carries the impulse towards the cell body. Ans.: Dendrite

5. The two antagonistic component of autonomic nervous system are _____ and _____. Ans.: Sympathetic / Parasympathetic

6. A neuron contains all cell organelles except _____. Ans.: Centriole

7. _____ maintains the constant pressure inside the cranium. Ans.: Cerebrospinal fluid

8. _____ and _____ increases the surface area of cerebrum. Ans.: Gyri and Sulci

9. The part of human brain which acts as relay center is _____. Ans.: Thalamus

III. State whether the following statements are true or false: If false correct the statement.

1. Dendrons are the longest fibres that conducts impulses away from the cell body. Ans.: False.

Correct statement : **Axon** is the longest fibres that conducts impulses away from the cell body.

2. Sympathetic nervous system is a part of central nervous system. Ans.: False.

Correct statement : Sympathetic nervous system is a part of **Autonomic** nervous system.

3. Hypothalamus is the thermoregulatory centre of human body. Ans.: True.

4. Cerebrum controls the voluntary actions of our body. Ans.: False.

Correct statement : **Cerebellum** controls the voluntary actions of our body.

5. In the central nervous system myelinated fibres form the white matter. Ans.: True.

6. All the nerves in the body are covered and protected by meninges. Ans.: False.

Correct statement : All the nerves in the body are covered and protected by **Epineurium.**

7. Cerebrospinal fluid provides nutrition to brain. Ans.: True.

8. Reflex arc allows the rapid response of the body to a stimulus. Ans.: True.

9. Pons helps in regulating respiration. Ans.: True.

IV. Book Exercise – Match the items in column-I to the items in column-II:

Column I	Column II
1. Nissil's granules	(a) Forebrain
2. Hypothalamus	(b) Peripheral Nervous system
3. Cerebellum	(c) Cyton
4. Schwann cell	(d) Hindbrain

V. Understand the assertion statement. Justify the reason given and choose the correct choice.

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.

1. Assertion: Cerebrospinal fluid is present throughout the central nervous system.

Reason: Cerebrospinal fluid has no such functions. **Ans : a)**

2. Assertion: Corpus callosum is present in space between the duramater and piamater.

Reason: It serves to maintain the constant intracranial pressure. **Ans : d)**

Answer the following questions.

1. Define stimulus.

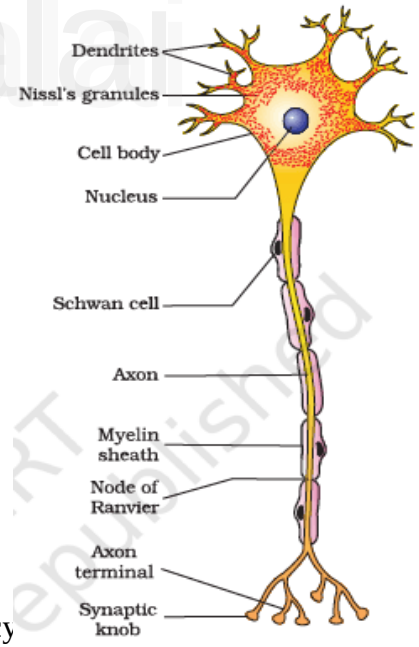
'Stimulus' refers to the changes in the environmental condition, that are detected by receptors present in the body.

2. 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 recticulum.
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.

iii) **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 cy
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.

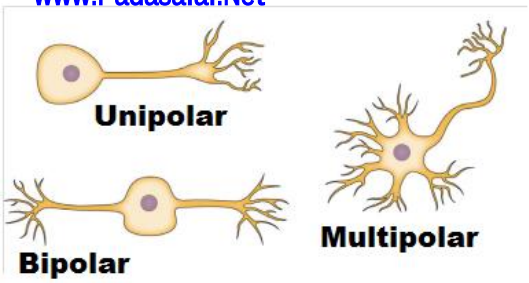
3. Classify neuron based on structure.

Structurally the neurons may be of the following types:

(i) **Unipolar neurons**: Only one nerve process arises from the cyton which acts as both axon and dendron. Found in early embryos but not in adult.

(ii) **Bipolar neurons**: The cyton gives rise to two nerve processes of which one acts as an axon while another as a dendron. Found in retina of eye and olfactory epithelium of nasal chambers.

(iii) **Multipolar neurons**: The cyton gives rise to many dendrons and an axon. Found in cerebral cortex of brain.

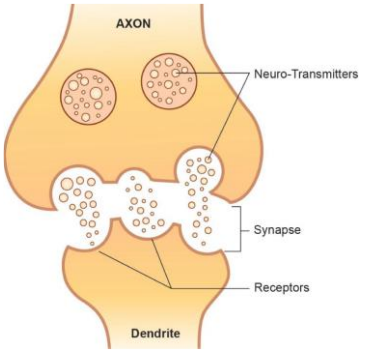


4. Our body contains a large number of cells 'L' which are the longest cells in the body. L has long and short branch called as 'M' and 'N' respectively. There is a gap 'O' between two 'L' cells, through which nerve impulse transfer by release of chemical substance 'P'.

i) Name the cells L.
ii) What are M and N?
iii) What is the gap O?
iv) Name the chemical substance P.

i) L – Neurons or Nerve cells.
ii) M – Axon and N - Dendron.
iii) Synapse is the gap O.
iv) The chemical substance P is Neurotransmitters (Acetylcholine).

5. **How nerve impulses are transferred from one neuron to next neuron?**



i) All the information from the environment are detected by the receptors located in our sense organs such as the eyes, the nose, the skin etc.
ii) Information from the receptors is transmitted as **electrical impulse** and is received by the dendritic tips of the neuron.
iii) This impulse travels from the dendrite to the cell body and then along the axon to its terminal end.
iv) On reaching the axonal end, it causes the nerve endings to release a chemical called **neurotransmitter** which diffuses across a synapse and starts a similar electrical impulse in the dendrites of the next neuron, then to their cell body to be carried along the axon.
v) In this way, the electrical signal reaches the brain or spinal cord.
vi) The response from brain (or spinal cord) is similarly passed on to the effector organs such as the muscle or gland cell, that undergoes the desired response.
vii) The flow of nerve impulses from axonal end of one neuron to dendrite of another neuron through a **synapse** is called **synaptic transmission**.

6. **What are the structures involved in the protection of brain?**

The structures involved in the protection of brain are
a) Skull
b) Three membranes of meninges : i) Duramater ii) Arachnoid membrane and iii) Piamater
c) Cerebrospinal fluid.

7. **'A' is a cylindrical structure that begins from the lower end of medulla and extend downwards. It is enclosed in bony cage 'B' and covered by membranes 'C'. As many as 'D' pairs of nerves arise from the structure 'A'.**

i) What is A?
ii) Name (a) bony cage 'B' and (b) membranes 'C'.
iii) How much is D?

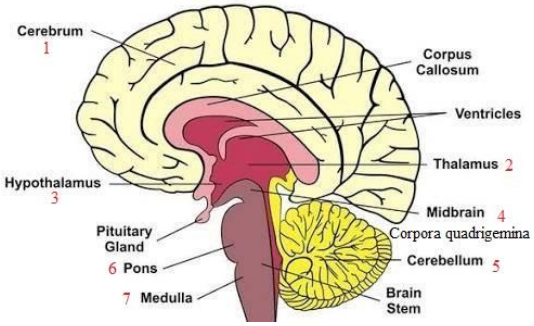
i) A is **Spinal cord**.
ii) (a) Bony cage 'B' is **Vertebral column**.
(b) Membranes 'C' are **Duramater, Arachnoid membrane** and **Piamater of Meninges**.
iii) D – **31 pairs** of nerves.

8. **What are the three divisions of Human nervous system?**

a) Central nervous system (CNS) – It consists of Brain and Spinal cord.
b) Peripheral nervous system (PNS) – It comprises the nerves arising from brain and spinal cord.
c) Autonomic nervous system (ANS) – It comprises of Sympathetic and Parasympathetic nerves.

