BLUE STARS HIGHER SECONDARY SCHOOL

X-BIOLOGY

UNIT NO:12 PLANT ANATOMY AND PLANT PHYSIOLOGY

I. ANSWER IN A SENTENCE

1.What is collateral vascular bundle?

Collateral vascular bundle is one type of conjoint vascular bundle in which Xylem lies towards the centre and phloem lies towards the periphery. **Eg :** Dicot stem.

2.Where does the carbon that is used in photosynthesis come from?

The carbon that is used in photosynthesis comes from carbon dioxide in the air.

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.

Fermentation or anaerobic respiration.

II. SHORT ANSWER QUESTIONS

1.Give an account on vascular bundle of dicot stem.

Vascular bundles of dicot stem are conjoint, collateral, endarch and open. They are arranged in the form of a ring around the pith.

2.Write a short note on mesophyll.

(i) The tissue present between the upper and lower epidermis of a dicot leaf is called mesophyll.

(ii) It is differentiated into Palisade parenchyma and Spongy parenchyma.

(a)Palisade parenchyma :

(i) It is found just below the upper epidermis. The cells are elongated.

(ii) These cells have more number of chloroplasts. The cells do not have intercellular spaces and they take part in photosynthesis.

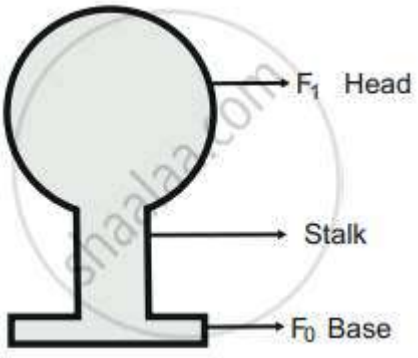
(b)Spongy parenchyma :

(i) It is found below the palisade parenchyma tissue.

(ii) Cells are almost spherical or oval and are irregularly arranged.

(iii) 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 tissue systems in flowering plants are
(i) Epidermal tissue system
(ii) Ground tissue system
(iii) Vascular tissue system

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

(i) Photosynthesis is a process by which autotrophic organisms like green plants, algae and chlorophyll containing bacteria utilize the energy from sunlight to synthesize their own food. In this process, carbon dioxide combines with water in the presence of sunlight and chlorophyll to form carbohydrates. During this process oxygen is released as a byproduct.

$6CO_2 + 12\ H_2O \xrightarrow[chlorophyll]{Light} C_6H_{12}O_6 + 6H_2O + 6O_2 \uparrow$

Carbon dioxide + Water → Glucose + Water + Oxygen

(ii) Photosynthesis occurs in green parts of the plant such as leaves, stems and floral buds.

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 = Volume of CO_2 liberated / Volume of O_2 consume

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 light dependent reaction only have to supply organic energy molecules such as ATP and NADPH2 necessary to reduce CO2 into carbohydrate in the light independent reaction.

8. Write the reaction for photosynthesis?

$6CO_2 + 12\ H_2O \xrightarrow[chlorophyll]{light} C_6H_{12}O_6 + 6H_2O + 6O_2 \uparrow$

Carbon dioxide + Water → Glucose + Water + Oxygen

VII. Long answer questions

1. Differentiate the following

a)Differences between Dicot and Monocot 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

b) Aerobic and Anaerobic respiration.

sl.no	Aerobic Respiration	Anaerobic Respiration
1.	It takes place in **higher plants and animals.**	It takes place in **lower plants.(yeast and bacteria).**
2.	Oxygen is **utilized** for respiration	Oxygen is **not utilized** for respiration.
3.	Glucose is **completely** oxidized.	**Incomplete oxidation** of Glucose takes place.
4.	**More energy** is produced. (38 ATP)	**Less energy** is produced.(2 ATP)
5.	The end products are **co2,H2O and energy.**	The end products are **Ethanol or Lactic acid,co2 and Energy**.

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

a. Glycolysis (Glucose splitting): It is the breakdown of one molecule of glucose (6 carbon) into two molecules of pyruvic acid (3 carbon) . Glycolysis takes place in cytoplasm of the cell. It is the first step of both aerobic and anerobic respiration.

b. Krebs Cycle: This cycle occurs in mitochondria matrix. At the end of glycolysis, 2 molecules of pyruvic acid enter into mitochondria. 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: This is accomplished through a system of electron carrier complex called **electron transport chain** (ETC) located on the inner membrane of the mitochondria. $NADH_2$ and $FADH_2$ molecules formed during glycolysis and Krebs cycle are oxidised to NAD+ and FAD+ to release

the energy via electrons. The electrons, as they move through the system, release energy which is trapped by ADP to synthesize ATP. This is called **oxidative phosphorylation**. 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**
Improtant differences	1.It takes place in the **presence of light.**	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 products	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.

III. Higher Order Thinking Skills (HOTS)

1. The reactions of photosynthesis make up a biochemical pathway.

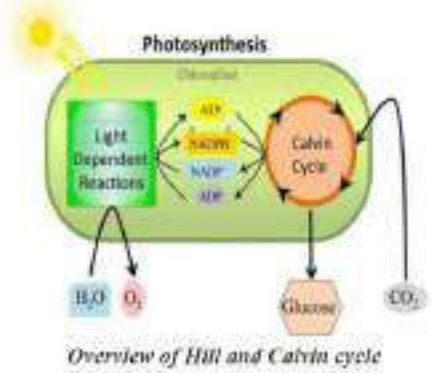
a) What are the reactants and products for both light and dark reactions.

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 NADPH.	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.



Overview of Hill and Calvin cycle

ii) Name of the recycled reactants :

The products of light reaction, ATP and $NADPH_2$, move out from the thylokoid to the
stroma. These ATP and $NADPH_2$ are utilized in Calvin cycle to reduce CO_2 to carbohydrate. The
used up ATP and $NADPH_2$ are converted to ADP and NADP+.

$$\text{ATP and NADPH}_2 \xrightarrow{\text{Calvin cycle}} \text{ADP and NADP}^+$$

Light reaction converts these energy - depleted compounds ADP and NADP+ back to the high energy forms ATP and NADPH.

$$\text{ADP and NADP}^+ + \xrightarrow{\text{Light reaction}} \text{ATP and NADPH}_2$$

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.

UNIT NO: 13 STRUCTURAL ORGANISATION OF ANIMALS.

I. ANSWER IN A SENTENCE

1. Give the common name of the *Hirudinar via granulosa*.

Indian cattle leech is the common name of *Hirudinaria granulosa*

2. How does leech respire?

Leech respires through the skin.

3.Write the dental formula of rabbit.

I=2/1, C=0/0, PM=3/2, H=3/3

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 the incisors, and premolar is called diastema. It helps in mastication and chewing of food.

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?

Muscular pharynx acts as suction pump in leech.

8.What does CNS stand for?

Central Nervous System.

9.Why is the teeth of rabbit called heterodont?

Different types of teeth are present. (Incisors, Premolars & Molars). Hence it 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.

II. SHORT ANSWER QUESTIONS

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

Tracheal walls are supported by rings of cartilage which 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 modifications in their structure.

(i) Blood is sucked by pharynx.

(ii) Anterior and posterior ends of the body are provided with suckers by which the animal attaches itself to the body of the host.

(iii) The three jaws inside the mouth, causes a painless Y-shaped wound in the skin of the host.

(iv) The salivary glands produce hirudin which does not allow the blood to coagulate. Thus, a continuous supply of the blood is maintained.

(v) Parapodia and setae are completely absent

(vi) Blood is stored in the crop. It gives nourishment to the leech for several months.

III. LONG ANSWER QUESTIONS

1. **How is the circulatory system designed in leech to compensate the heart structure ?**
   - In leech, circulation is brought about by **haemocoelic system**.

- There are no true blood vessels. The blood vessels are replaced by channels called **haemocoelic channels** or **canals** filled with blood like fluid.
- The coelomic fluid contains haemoglobin.
- There are four longitudinal channels. One channel lies above (dorsal) the alimentary canal, one below (ventral) the alimentary canal.
- The other two channels lie on either (lateral) side of the alimentary canal which serve as heart and have inner valves.
- All the 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 (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.

Male reproductive system in Rabbit: The male reproductive system of rabbit consists of

(i)a pair of testes
(ii)The associated ducts and
(iii)Three accessory gland

(i) Testes:

which are ovoid in shape. Testes are enclosed by scrotal sacs in the abdominal cavity.

(ii) Ducts:

Each testis consists of numerous fine tubules called **seminiferous tubules**. This network of tubules lead into a coiled tubule called **epididymis,** which lead into the sperm duct called **vas deferens**. The vas deferens join in the urethra just below the urinary bladder. The urethra runs backward and passes into the penis.

(iii)Accessory glands:

There are three accessory glands namely

(a)prostate gland
(b)cowper's gland
(c)perineal gland.

Their secretions are involved in reproduction.

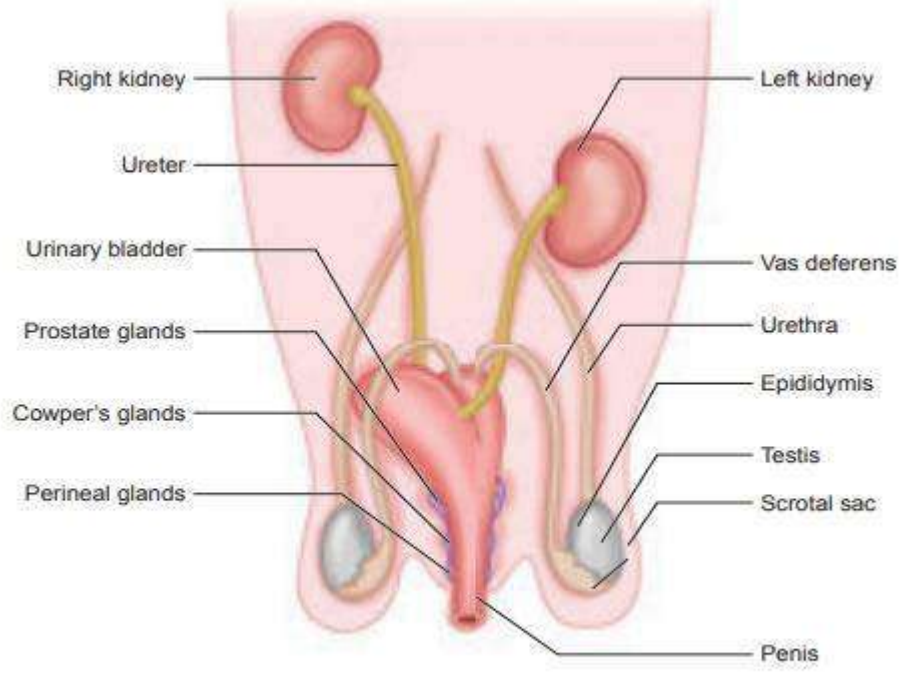


Fig. 13.11 Male reproductive system of Rabbit

IV. 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 anasthetic 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 (young ones) and
   b) Permanent teeth (in adults).

iii) In rabbit the teeth are of three different kinds (Heterodont). They are;
   a) Incisors
   b) Premolars and
   c) Molars.

iv) Diastema is the gap between the incisors and premolar which helps in mastication and chewing of food.