9. **Which acts as a link between the nervous system and endocrine system?**
Hypothalamus acts as a link between the nervous system and endocrine system.

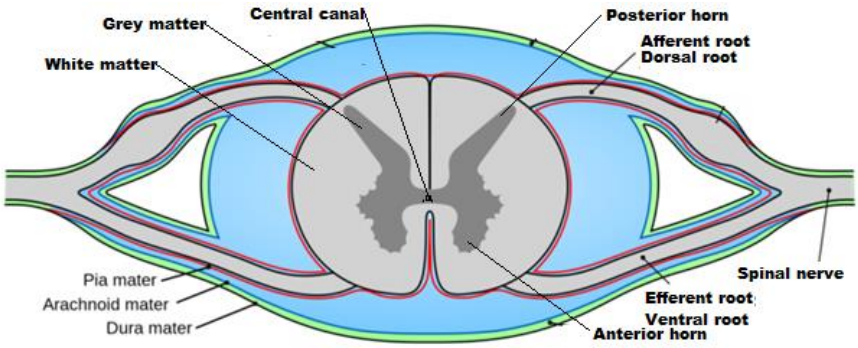
10. **Illustrate the structure and functions of brain.**



Structure	Functions
I. Fore brain	
1. **Cerebrum** is the largest portion forming nearly two-third of the brain. The cerebrum is longitudinally divided into two halves as right and left **cerebral hemispheres**. The **outer** portion of each cerebral hemisphere is formed of **grey matter** and is called **cerebral cortex**. The **inner or deeper** part is formed of **white** matter and is called **cerebral medulla**.	The cerebrum is responsible for the thinking, intelligence, consciousness, memory, imagination, reasoning and willpower.
2. **Thalamus** present in cerebral medulla	Acts as relay station.
3. **Hypothalamus** lies at the base of the thalamus.	Temperature control, thirst, hunger, urination, important link between nervous system and endocrine glands
II. Mid brain	
4. **Corpora quadrigemina** is the dorsal portion of the mid brain consists of four rounded bodies.	It controls visual and auditory (hearing) reflexes.
III. Hind brain	
5. **Cerebellum** is second largest part of the brain formed of two large sized hemispheres and middle vermis.	It coordinates voluntary movements and also maintains body balance.
6. **Pons** is a bridge of nerve fibre that connects the lobes of cerebellum.	It relay signals between the cerebellum, spinal cord, midbrain and cerebrum. It controls respiration and sleep cycle.
7. **Medulla oblongata** is the posterior most part of the brain that connects spinal cord and various parts of brain.	It has cardiac centres, respiratory centres, vasomotor centres to control heart beat, respiration and contractions of blood vessels respectively. It also regulates vomiting and salivation.

11. Name the parts of the hind brain.
Hindbrain is formed of three parts
a) Cerebellum, b) Pons and c) Medulla oblongata.

12. Describe the structure of spinal cord.
i) Spinal cord is a cylindrical structure lying in the neural canal of the vertebral column.
ii) It is covered by meninges.
iii) It extends from the lower end of medulla oblongata to the first lumbar vertebra.
iv) The posterior most region of spinal cord tapers into a thin fibrous thread like structure called **filum terminale**.
v) Internally, the spinal cord contains a cerebrospinal fluid filled cavity known as the **central canal**.
vi) The grey matter of spinal cord is 'H' shaped. The upper end of letter 'H" forms **posterior horns** and lower end forms **anterior horns**.
vii) A bundle of fibres pass into the posterior horn forming **dorsal** or **afferent root**. Fibres pass outward from the anterior horn forming **ventral** or **efferent root**.
viii) These two roots joins to form **spinal nerves**.
ix) The white matter is external and have bundle of nerve tracts.
x) Spinal cord conducts sensory and motor impulses to and from the brain. It controls reflex actions of the body.



13. What will you do if someone pricks your hand with a needle? Elucidate the pathway of response with a neat labelled diagram.

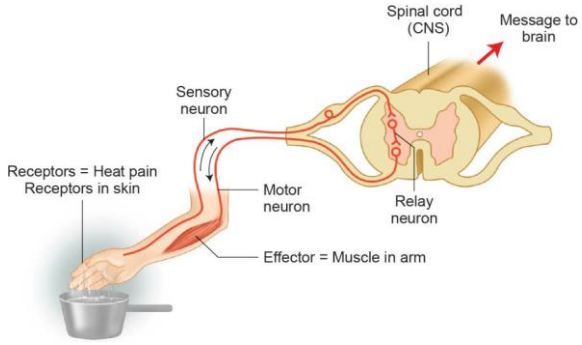
i) When a needle pricks our hand, we withdraw our hand away from the source of pain, the needle. This stimulus (pain) in turn triggers an impulse in sensory neuron.

ii) The **sensory neuron** transmits or conveys the message to the spinal cord.

iii) **Spinal cord** interprets the stimulus and the impulse is passed on to the relay neuron which in turn transmits it to a motor neuron.

iv) **Motor neurons** carry command from spinal cord to our arm.

v) Muscle in our arm contracts and we withdraw our hand immediately from the source of pain, the needle.



14. Voluntary and involuntary actions.

Voluntary action	Involuntary action
i) The Voluntary actions are **under the control of our will**. e.g Eating,Locomotion etc.	i) Involuntary action are **not under our control**. e.g Breathing,Heart beat etc.
ii) It is controlled by the **brain**.	ii) It is controlled by the **spinal cord**.
iii) All voluntary actions result in a **muscular action**.	iii) Involuntary actions result in a **muscular action or secretion from some gland**.

15. Medullated and non-medullated nerve fibre.

Medullated nerve fibre	Non-medullated nerve fibre
i) The axon is **covered with myelin sheath**.	i) The axon is **not covered by myelin sheath**.
ii) They form the **white matter** of the brain.	ii) They form the **grey matter** of the brain.
iii) They also known as **Myelinated** nerve fibre.	iii) They also known as **Non-myelinated** nerve fibre.

16. Define reflex arc.

A reflex action is any response that occurs automatically without consciouness. The pathway taken by nerve impulse to accomplish reflex action is called reflex arc.

17. Give an example for conditioned reflexes.

Playing harmonium by striking a particular key on seeing a music note is an example of conditioned reflexes which required conscious training effort.

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CHAPTER 16 PLANT AND ANIMAL HORMONES

I. Choose the correct answer

1. Gibberellins cause:
a) Shortening of genetically tall plants b) Elongation of dwarf plants
c) Promotion of rooting d) Yellowing of young leaves **Ans.:** b) Elongation of dwarf plants
2. The hormone which has positive effect on apical dominance is:
a) Cytokinin b) Auxin c) Gibberellin d) Ethylene **Ans.:** b) Auxin
3. Which one of the following hormones is naturally not found in plants:
a) 2, 4-D b) GA3 c) Gibberellin d) IAA **Ans.:** a) 2, 4-D
4. Avena coleoptile test was conducted by
a) Darwin b) N. Smit c) Paal d) F.W. Went **Ans.:** d) F.W. Went
5. To increase the sugar production in sugarcanes they are sprayed with _____
a) Auxin b) Cytokinin c) Gibberellins d) Ethylene **Ans.:** c) Gibberellins
6. LH is secreted by
a) Adrenal gland b) Thyroid gland c) Anterior pituitary d) Hypothalamus. **Ans.:** c) Anterior pituitary
7. Identify the exocrine gland
a) Pituitary gland b) Adrenal gland c) Salivary gland d) Thyroid gland **Ans.:** c) Salivary gland
8. Which organ acts as both exocrine gland as well as endocrine gland
a) Pancreas b) Kidney c) Liver d) Lungs **Ans.:** a) Pancreas
9. Which one is referred as "Master Gland"?
a) Pineal gland b) Pituitary gland c) Thyroid gland d) Adrenal gland **Ans.:** b) Pituitary gland