V. VALUE BASED QUESTIONS

1. **Leeches do not have an elaborate 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 noureshment 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 helps in digestion of cellulose.

UNIT NO 14
TRANSPORTATION IN PLANTS AND CIRCULATION IN ANIMALS

I.ANSWER IN A WORD OR SENTENCE

1.Name two layered protective covering of human heart.

Tow layered protective covering of human heart is **pericardium.**

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

RBCs human blood are **Biconcave/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?

White Blood cells (WBC) 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 muscle.

Coronary artery supplies blood to the heart muscles.

II. SHORT ANSWER QUESTIONS

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

(i) Stomata are open in the day and closed at night. The opening and closing of the stomata is due to the change in turgidity of the guard cells.

(ii) When water enters into the guard cells, they become turgid and the stoma open. 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 than its absorption in the roots?

When transpiration exceeds water absorption by the roots, the plants 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.

Structure :

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

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

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

iv) The two **lower thick walled** chambers are called **ventricles**.
v) The **right atrium receives deoxygenated blood** from different parts of the body through main veins **superior vena cava, inferior vena cava and coronary sinus**.
vi) **Pulmonary veins** bring **oxygenated blood** to the left atrium from the **lungs**.
vii) The right and left auricles pump blood into the right and left ventricles respectively.
viii) **From the right ventricle** arises the pulmonary trunk which bifurcates to form right and left **pulmonary arteries**.
ix) The right and left **pulmonary arteries** supply **deoxygenated** to the **lungs** of the respective side.
x) The **left ventricle** gives rise to **aorta**.
xi) The **oxygenated blood** is supplied by the **aorta** to various organs of the body.
xii) The **coronary arteries** supply blood to the **heart**.

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

In our body blood circulates twice through the heart in one complete cycle and it is called **double circulation.**

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

(i) The rhythmic closure and opening of the valves cause the **sound of the heart.**
(ii) 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.
(iii) 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 are 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?

(i) Rh factor was discovered by Landsteiner and **Wiener** in 1940.
(ii) It is named as 'Rh' because it was first discovered is Rhesus monkeys.

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

sl.no	Artery	Vein
1.	Distributing vessel	Collecting vessel
2.	Pink in colour	Red in colour
3.	Deep location	Superficial in location
4.	Blood flow with high pressure	Blood flow with low pressure

11 Why is the Sinoatrial node called the pacemaker of heart?

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

12.Differentiate between systemic circulation and pulmonary circulation.

NO	Systemic circulation	Pulmonary circulation
1.	It occurs **between** the **heart** and the **entire body.**	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.	It carries **deoxygenated blood** from the heart to the lungs and **oxygenated blood** from lungs to the heart**.**

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

Events of cardiac cycle - Total duration 0.8 sec.

a) Atrial 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

Total duration of cardiac cycle - 0.8 sec

III.GIVE REASONS FOR THE FOLLOWING:

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.

(i) Stomata are open in the day and closed at night. The opening and closing of the stomata is due to the change in turgidity of the guard cells.

(ii) When water enters into the guard cells, they become turgid and the stoma open. 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.

(i) Minerals are remobilised from older dying leaves to younger leaves. eg. Elements like phosphorus, sulphur.
(ii) This phenomenon can be seen in deciduous plants.
(iii) Small amounts of material exchange takes place between xylem and phloem. Hence minerals are not lost when the 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.

IV. LONG ANSWER QUESTIONS

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) ApoplastPathway : The apoplastic movement of water occurs exclusively through the intercellular spaces and the walls of the cells. Apoplastic

movement does not involve crossing thecell membrane. This movement is dependent on the gradient.

b) SymplastPathway : In symplastic movement, the water travels through the cells i.e. their cytoplasm; intercellular movement is through the plasmodesmata. Water enters the cells throughthe 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.

i) Granulocytes : They contain granules in their cytoplasm.

ii) Agranulocytes : Granules are not found in the cytoplasm of these cells.

I.Types of Granulocytes and their functions:

Name of granulocyte cells	**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 of Agranulocyte Cells	**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

i) 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.

ii) 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.

iii) 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.

a) Transport of respiratory gases (Oxygen and CO_2).

b) Transport of digested food materials to the different body cells.

c) Transport of hormones.

d) Transport of nitrogenous excretory products like ammonia, urea and uric acid.

e) It is involved in protection of the body and defense against diseases.

f) It acts as buffer and also helps in regulation of pH and body temperature.

g) It maintains proper water balance in the body.

V.HIGHER 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 higherpressure 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?

Ans :

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 vapour 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.

UNIT NO :15 NERVOUS SYSTEM

I. SHORT ANSWER QUESTIONS

1.Define stimulus.

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

2.Name the parts of the hind brain.

It is formed of three parts **cerebellum, pons** and **medulla oblongata.**

3.What are the structures involved in the protection of brain?

The brain is covered by three connective tissue membranes or meninges:
(i) Outer Duramater
(ii) Middle arachnoid
(iii) Inner piamater
It protects the brain from mechanical injury.

4.Give an example for conditioned reflexes.

Playing a harmonium by striking a particular key on seeing a music note is an example of conditioned reflex.

5.Which acts as a link between the nervous system and endocrine system?

Hypothalamus of the fore brain acts as a link between nervous and endocrinesystem.

6.Define reflex arc.