II Fill in the blanks

1._____ causes cell elongation, apical dominance and prevents abscission. **Ans.: Auxins**
2. ____ is a gaseous hormone involved in abscission of organs and acceleration of fruit ripening. **Ans.:Ethelene**
3. _____ causes stomatal closure. **Ans.: Abscisic acid**
4. Gibberellins induce stem elongation in _____ plants. **Ans.: Rosette**
5. The hormone which has negative effect on apical dominance is _____. **Ans.: Cytokinin**
6. Calcium metabolism of the body is controlled by _____. **Ans.: Paratharmone**
7. In the islets of Langerhans, beta cells secrete _____. **Ans.:Insulin**
8. The growth and functions of thyroid gland is controlled by ___. **Ans.:Thyroid Stimulating Hormone(TSH)**
9. Decreased secretion of thyroid hormones in the children leads to _____. **Ans.: Cretinism**

III a) Match Column I with Columns II and III

Column I	Column II	Column III
1.Auxin	Gibberella fujikuroi	Abscission
2.Ethylene	Coconut milk	Internodal elongation
3.Abscisic acid	Coleoptile tip	Apical dominance
4.Cytokinin	Chloroplast	Ripening
5.Gibberellins	Fruits	Cell division

Answer

Column I	Column II	Column III
1.Auxin	**Coleoptile tip**	**Apical dominance**
2.Ethylene	**Fruits**	**Ripening**
3.Abscisic acid	**Chloroplast**	**Abscission**
4.Cytokinin	**Coconut milk**	**Cell division**
5.Gibberellins	**Gibberella fujikuroi**	**Internodal elongation**

III b) Match the following hormones with their deficiency states

Hormones	Disorders
a) Thyroxine	- Acromegaly
b) Insulin	- Tetany
c) Parathormone	- Simple goitre
d) Growth hormone	- Diabetes insipidus
e) ADH	- Diabetes mellitus

Hormones	Disorders
a) Thyroxine	**- Simple goitre**
b) Insulin	**- Diabetes mellitus**
c) Parathormone	**- Tetany**
d) Growth hormone	**- Acromegaly**
e) ADH	**- Diabetes insipidus**

IV State whether True or false, If false write the correct statement

1. A plant hormone concerned with stimulation of cell division and promotion of nutrient mobilization is cytokinin. **Ans.: True**
2. Gibberellins cause parthenocarpy in tomato. **Ans.: True**
3. Ethylene retards senescence of leaves, flowers and fruits. **Ans.: False**

Correct statement : Ethylene **hastens** senescence of leaves, flowers and fruits.

4. Exopthalmic goiter is due to the over secretion of thyroxine. **Ans.: True**
5. Pituitary gland is divided into four lobes. **Ans.: True**
6. Estrogen is secreted by corpus luteum. **Ans.: Ans.: False**

Correct statement : Estrogen is secreted by **Graafian follicles**.

V Assertion and Reasoning

Direction: In each of the following questions a statement of assertion (A) is given and a corresponding statement of reason (R) is given just below it. Mark the correct statement as.

a. If both A and R are true and R is correct explanation of A
b. If both A and R are true but R is not the correct explanation of A
c. A is true but R is false d. both A and R are false

1. **Assertion:** Application of cytokinin to marketed vegetables can keep them fresh for several days.
Reason: Cytokinins delay senescence of leaves and other organs by mobilisation of nutrients.
Ans.: a. Both A and R are true and R is correct explanation of A
2. **Assertion (A):** Pituitary gland is referred as "Master gland".
Reason (R): It controls the functioning of other endocrine glands.
Ans.: a. Both A and R are true and R is correct explanation of A
3. **Assertion (A):** Diabetes mellitus increases the blood sugar levels.
Reason (R): Insulin decreases the blood sugar levels.
Ans.: b. Both A and R are true but R is not the correct explanation of A

VI Answer in a word or sentence

1.Which hormone promotes the production of male flowers in Cucurbits?
Ans.: Gibberellins promotes the production of male flowers in Cucurbits
2. Write the name of a synthetic auxin.
Ans.: 2,4 D – 2,4 Dichlorophenoxy Acetic Acid is a synthetic auxin.
3. Which hormone induces parthenocarpy in tomatoes?
Ans.: Gibberellins induces parthenocarpy in tomatoes
4. What is the hormone responsible for the secretion of milk in female after child birth?
Ans.: Prolactin (PRL) or Lactogenic Hormone is responsible for the secretion of milk in female after child birth.
5. Name the hormones which regulates water and mineral metabolism in man.
Ans.: Aldosterone regulates water and mineral metabolism in man.
6. Which hormone is secreted during emergency situation in man?
Ans.: Adrenaline is secreted during emergency situation in man.
7. Which gland secretes digestive enzymes and hormones?
Ans.: Pancreas is a **duel gland**. It secretes both digestive enzymes and hormones.
8. Name the endocrine glands associated with kidneys.
Ans.: The endocrine glands associated with kidneys is **Adrenal Gland**.

VII Short answer questions

1. What are synthetic auxins? Give examples.
Ans.: i) Artificially synthesized auxins that have properties like auxins are called as synthetic auxins.
ii) Example: 2, 4 D (2,4 Dichlorophenoxy Acetic Acid).

2. What is bolting? How can it be induced artificially?
Ans.: i)Bolting : Treatment of rosette plants with gibberellin induces sudden shoot elongation followed by flowering. This is called **bolting**.
ii) It is induced by artificial treatment with plant hormone gibberellin. It causes stem elongation in plants under normal condition.

3. Bring out any two physiological activities of abscisic acid
Ans.: i) ABA promotes the process of **abscission** (separation of leaves, flowers and fruits from the branch).
ii) ABA **promotes senescence** in leaves by causing loss of chlorophyll.

4. What will you do to prevent leaf fall and fruit drop in plants? Support your answer with reason.

Ans.: We can spray auxins to prevent leaf fall and fruit drop in plants. Auxins prevent the formation of abscission layer thus delay the abscission of leaves and fruits. So leaf and fruit can remain attached to the stem long time.

5. What are chemical messengers?

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

6. Write the differences between endocrine and exocrine gland.

Ans.:

Endocrine Gland	Exocrine Gland
1.They secrete hormones.	1. They secrete enzymes, saliva and milk.
2.They are ductless gland.	2. They may have or may not have ducts.
3.They are transported through blood stream.	3. They are transported through ducts or tubes.
4.They control long term activities.	4. They control long term activities.
5. Examples : Piyuitary , Thyroid, Adrenal etc.	5. Examples : Salivary, Gastric and sweat glands.

7. What is the role of parathormone?

Ans.: <u>Role of parathormone</u>

i) The parathormone regulates calcium and phosphorus metabolism in the body.

ii) They act on bone, kidney and intestine to maintain blood calcium levels.

8. What are the hormones secreted by posterior lobe of the pituitary gland? Mention the tissues on which they exert their effect.

Hormones secreted by posterior lobe of the pituitary gland	**Hormones excert effect on**
1. Vasopressin or Antidiuretic hormone	Tissues of **kidney tubules**.
2. Oxytocin	Tissues of **uterus** and **mammary gland**.

9. Why are thyroid hormones refered as personality hormone?

Ans.: As thyroid hormones (Triiodothyronine (T_3) and Tetraiodothyronine (T_4) or Thyroxine) are essential for normal physical, mental and personality development, they are also known as **personality hormone**.

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

Ans.: i) Thyroid hormones, Triiodothyronine (T_3) and Tetraiodothyronine or Thyroxine (T_4), requires iodine for its formation

ii) The inadequate supply of iodine in our diet leads to the enlargement of thyroid gland which protrudes as a marked swelling in the neck and is called as **goitre.**

<u>VIII. Long answer questions</u>

1. (a) Name the gaseous plant hormone. Describe its three different actions in plants.

(b) Which hormone is known as stress hormone in plants ? Why?

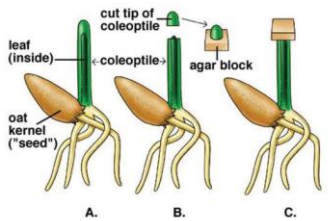
Ans.: a) **Ethylene** is a gaseous plant hormone.

<u>Physiological effects of ethylene:</u>

1. Ethylene promotes the **ripening of fruits**. e.g. Tomato, Apple, Mango, Banana, etc.
2. Ethylene **inhibits** the **elongation** of stem and root in dicots.
3. Ethylene hastens the **senescence** of leaves and flowers.
4. Ethylene stimulates formation of abscission zone in leaves, flowers and fruits. This leads to premature shedding.
5. Ethylene breaks the dormancy of buds, seeds and storage organs.

b) **Abscisic acid (ABA)** is the stress hormone. Because it increases tolerance of plants to various kinds of stress. So, it is called as **stress hormone**.

2. Describe an experiment which demonstrates that growth stimulating hormone is produced at the tip of coleoptile.



A. Germination of an oat seed
B. Decapitate tip of coleoptile and place on agar block.
C. Agar block is placed on top of the decapitated tip of the seedling.

1.Frits Warmolt Went (1903– 990), a Dutch biologist demonstrated the existence and effect of auxin in plants.
2.He did a series of experiments in Avena coleoptiles.
3.In his first experiment he removed the tips of Avena coleoptiles.
4.The cut tips did not grow indicating that the tips produced something essential for growth.In his second experiment he placed the agar blocks on the decapitated coleoptile tips.
5.The coleoptile tips did not show any response. In his next experiment he placed the detached coleoptile tips on agar blocks.
6.After an hour, he discarded the tips and placed this agar block on the decapitated coleoptile.
7.It grew straight up indicating that some chemical had diffused from the cut coleoptile tips into the agar block which stimulated the growth.
8.From his experiments Went concluded that a chemical diffusing from the tip of coleoptiles was responsible for growth, and he named it as "**Auxin**" meaning '**to grow**".

3. Write the physiological effects of gibberellins.

Ans.: <u>Physiological effects of Gibberellins:</u>

1.Application of gibberellins on plants stimulate extraordinary **elongation of internode**. e.g. Corn and Pea.
2.Treatment of rosette plants with gibberellin induces sudden shoot elongation followed by 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 auxins in inducing the formation of seedless fruit - **Parthenocarpic fruits** (Development of fruits without fertilization) e.g. Tomato.

4. Where are estrogens produced? What is the role of estrogens in the human body?

Ans.: i) Estrogens are produced by the **Graafian follicles** of the ovary.

ii) **<u>Functions of estrogens</u>**

1.It brings about the changes that occur during puberty.
2.It initiates the process of oogenesis.
3.It stimulates the maturation of ovarian follicles in the ovary.
4.It promotes the development of secondary sexual characters (breast development, high pitched voice etc).

5. What are the conditions which occur due to lack of ADH and insulin? How are the conditions different from one another?

Ans.: i) The conditions occur due to lack of ADH and insulin

a) Deficiency of ADH causes **Diabetes insipidus**.
b) The deficiency of insulin causes **Diabetes mellitus**.

ii) Differences between **Diabetes insipidus and Diabetes mellitus.**

Diabetes insipidus	Diabetes mellitus
1. It reduces reduces reabsorption of water in kidney tubules.	1. It increases blood sugar level (Hyperglycemia)
2. **Symptoms:** i) Frequent and excessive urination (polyuria). ii) Dehydration iii.Increased thirst (Polydipsia).	2. **Symptoms**: i.Excretion of excess glucose in the urine (Glycosuria). ii.Frequent urination (Polyuria). iii.Increased thirst (Polydipsia). iv.Increase in appetite (Polyphagia).

<u>IX Higher Order Thinking Skills (HOTS)</u>

2. What would be expected to happen if

a. Gibberellin is applied to rice seedlings.
b. A rotten fruit gets mixed with unripe fruits.
c. When cytokinin is not added to culture medium

Ans.: a) If Gibberellins is *applied to rice seedlings*, then the *rice seedlings* will exhibit internode-elongation and increase in height.

b) If rotten fruits get mixed with unripe fruits, then the Ethylene produced from the rotten fruits will hastens the ripening of the unripe fruits.

c) When cytokinin is not added to culture medium, it slows down the cell division and there by prevent the fomation of new organs from the callus (O*rganogenesis)* in the tissue culture.

3. A plant hormone was first discovered in Japan when rice plants were suffering from Bakanae disease caused by *Gibberella fujikoroi*. Based on this information answer the following questions:

a. Identify the hormone involved in this process.

b. Which property of this hormone causes the disease?

c. Give two functions of this hormone.

Ans.: a) The hormone in this process is **Gibberellins.**

b) Gibberellins has the property of stimulating the extraordinary elongation of internode.

c) **Functions of Gibberellins:**

1. Gibberellins promote the **production of male flowers** in monoecious plants (Cucurbits).
2. Gibberellins **break dormancy** of potato tubers.

4. Senthil has high blood pressure, protruded eyeball and an increased body temperature. Name the endocrine gland involved and hormone secretion responsible for this condition.

Ans.: High blood pressure, protruded eyeball and an increased body temperature are the symptoms of Grave's disease. It is caused due to the excess secretion (Hyperthyroidism **)** of the thyroid hormones.

a) The endocrine gland involved for this condition is **Thyroid gland.**

b) Hormones responsible for this condition are Thyroid hormones such as

a. Triiodothyronine (T_3)

b. Tetraiodothyronine or Thyroxine (T_4)

5. Sanjay is sitting in the exam hall. Before the start of the exam , he sweats a lot, with increased rate of heart beat. Why does this condition occur?

Ans.: In stressful situations, such as before and during an exam, the body releases "**Emergency hormones**" called Epinephrine (Adrenaline) and Norepinephrine (Noradrenaline). Secretion of these hormones leads to conditions such as more sweating and increased rate of heart beat.

6. Susan's father feels very tired and frequently urinates. After clinical diagnosis he was advised to take an injection daily to maintain his blood glucose level. What would be the possible cause for this? Suggest preventive measures.

Ans.: Feeling very tired and frequent urination are the symptoms of Diabetes mellitus. It is caused due to deficiency of insulin.

Prevention of Diabetes mellitus

1.Performing physical activity on a regular basis may help prevent diabetes.

2.Lose excess body fat - Being overweight is a big risk factor for diabetes.

3.Follow a plant-based, low-calorie diet.

4.Foods to avoid are those rich in trans fats (also called hydrogenated fat), saturated fat, and sugar.

5.Stress less - The stress response triggers the release of several hormones that increase blood sugar.

6.Sleep well - Chronic sleep deprivation and poor quality sleep increase the risk for diabetes and obesity.