The pathway taken by nerve impulse to accomplish reflex action is called **reflex arc.**

II. DIFFERENTIATE BETWEEN

1.Voluntary and involuntary actions.

Voluntary action	**Involuntary action**
i) The Voluntary actions are **under the control** of our will. e.gEating,Locomotionetc	i) Involuntary action are **not under our control**. e.gBreathing,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**

2. 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**

III. LONG ANSWER QUESTIONS:

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

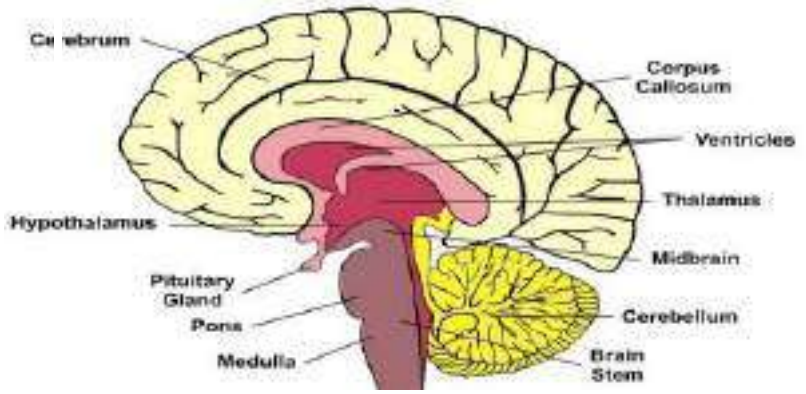
(i) **Cyton**: Cyton is also called cell body or perikaryon. It has a central nucleus with abundant cytoplasm called **neuroplasm**. The cytoplasm has large granular body called **Nissl's granules** and the other cell organelles like mitochondria, ribosomes, lysosomes, and endoplasmic recticulum. Neurons do not have the ability to divide. Several neurofibrils are present in the cytoplasm that help in transmission of nerve impulses to and from the cell body.

(ii) **Dendrites**: These are the numerous branched cytoplasmic processes that project from the surface of the cell body. They conduct nerve impulses towards the cyton. The branched projections increase the surface area for receiving the signals from other nerve cells.

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

Synapse: A junction between synaptic knob of axon of one neuron and dendron of next neuron is called **synaptic junction**. Information from one neuron can pass to another neuron through these junctions with the release of chemicals known as neurotransmitters from the synaptic knob.

2.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, vasomotorcentres to control heart beat, respiration and contractions of blood vessels respectively. It also regulates vomiting and salivation.

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

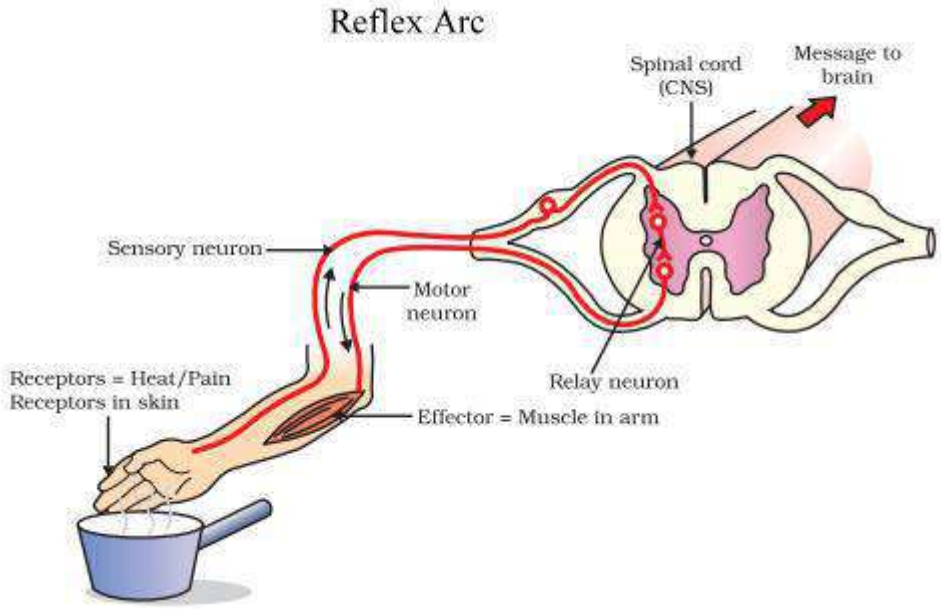
i) When a needle pricks our hand, we withdraw our hand away from the source of pain, the needle. This stimulus (pain) in turn triggers an impulse in sensory neuron.

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.



4.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.

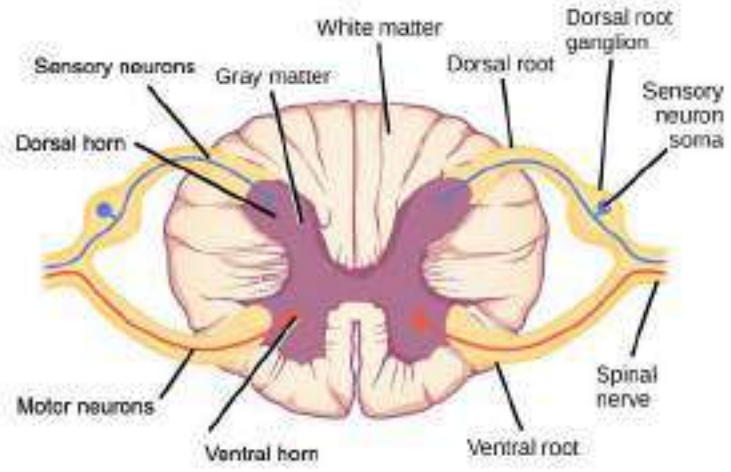
vi) The grey matter of spinal cord is 'H' shaped. The upper end of letter 'H" forms posterior horns and lower end forms anterior horns.