CHAPTER 17 REPRODUCTION IN PLANTS AND ANIMALS

I. Choose the correct answer

1. The plant which propagates with the help of its leaves is _____ .

a) Onion b) Neem c) Ginger d) *Bryophyllum* **Ans.:** d) *Bryophyllum*

2. Asexual reproduction takes place through budding in _____ .

a) *Amoeba* b) Yeast c) *Plasmodium* d) Bacteria **Ans.:** b) Yeast

3. Syngamy results in the formation of _____ .

a) Zoospores b) Conidia c) Zygote d) Chlamydospores **Ans.:** c) Zygote

4. The essential parts of a flower are _____ .

a) Calyx and Corolla b) Calyx and Androecium

c) Corolla and Gynoecium d) Androecium and Gynoecium **Ans.:** d) Androecium and Gynoecium

5. Anemophilous flowers have _____ .

a) Sessile stigma b) Small smooth stigma c) Colored flower d) Large feathery stigma

Ans.: d) Large feathery stigma

6. Male gametes in angiosperms are formed by the division of _____ .

a) Generative cell b) Vegetative cell c) Microspore mother cell d) Microspore **Ans.:** a) Generative cell

7 What is true of gametes?

a) They are diploid b) They give rise to gonads

c) They produce hormones e) They are formed from gonads **Ans.:** e) They are formed from gonads

8. A single highly coiled tube where sperms are stored, get concentrated and mature is known as
a) Epididymis b) Vasa efferentia c) Vas deferens d) Seminiferous tubules **Ans.:** a) Epididymis
9. The large elongated cells that provide nutrition to developing sperms are
a) Primary germ cells b) Sertoli cells c) Leydig cells d) Spermatogonia **Ans.:** b) Sertoli cells
10 Estrogen is secreted by
a) Anterior pituitary b) Primary follicle c) Graffian follicle d) Corpus luteum **Ans.:** c) Graffian follicle
11. Which one of the following is an IUCD?
a) Copper – T b) Oral pills c) Diaphragm d) Tubectomy **Ans.:** a) Copper – T

II. Fill in the blanks

1. The embryo sac in a typical dicot at the time of fertilization is _____ . **Ans.: 7 Celled**
2. After fertilization the ovary develops into _____ . **Ans.: Fruit**
3. *Planaria* reproduces asexually by _____ . **Ans.: Regeneration**
4. Fertilization is _____ in humans. **Ans.: Internal**
5. The implantation of the embryo occurs at about _____ day of fertilization. **Ans.: 6 – 7 days**
6. _____ is the first secretion from the mammary gland after child birth **Ans.: Colostrum**
7. Prolactin is a hormone produced by _____ . **Ans.: Pituitary gland**

III. (a) Match the following

Column 1	Column 2	ANSWER	Column 1	Column 2
Fission	Spirogyra		**Fission**	**Amoeba**
Budding	Amoeba		**Budding**	**Yeast**
Fragmentation	Yeast		**Fragmentation**	**Spirogyra**

III. (b) Match the following terms with their respective meanings

a) Parturition - 1) Duration between pregnancy and birth
b) Gestation - 2) Attachment of zygote to endometrium
c) Ovulation - 3) Delivery of baby from uterus
d) Implantation - 4) Release of egg from Graafian follicle

Ans.:

a) Parturition - 3) Delivery of baby from uterus
b) Gestation - 1) Duration between pregnancy and birth
c) Ovulation - 4) Release of egg from Graafian follicle
d) Implantation - 2) Attachment of zygote to endometrium

IV. State whether the following statements are True or False. Correct the false statement

1.Stalk of the ovule is called pedicle. **Ans.: False**
Correct statement : Stalk of the ovule is called **funiculus**.
2. Seeds are the product of asexual reproduction. **Ans.: False**
Correct statement : Seeds are the product of **sexual** reproduction.
3. Yeast reproduces asexually by means of multiple fission. **Ans.: False**
Correct statement : Yeast reproduces asexually by means of **budding**.
4. The part of the pistil which serves as a receptive structure for the pollen is called as style. **Ans.: False**
Correct statement : The part of the pistil which serves as a receptive structure for the pollen is called as **stigma**.
5. Insect pollinated flowers are characterized by dry and smooth pollen. **Ans.: False**
Correct statement : Wind pollinated flowers are characterized by dry and smooth pollen.
6. Sex organs produce gametes which are diploid. **Ans.: False**
Correct statement : Sex organs produce gametes which are **haploid**.
7. LH is secreted by the posterior pituitary. **Ans.: False**
Correct statement : LH is secreted by the **anterior** pituitary.
8. Menstrual cycle ceases during pregnancy. **Ans.: True**
9. Surgical methods of contraception prevent gamete formation. **Ans.: True**
10. The increased level of estrogen and progesterone is responsible for menstruation. **Ans.: False**
Correct statement : The **decreased** level of estrogen and progesterone is responsible for menstruation.

V. Answer in a word or sentence

1. If one pollen grain produces two male gametes, how many pollen grains are needed to fertilize 10 ovules?

Ans.: Ten pollen grains are needed to fertilize 10 ovules. Because two sperms of each pollen grain are needed to fertilize each ovule during the process of double fertilization.

2. In which part of the flower germination of pollen grains takes place?
Ans.: Germination of pollen grains takes place on the **stigmatic surface** of the flower.
3. Name two organisms which reproduces through budding.
Ans.: Budding takes place in 1.Yeast 2. Bryophyllum
4. Mention the function of endosperm.
Ans.: Endosperm is the **nutritive tissue.** It provides food to the developing embryo.
5. Name the hormone responsible for the vigorous contractions of the uterine muscles.
Ans.: Oxytocin from the posterior pituitary stimulates the **uterine contractions** and provides force to expel the baby from the uterus, causing birth.
6. What is the enzyme present in acrosome of sperm?
Acrosome contains **hyaluronidase,** an enzyme that helps the sperm to enter the ovum during fertilization.
7. When is World Menstrual Hygiene Day observed?
Ans.: Every year May 28 is observed World Menstrual Hygiene Day.
8. What is the need for contraception ?
Ans.: Contraception is one of the best **birth control measures**. Contraception is needed to follow the small family norms, which improve economic status, living status and the quality of life.
9. Name the part of the human female reproductive system where the following occurs.
a. Fertilization b. Implantation
Ans.: a. Fertilization : Fertilization occurs in **the oviduct** of the female genital tract.
b. Implantation - Fertilized egg gets implanted in **the uterus**.

VI. Short answer question

1. What will happen if you cut planaria into small fragments?
Ans.: If we cut a Planaria into small fragments, over time each piece will regenerate into a complete worm.
2. Why is vegetative propagation practiced for growing some type of plants?
Ans.: Vegetative propagation is practiced for growing some type of plants, becuse
i) Some plants have reduced power of sexual reproduction.
ii) Seeds of some plants have long dormant period or poor viability.
iii) It is a rapid and easier method.
iv) Good characters can be preserved.
3. How does binary fission differ from multiple fission?
Ans.:

Binary fission	Multiple fission
1.A single parent cell divides into two daughter cells.	1.A single parent cell divides into many daughter cells.
2.It occurs during favourable conditions. Eg. Amoeba	2.It occurs during unfavourable conditions. Eg. Plasmodium

4. Define triple fusion.
Ans.: The fusion of second sperm (n) with secondary nucleus (2n) is known as triple fusion. As the result of triple fusion endosperm nucleus is formed.
Second sperm (n) + Secondary nucleus (2n) = Endosperm nucleus (3n)
5. Write the characteristics of insect pollinated flowers.
Ans.: The characteristics of insect pollinated flowers Or Entamophilous flower.
1.To attract insects these flowers are **brightly coloured, have smell and nectar.**
2. The pollen grains are larger in size, the exine is pitted, spiny etc., so they can be adhered firmly on the sticky stigma.
6. Name the secondary sex organs in male
Ans.: The secondary sex organs in male are
i) Epididymis
ii) Vas deferens
iii) Seminal vesicles
iv) Sperm duct
v) Prostate gland
vi) Cowper's gland
vii.Urethra

7. What is colostrum? How is milk production hormonally regulated ?

Ans.: i)The first fluid which is released from the mammary gland after child birth is called as **colostrum.**
ii)Milk production from alveoli of mammary glands is stimulated by **prolactin** secreted from the anterior pituitary. The **ejection of milk** is stimulated by posterior pituitary hormone **oxytocin**.

8. How can menstrual hygiene be maintained during menstrual days?

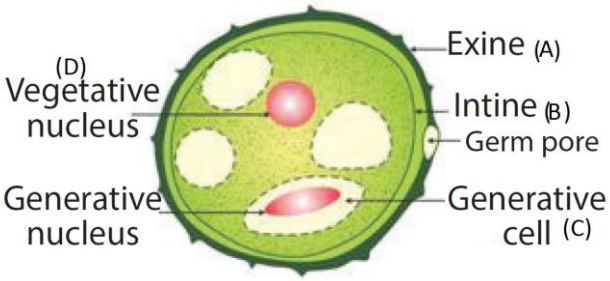
Ans.: Maintaining menstrual hygiene is important for the overall health of women. The basic menstrual hygiene ways are
1.Sanitary pads should be changed regularly, to avoid infections due to microbes from vagina and sweat from genitals.
2.Use of warm water to clean genitals helps to get rid of menstrual cramps
3. Wearing loose clothing rather than tight fitting clothes will ensure the airflow around the genitals and prevent sweating.

9. How does developing embryo gets its nourishment inside the mother's body?

Ans.: i) After fertilization, the lining of uterus thickens and is richly supplied with bloo to nourish the growing embryo.
ii) The embryo gets nutrition from the mother's blood with the help of special tissue called placenta.

10. Identify the parts A, B, C and D

Ans.:



11. a) Write the events involved in the sexual reproduction of a flowering plant.
b) Discuss the first event and write the types.
c) Mention the advantages and the disadvantages of that event.
(This question may be asked in long answer)

Ans.: a) Process of sexual reproduction in flowering plants. It involves:
1. Pollination and 2. Fertilization
b) **Pollination** : The transfer of pollen grains from anther to stigma of a flower is called as pollination.

Types of Pollination

1. **Self-pollination (Autogamy):** The transfer of pollen grains from the anther to the stigma of same flower or another flower borne on the same plant is known as self-pollination.
2. **Cross pollination (Allogamy):** Cross-pollination is the transfer of pollen from the anthers of a flower to the stigma of a flower on another plant of the same species

c) Advantage and disadvantage os Self and Cross Pollination

Advantages of self-pollination
1. Self-pollination is possible in certain bisexual flowers.
2. Flowers do not depend on agents for pollination.
3. There is no wastage of pollen grains.

Disadvantages of self-pollination
1. The seeds are less in numbers.
2. The endosperm is minute. Therefore, the seeds produce weak plants.
3. New varieties of plants cannot be produced

Advantages of cross pollination
1. The seeds produced as a result of cross pollination, develop and germinate properly and grow into better plants, i.e. cross pollination leads to the production of new varieties.
2. More viable seeds are produced.

Disadvantages of cross-pollination
1. Pollination may fail due to distance barrier.
2. More wastage of pollen grains
3. It may introduce some unwanted characters
4. Flowers depend on the external agencies for pollination

12. Why are the human testes located outside the abdominal cavity? Name the pouch in which they are present .

Ans.: Human testes responsible for formation of sperms (Spermatogenesis) need slightly lower temperature than the normal body temperature for this function. So human testes are located outside the abdominal cavity in sac-like structure called **scrotum**.

13. Luteal phase of the menstrual cycle is also called the secretory phase. Give reason.

Ans.: The luteal phase is the second half of the menstrual cycle, in which fertilisation and implantation may occur. Female hormones like estrogen and progesterone secreted in peak level because ovulation have to occur and they provide conditions for implantation. For this reason, Luteal phase of the menstrual cycle is called the secretory phase.

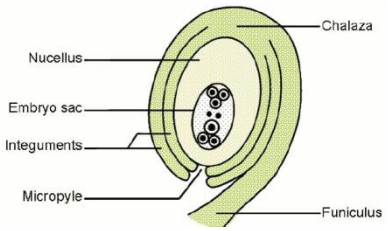
14. Why are family planning methods not adopted by all the people of our country?

Ans.: i..Due to lack of awareness about family planning.
ii. Myths and misconceptions about family planning.
iii..Long distance to Health facility.
iv. Unavailability of preferred contraceptive methods.
v. high cost of managing side effects.
vi. Desire for big family size.

VII. Long answer questions

1. With a neat labelled diagram describe the parts of a typical angiospermic ovule.

Ans.: Structure of the Ovule



i) The main part of the ovule is the **nucellus** which is enclosed by two integuments leaving an opening called as **micropyle**.
ii) The ovule is attached to the ovary wall by a stalk known as **funiculus**.
iii) **Chalaza** is the basal part.
iv) The embryo sac contains seven cells and the eighth nuclei located within the **nucellus**.
v) Three cells at the **micropylar** end form the **egg apparatus** and the three cells at the **chalaza** end are the **antipodal cells**.
vi) The remaining two nuclei are called **polar nuclei** found in the centre.
vii) In the egg apparatus one is the **egg cell** (female gamete) and the remaining two cells are the **synergids**.

2. What are the phases of menstrual cycle? Indicate the changes in the ovary and uterus.

Phase	Days	Changes in Ovary	Changes in Uterus
1.Menstrual phase	4–5 days	Development of primary follicles	Breakdown of uterine endometrial lining leads to bleeding
2.Follicular phase	6th–13th day	Primary follicles grow to become a fully mature Graafian follicle	Endometrium regenerates through proliferation
3.Ovulatory phase	14th day	The Graafian follicle ruptures, and releases the ovum(egg)	Increase in endometrial thickness
4.Luteal phase	15th– 28th day	Emptied Graafian follicle develops into corpus luteum	Endometrium is prepared for implantation if fertilization of egg takes place, if fertilization does not occur corpus luteum degenerates, uterine wall ruptures, bleeding starts and unfertilized egg is expelled

VIII. Higher Order Thinking Skills (HOTS)

1.In angiosperms the pollen germinates to produce pollen tube that carries two gametes. What is the purpose of carrying two gametes when single gamete can fertilize the egg?

Ans.: Double fertilization requires two sperm cells; one to fertilize the egg cell and thereby to form the zygote, while the other sperm to fuse with the secondary nucleus to form the endosperm. That's why two sperms are needed for the process of sexual reproduction in angiosperm.

2.Why menstrual cycle does not take place before puberty and during pregnancy ?

Ans.: i) When a baby girl is born, her ovaries contain hundreds of thousands of eggs, which remain inactive until puberty begins. Only at the time of puberty (age of 11-13 years), the pituitary gland starts making hormones (LH and FSH) that stimulate the ovaries to produce female sex hormones, including estrogen and progesterone. These hormones are responsible for first menstruation (Menarche).
That's why menstrual cycle does not take place before puberty.
ii) Lack of menstruation generally indicates pregnancy. If fertilization takes place the corpus luteum persists, continues to secrete progesterone maintains the thickened state of uterine wall and prevents maturation of another follicle till the end of pregnancy. That's why menstrual cycle does not take place during pregnancy.

3. Read the following passage and answer the questions that follow

Rahini and her parents were watching a television programme. An advertisement flashed on the screen which was promoting use of sanitary napkins. Rahini's parents suddenly changed the channel, but she objected to her parents and explained the need and importance of such advertisement.

a) What is first menstruation called? When does it occur ?

b) List out the napkin hygiene measures taken during menstruation ?

c) Do you think that Rahini's objection towards her parents was correct? If so, Why?

Ans.: a) First menstruation is called **menarche.** The first menstruation occurs at the **age of 11-13 years.**
b) Girls should be educated about **napkin hygiene** in the following ways
1.The sanitary pad and tampons should be wrapped properly and discarded because they can spread infections.
2. Sanitary pad or tampon should not be flushed down the toilet.
3. Napkin incinerators are to be used properly for disposal of used napkins.
c) Yes. Rahini's objection towards her parents was correct. Rahini's parents should not change channel, instead they must explain about the use of napkins and their proper disposal.