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.



Cross Section of Spinal Cord

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.

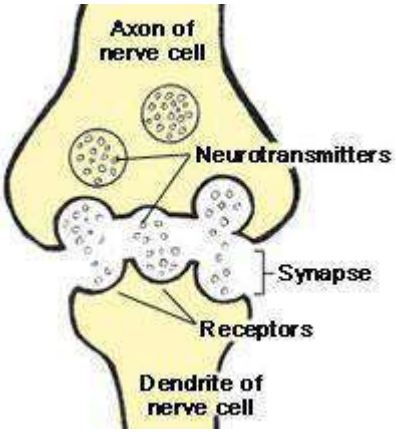
iii) This impulse travels from the dendrite to the cell body and then along the axon to its terminal end.

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.Classify neurons based on its structure.

Based on structure the neurons classified as follows:

i)Unipolar neurons:

Only **one nerve process** arises from the cyton which acts as both axon and dendron. They found in **early embryos** but not inadult.

ii) **Bipolar neurons:**

The cyton gives rise to **two nerve processes** of which one acts as an axon while another as a dendron. They found in **retinaof eye** and **olfactory epithelium** of nasal chambers.

iii) **Multipolar neurons:**

The cyton gives rise to **many dendrons**and an **axon**. They found in **cerebral cortex** of brain

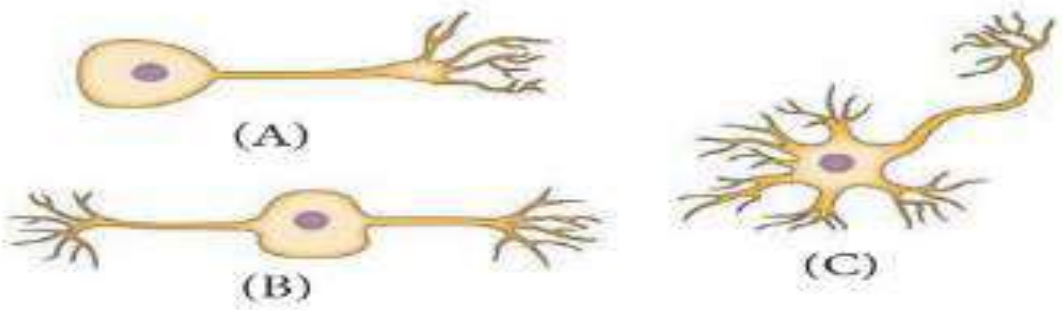


Fig. 15.2 Unipolar (A), Bipolar (B) and multipolar (C) neurons

IV.HIGHER ORDER THINKING (HOTS)

1.'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.

2. 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).

UNIT 16: PLANT AND ANIMAL HORMONES

I. ANSWER IN A WORD OR SENTENCE

1. Which hormone promotes the production of male flowers in Cucurbits?
Gibberellin.

2.Write the name of a synthetic auxin.
2,4D (2,4Dichlorophenoxy Acetic acid).

3.Which hormone induces parthenocarpy in tomatoes?
Gibberellin.

4.What is the hormone responsible for the secretion of milk in female after child birth?
Prolactin.

5. Name the hormones which regulates water and mineral metabolism in man.
Aldosterone.

6.Which hormone is secreted during emergency situation in man?
Adrenalin.(a.Epinephrine(Adrenaline)b.Norepinephrine(Noradrenaline)

7.Which gland secretes digestive enzymes and hormones?
Pancreas is a dual gland. It secretes both digestive enzyme and hormones.

8.Name the endocrine glands associated with kidneys.
The endocrine gland associated with kidneys is Adrenal gland.

II SHORT ANSWER QUESTIONS

1.What are synthetic auxins? Give examples.

Artificially Synthesized Auxins that have properties like Auxins are called as **Synthetic Auxins.** Example : 2,4D (2,4 Dichlorophenoxy Acetic Acid)

2.What is bolting? How can it be induced artificially?

Treatment of Rosette plants with Gibberellin induces sudden shoot elongation followed by flowering. This is called **bolting.**

3.Bring out any two physiological activities of abscisic acid
(i) ABA promotes the process of separation of leaves, flowers and fruits (abscission).
(ii) During water stress and drought conditions ABA causes stomatal closure.

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

Spraying with Auxins can help to prevent leaf fall and fruit drop in a plant. This is because Auxins prevent the formation of a abscission layer which is formed before separation of plant parts.

5.What are chemical messengers?

The hormones produced by the endocrine glands are called **chemical messengers.** They diffuse into the blood stream and are carried to distant parts of the body. They act on specific organs called target organs.

6.Write the differences between endocrine and exocrine gland

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

7. What is the role of parathormone?

Role of parathormone

- Theparathormone regulates calcium and phosphorus metabolism in the body.
- They act on bone, kidney and intestine to maintain blood calcium levels

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

SL. NO	**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?

As thyroid hormones (Triiodothyronine (T3) and Tetraiodothyronine (T4) 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?

- Thyroid hormones, Triiodothyronine (T3) and Tetraiodothyronine or Thyroxine (T4) require iodine for its formation.
- 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.

III.LONG ANSWER QUESTION:

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

Physiological effects of ethylene :

- Ethylene promotes the ripening of fruits eg: Tomato, Apple, Mango, Banana, etc.
  - Ethylene inhibits the elongation of stem and root in dicots.
  - Ethylene hastens the senescence of leaves and flowers.
  - Ethylene stimulates formation of abscission zone in leaves, flowers and fruits. This leads to premature shedding.
- Ethylene breaks the dormancy of buds, seeds and storage organs.

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

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.

INTRODUCTION;

- Frits Warmolt Went (1903–1990), a Dutch biologist demonstrated the existence and effect of auxin in plants.
- He did a series of experiments in Avena coleoptiles.

FIRST EXPERIMENT:

- In his first experiment he removed the tips of Avena coleoptiles.
- The cut tips did not grow indicating that the tips produced something essential for growth.

SECOND EXPERIMENT

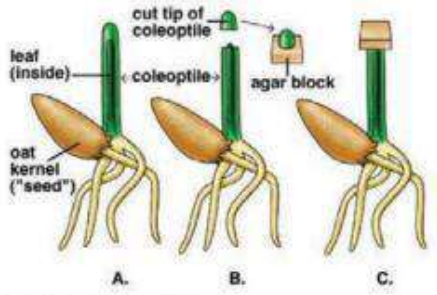
- In his Second Experiment he placed the agar blocks on the decapitated coleoptile tips.
- The coleoptile tips did not show any response.

THIRD EXPERIMENT :

- In his next experiment he placed the detached coleoptiles tips on agar blocks.
- After an hour, he discarded the tips and placed this agar block on the decapitated coleoptile.
- It grew straight up indicating that some chemical had diffused from the cut coleoptile tips into the agarblock which stimulated the growth.

CONCLUSION ;

- From his experiments Went concluded that a chemical diffusing from the tip of coleoptiles was responsiblefor growth, and he named it as "Auxin" meaning 'to grow".



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.

3. Write the physiological effects of gibberellins.

Physiological effects of Gibberellins:

- Application of gibberellins on plants stimulate extraordinary elongation of internode. eg: Corn and Pea.
- Treatment of rosette plants with gibberellin induces sudden shoot elongation followed by flowering. This is called bolting.
- Gibberellins promote the production of male flowers in monoecious plants (Cucurbits).
- Gibberellins break dormancy of potato tubers.
- Gibberellins are efficient than auxins in inducing the formation of seedless fruit - Parthenocarpic fruits (Development of fruits without fertilization) eg: Tomato.

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

Estrogens are produced by the Graafian follicles of the ovary.

Functions of estrogens :

- It brings about the changes that occur during puberty.
- It initiates the process of Oogenesis.
- It stimulates the maturation of ovarian follicles in the ovary.
- 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 form one another?

i) **The conditions occur due to lack of ADH and insulin**

- Deficiency of ADH causes Diabetes insipidus.

- The deficiency of insulin causes Diabetes mellitus.

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

S.No.	Diabetes insipidus	Diabetes mellitus
1	It reduces reabsorption water in kidney tubules	It increases blood sugar level (Hyperglycemia)
2	**Sympoms :** i) Frequenty and excessive urination (polyuria) ii) Dehydration iii) Increased thirst (Polydipsia)	**Symptoms :** i) Excretion of excess glucose in the urine(Glycosuria) ii) Frequenty urination (Polyuria) iii) Increased thirst (Polydipsia) iv) Increase in appetite (Polyphagia)

IV HIGHER ORDER THINKING SKILLS (HOTS)

1. What would be expected to happen if :

a. Gibberellin is applied to rice seedlings.

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

b. A rotten fruit gets mixed with unripe fruits.

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.

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

2. 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.

The hormone involved in this process is Gibberellins.

b. Which property of this hormone causes the disease?

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

c. Give two functions of this hormone.

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

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

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

- Triiodothyronine (T3).
- Tetraiodothyronine or Thyroxine (T4)

4. **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?**

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.

5. **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.**

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

Prevention of Diabetes mellitus

- Performing physical activity on a regular basis may help prevent diabetes.
- Lose excess body fat - Being overweight is a big risk factor for diabetes.
- Follow a plant-based, low-calorie diet.
- Foods to avoid are those rich in trans fats (also called hydrogenated fat), saturated fat, and sugar.
- Stress less : The stress response triggers the release of several hormones that increase blood sugar.
- Sleep well : Chronic sleep deprivation and poor quality sleep increase the risk for diabetes and obesity.

UNIT NO 17 REPRODUCTION IN PLANT AND ANIMALS

I.ANSWER IN A SENTENCE:

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

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?

Germination of pollen grains takes place on the stigmatic surface of the flower.

3.**Name two organisms which reproduces through budding.**

Budding takes place in

- Yeast
- Bryophyllum

4.Mention the function of endosperm.

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.

Oxytocinfrom 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?

Every year May 28 is observed World Menstrual Hygiene Day.

8. What is the need for contraception ?

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.

Fertilization : Fertilization occurs in the oviduct particularly in ampulla of fallopian tube.

b. Implantation.

Implantation : Fertilized egg gets implanted in the uterus.

II.SHORT ANSWER QUESTION

1. What will happen if you cut planaria into small fragments?

If we cut a Planaria into small fragments, over time each piece will regenerate into a complete worm by the
process regeneration.

2. Why is vegetative propagation practiced for growing some type of plants?

Vegetative propagation is practiced for growing some type of plants, because

- Some plants have reduced power of sexual reproduction.
- Seeds of some plants have long dormant period or poor viability.
- It is a rapid and easier method.
- Good characters can be preserved

3.How does binary fission differ from multiple fission?

S.No.	BINARY FISSION	MULTIPLE FISSION
1	A single parent cell divides into two daughter cells	A single parent cell divides into many daughter cells
2	It occurs during favourable conditions Eg: Amoeba	It occurs during unfavourable conditions Eg: Plasmodium

4.Define triple fusion.