CHAPTER 18 GENETICS

I. Choose the correct answer

1. According to Mendel alleles have the following character
a) Pair of genes b) Responsible for character c) Production of gametes d) Recessive factors
Ans.: b) Responsible for character
2. 9 : 3 : 3 : 1 ratio is due to
a) Segregation b) Crossing over c) Independent assortment d) Recessiveness
Ans.: c) Independent assortment
3. The region of the chromosome where the spindle fibres get attached during cell division
a) Chromomere b) Centrosome c) Centromere d) Chromonema **Ans.:** c) Centromere
4. The centromere is found at the centre of the _____ chromosome.
a) Telocentric b) Metacentric c) Sub-metacentric d) Acrocentric **Ans.:** b) Metacentric
5. The _____ units form the backbone of the DNA.
a) 5 carbon sugar b) Phosphate c) Nitrogenous bases d) Sugar phosphate **Ans.:** d) Sugar phosphate
6. Okasaki fragments are joined together by _____.
a) Helicase b) DNA polymerase c) RNA primer d) DNA ligase **Ans.:** d) DNA ligase
7. The number of chromosomes found in human beings are _____.
a) 22 pairs of autosomes and 1 pair of allosomes. b) 22 autosomes and 1 allosome
c) 46 autosomes d) 46 pairs autosomes and 1 pair of allosomes.
Ans.: a) 22 pairs of autosomes and 1 pair of allosomes.
8. The loss of one or more chromosome in a ploidy is called _____.
a) Tetraploidy b) Aneuploidy c) Euploidy d) polyploidy **Ans.:** b) Aneuploidy

II. Fill in the blanks

1. The pairs of contrasting character (traits) of Mendel are called _____. **Ans.:** Allele
2. Physical expression of a gene is called _____ . **Ans.: Phenotype**
3. The thin thread like structures found in the nucleus of each cell are called _____. **Ans.: Chromsomes**

4. DNA consists of two _____ chains . **Ans.: Polynucleotide**
5. An inheritable change in the amount or the structure of a gene or a chromosome is called _____.
Ans.: Mutation

III. Identify whether the statement are True or False. Correct the false statement

1. A typical Mendelian dihybrid ratio of F_2 generation is 3:1 **Ans.: False**
Correct statement : A typical Mendelian dihybrid ratio of F_2 generation is **9 : 3: 3 : 1**
2. A recessive factor is altered by the presence of a dominant factor. **Ans.: False**
Correct statement : A recessive factor is **masked** by the presence of a dominant factor.
3. Each gamete has only one allele of a gene. **Ans.: True**
4. Hybrid is an offspring from a cross between genetically different parent. **Ans.: True**
5. Some of the chromosomes have an elongated knob-like appendages known as telomere. **Ans.: False**
Correct statement : Some of the chromosomes have an elongated knob-like appendages known as **Satellite** .
6. New nucleotides are added and new complementary strand of DNA is formed with the help of enzyme DNA polymerase. **Ans.: True**
7. Down's syndrome is the genetic condition with 45 chromosomes. **Ans.: False**
Correct statement : Down's syndrome is the genetic condition with **47** chromosomes.

IV. Match the following

1. Autosomes	Trisomy 21		**1. Autosomes**	**22 pair of chromosome**
2. Diploid condition	9:3:3:1		**2. Diploid condition**	**2n**
3. Allosome	22 pair of chromosome		**3. Allosome**	**23rd pair of chromosome**
4. Down's syndrome	2n		**4.Down's syndrome**	**Trisomy 21**
5. Dihybrid ratio	23rd pair of chromosome		**5. Dihybrid ratio**	**9:3:3:1**

V. Answer in a sentence

1. What is a cross in which inheritance of two pairs of contrasting characters are studied?
A cross in which inheritance of two pairs of contrasting characters are studied is called **Dihybrid cross.**
2. Name the conditions when both the alleles are identical?
The conditions when both the alleles are identical (TT or tt) is known as **Homzygous**.
3. A garden pea plant produces axial white flowers. Another of the same species produced terminal violet flowers. Identify the dominant trait?
The dominant trait is **axial white flower.**
4. **What is the name given to the segments of DNA, which are responsible for the inheritance of a particular character?**
The segments of DNA, which are responsible for the inheritance of a particular character is **gene**.
5. Name the bond which binds the nucleotides in a DNA.
Phosphodiester bond binds the nucleotides in a DNA.

VI. Short answers questions

1. Why did Mendel select pea plant for his experiments?
1. It is naturally self- pollinating and is very easy to raise pure breeding individuals.
2. It has a short life span so it is an annual and so it was possible to follow several generations.
3. It is easy to cross - pollinate.
4. It has deeply defined contrasting characters.
5. Th flowers are bisexual.

2. What do you understand by the term phenotype and genotype?
a) Phenotype : External expression of of a particular trait.
b) Genotype : Genetic expression of an organism.

3. What are allosomes?
Allosomes are chromosomes which are responsible for determining the sex of an individual. They are also called as **sex chromosomes** or **hetero-chromosomes**.
There are two types of sex chromosomes, X and Y- chromosomes.
A male has XY chromosomes
A female has XX Chromosomes

4. What are Okazaki fragments?

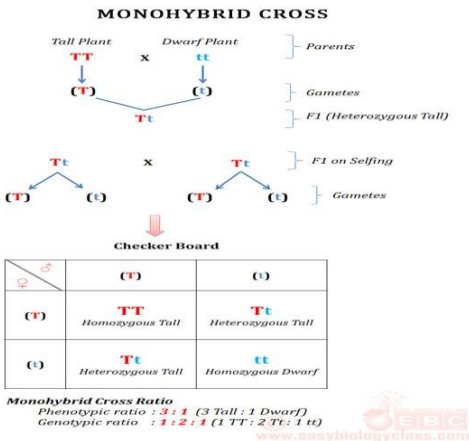
Okazaki fragments are short sequences of DNA nucleotides which are synthesized discontinuously and later linked together by enzyme DNA ligase to create the lagging strand during DNA replication.

5. Why is euploidy considered to be advantageous to both plants and animals?

Organisms with multiples of the basic chromosome set are called euploid.

1. Plants with euploidy condition have increased fruit and flower size.
2. Plants and animals with euploidy condition are typically sterile.

6. A pure tall plant (TT) is crossed with pure dwarf plant (tt), what would be the F1 and F2 generations? Explain.



Mendel selected tall (TT) and dwarf (tt) garden pea plants, *Pisum sativum*, for the Monohybrid cross.

When a pure breeding tall plant (TT) was crossed with a pure breeding dwarf plant(tt), all plants were tall in the first filial generation (F1)

When such an F1 tall plant (Tt) was allowed to self-pollination, both the tall and dwarf plants appeared in second filial generation (F2) in the ratio of 3:1.

7. Explain the structure of a chromosome.

The chromosomes are thin, long and thread like structures consisting of two identical strands called sister chromatids.

They are held together by the centromere.

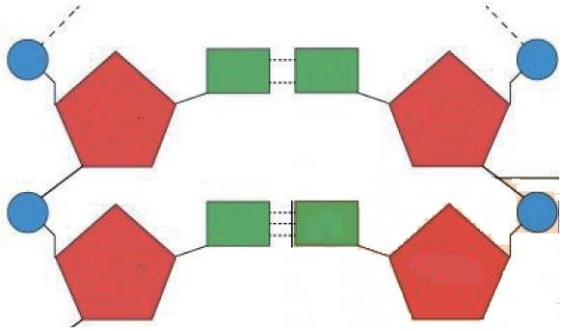
Each **chromatid** is made up of spirally coiled thin structure called **chromonema.**

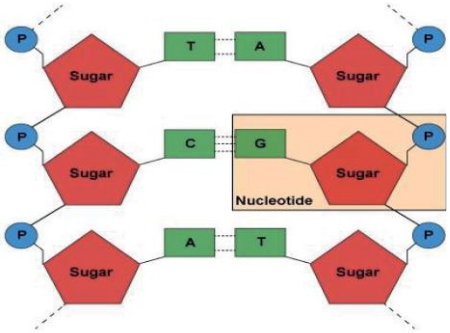
The chromonema has number of bead-like structures along its length which are called **chromomeres.**

The chromosomes are made up of DNA, RNA, chromosomal proteins (Histones and non-histones) and certain metallic ions. These proteins provide structural support to the chromosome .