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.

The characteristics of insect pollinated flowers or Entamophilous flower.

- To attract insects these flowers are brightly coloured, have smell and nectar.
- 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.

The secondary sex organs in male are;

- Epididymis.
- Vas deferens.
- Seminal vesicles.
- Sperm duct.
- Prostate gland.
- Cowper's gland.
- Urethra and
- Penis.

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

- The first fluid which is released from the mammary gland after child birth is called as colostrum.
- Milk production from alveoli of mammary glands is stimulated by prolactin secreted from the anteriorpituitary. The ejection of milk is stimulated by posterior pituitary hormone oxytocin.

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

Maintaining menstrual hygiene is important for the overall health of women. The basic menstrual hygieneways are;

- Sanitary pads should be changed regularly, to avoid infections due to microbes from vagina and sweatfrom genitals.Use of warm water to clean genitals helps to get rid of menstrual cramps.
- Wearing loose clothing rather than tight fitting clothes will ensure the airflow around the genitals andprevent sweating.

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

- After fertilization, the lining of uterus thickens and is richly supplied with blood to nourish the growing embryo.
- The embryo gets nutrition from the mother's blood with the help of special tissue called placenta.
- Umbilical cord connects the placenta and foetus.

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

A :Exine.
B :Intine.
C : Generative cell.
D : Vegetative nucleus.

11. Write the events involved in the sexual reproduction of a flowering plant.
a. Discuss the first event and write the types.
i) **Process of sexual reproduction in flowering plants. It involves :**

- Pollination.
- Fertilization.

ii) **Pollination :**The transfer of pollen grains from anther to stigma of a flower is called as pollination.
Types of Pollination :

- **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.

- **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**.**
b. Mention the advantages and the disadvantages of that event.
Advantages of self-pollination

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

Disadvantages of self-pollination

- The seeds are less in numbers.
- The endosperm is minute. Therefore, the seeds produce weak plants.
- New varieties of plants cannot be produced

Advantages of cross pollination

- 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.

- More viable seeds are produced.

Disadvantages of cross-pollination

- More wastage of pollen grains.
- It may introduce some unwanted characters.
- 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.

Human testes responsible for formation of sperms (Spermatogenesis) need slightly lower temperature thanthe 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.

The luteal phase is the second half of the menstrual cycle, in which fertilisation and implantation may occur.

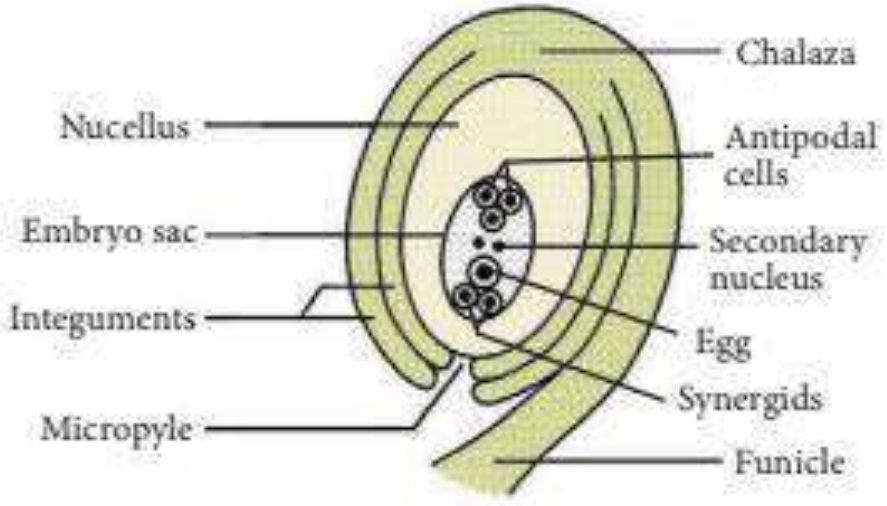
Female hormones like estrogen and progesterone secreted in peak level because ovulation have to occur and they provide conditions for implantation. For this reason, Luteal phase of the menstrual cycle is called the secretory phase.

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

- Due to lack of awareness about family planning.
- Myths and misconceptions about family planning.
- Long distance to Health facility.
- Unavailability of preferred contraceptive methods.
- high cost of managing side effects.
- Desire for big family size.

III.LONG ANSWER QUESTIONS

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



- The main part of the ovule is the nucellus which is enclosed by two integuments leaving an opening
- called as micropyle.

- The ovule is attached to the ovary wall by a stalk known as funiculus.
- Chalaza is the basal part.
- The embryo sac contains seven cells and the eighth nuclei located within the nucellus.
- Three cells at the micropylar end form the egg apparatus and the three cells at the chalaza end are the
- antipodal cells.
- The remaining two nuclei are called polar nuclei found in the centre.
- 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.

S.No.	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	6^{th} – 13^{th} day	Primary follicles grow to become a fully mature Graafian follicle	endometrium regenerates through proliferation
3	Ovulatory phase	14^{th} day	The Graafian follicle ruptures and releases the ovum (egg)	Increase in endometrial thickness
4	Luteal phase	15^{th} – 28^{th} 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

IV.HIGHER ORDER THINKING:

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?

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 ?

- 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 startsmaking 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'swhy menstrual cycle does not take place before puberty.
- 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 duringpregnancy.

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?

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

- The sanitary pad and tampons should be wrapped properly and discarded because they can spread

infections.

- Sanitary pad or tampon should not be flushed down the toilet.
- 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.