Some of the chromosomes have an elongated **knob-like appendage** at one end of the chromosome known as satellite. The chromosomes with satellites are called as the **sat-chromosomes**.

8. Label the parts of the DNA in the diagram given below. Explain the structure briefly.





DNA is a large molecule consisting of millions of nucleotides. Each nucleotide consists of three components.

1.A sugar molecules – Deoxyribose sugar.

2.A nitrogenous base. There are two types of nitrogenous bases in DNA. They are

(a) Purines (Adenine and Guanine)

(b) Pyrimidines (Cytosine and Thymine)

3.A phosphate group

VII. Long answer questions

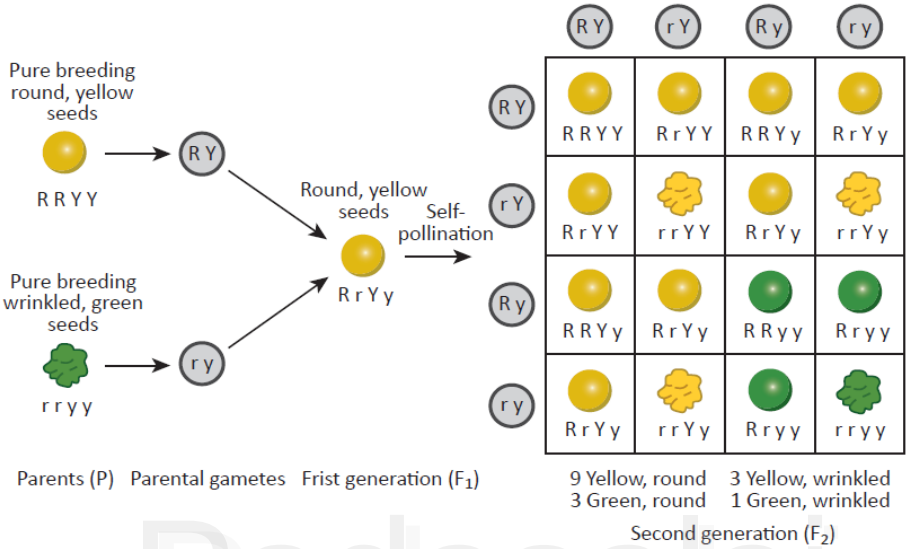
1.Explain with an example the inheritance of dihybrid cross. How is it different from monohybrid cross?

i) Dihybrid cross involves the **inheritance of two pairs of contrasting characteristics** (or contrasting traits) at the same time.

ii) Mendel first crossed pure breeding pea plants having round-yellow (RRYY) seeds with pure breeding pea plants having wrinkled-green (rryy) seeds and found that only round-yellow (RrYy) seeds were produced in the first generation (F1).

iii) When the hybrids of F1 generation pea plants having round-yellow (RrYy) seeds were cross-bred by self pollination, then four types of seeds having different combinations of shape and color were obtained in second generation or F2 generation. They were **round yellow**, **round-green**, **wrinkled yellow** and **wrinkled-green** seeds.

iv) The ratio of each phenotype (or appearance) of seeds in the F2 generation is **9:3:3:1**. This is known as the **Dihybrid ratio**.



Differences between Monohybrid and Dihybrid cross.

Monohybrid cross	Dihybrid cross
1. The inheritance of **one** pair of contrasting characteristics.	1. The inheritance of **two** pairs of contrasting characteristics.
2.The phenotypic ratio is **3:1**	2.The phenotypic ratio is **9:3:3:1**

2. How is the structure of DNA organised? What is the biological significance of DNA?

The structure of DNA

i) DNA molecule consists of two **polynucleotide** chains.

ii) These chains form a **double helix** structure with two strands which run **anti-parallel** to one another.

iii) Nitrogenous bases in the centre is linked by **sugar-phosphate** units which form the backbone of the DNA.

iv) Pairing between the nitrogenous bases is very specific and is always between purine and pyrimidine linked by hydrogen bonds.

* Adenine (A) links Thymine (T) with two hydrogen bonds (A = T)
* Cytosine (C) links Guanine (G) with three hydrogen bonds(C ≡ G)

This is called **complementary base pairing**.

v) Hydrogen bonds between the nitrogenous bases make the DNA molecule stable.

vi) Each turn of the double helix is 34 A° (3.4 nm). There are ten base pairs in a complete turn.

vii) The nucleotides in a helix are joined together by phosphodiester bonds.

Biological 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.

3. The sex of the new born child is a matter of chance and neither of the parents may be considered responsible for it. What would be the possible fusion of gametes to determine the sex of the child?

The sex of the new born child is a chance of probability as to which category of sperm fuses with the egg.

If the egg (X) is fused by the X-bearing sperm an **XX individual (female)** is produced.

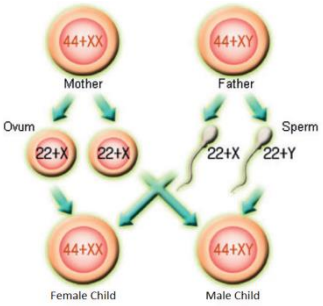
Egg (22+X) + Sperm (22+X) = Female child (44+XX)

If the egg (X) is fused by the Y-bearing sperm an **XY individual (male)** is produced.

Egg (22+X) + Sperm (22+X) = Female child (44+XX)

Thus the sperm, produced by the father, determines the sex of the child.

The mother is not responsible in determining the sex of the child.



VIII. Higher Order Thinking Skills (HOTS)

1. Flowers of the garden pea are bisexual and self-pollinated. Therefore, it is difficult to perform hybridization experiment by crossing a particular pistil with the specific pollen grains. How Mendel made it possible in his monohybrid and dihybrid crosses?

In pea plants, cross pollination can be easily achieved by emasculation in which the stamen of the flower is removed without affecting the pistil. The emasculated flower is immediately enclosed in a bag to prevent pollination by unwanted pollen. Then, the specific , mature and viable pollen grains are collected from the male parent, the bag is opened and the pollen grains are dusted on the stigma.

2. **Pure-bred tall pea plants are first crossed with pure-bred dwarf pea plants. The pea plants obtained in F1 generation are then cross-bred to produce F2 generation of pea plants.**

a. What do the plants of F1 generation look like?

b. What is the ratio of tall plants to dwarf plants in F2 generation?

c. Which type of plants were missing in F1 generation but reappeared in F2 generation?

a) All the plants of F1 generation are **tall (Tt)**

b) The ratio of tall plants to dwarf plants in F2 generation is **3:1**

c) The trait **dwarf** is missing in F1 generation but reappeared in F2 generation.

3. **Kavitha gave birth to a female baby. Her family members say that she can give birth to only female babies because of her family history. Is the statement given by her family members true. Justify your answer.**

The statement given by her family members is **not true**.

Because, the sex of the new born child is a chance of probability as to which category of sperm fuses with the egg.

If the egg (X) is fused by the X-bearing sperm an **XX individual (female)** is produced.

Egg (22+X) + Sperm (22+X) = Female child (44+XX)

If the egg (X) is fused by the Y-bearing sperm an **XY individual (male)** is produced.

Egg (22+X) + Sperm (22+X) = Female child (44+XX)

Thus the sperm, produced by the father, determines the sex of the child. The mother or her family history is not responsible in determining the sex of the child.

IX. Value based question

1. Under which conditions does the law of independent assortment hold good and why?

i) The factors for each character or trait remain independent and maintain their identity in the gametes.

ii) The factors are independent to each other and pass to the offspring (through gametes).

iii) If the law of independent assortment did not happen, all the genes have been locked with each other and not a single gene can be able to express independently.

iv) Independent assortment of genes is important to produce new genetic combinations that increase genetic variations within a population.