UNIT:18 GENETICS

I.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 Homozygous.

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.

Hydrogen bond binds the nucleotides in a DNA.

II.SHORT ANSWER QUESTION:

1. Why did Mendel select pea plant for his experiments?

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

2. What do you understand by the term phenotype and genotype?

- **Phenotype :**External expression of of a particular trait.
- **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?

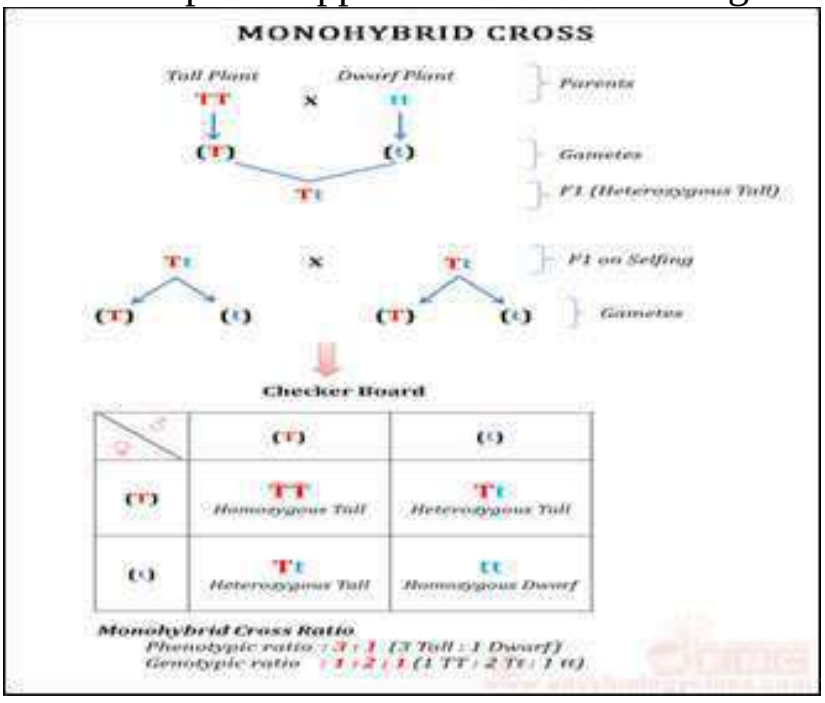
Organisms with multiples of the basic chromosome set are called euploid.

- Plants with euploidy condition have increased fruit and flower size.
- 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?

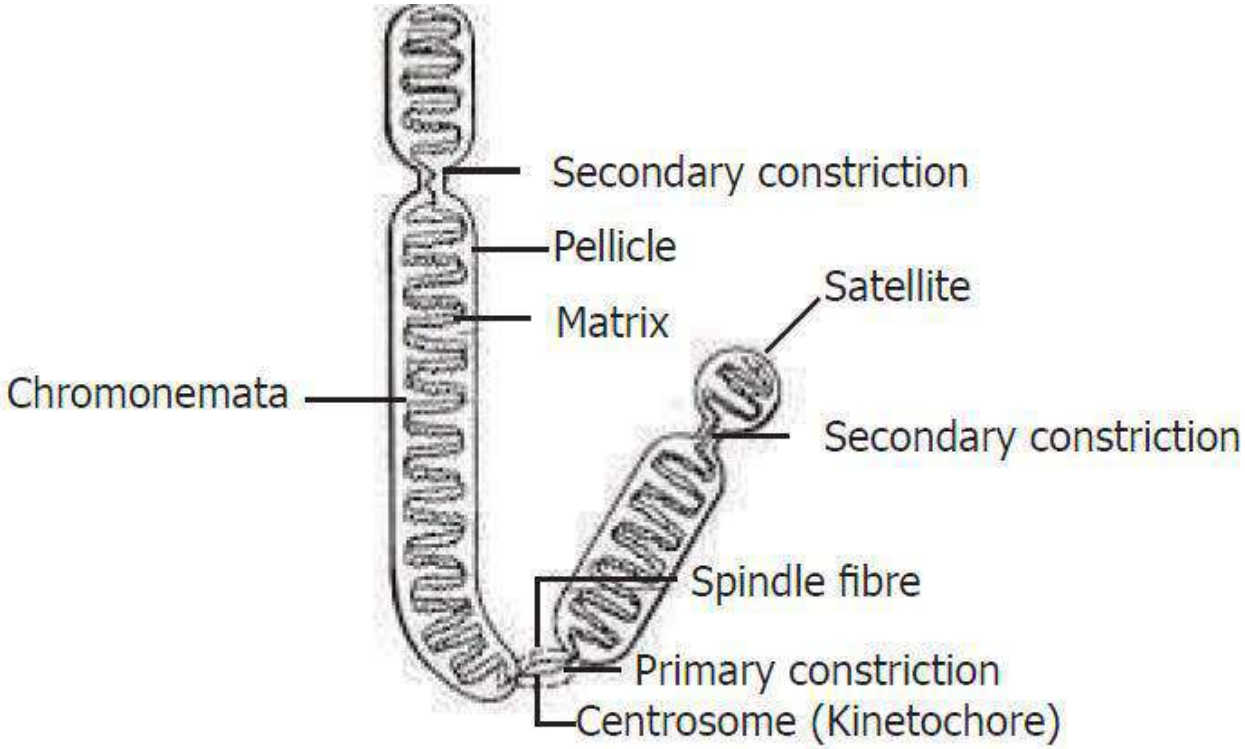
Explain.

Mendel selected tall (TT) and dwarf (tt) garden pea plants, Pisumsativum, 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.

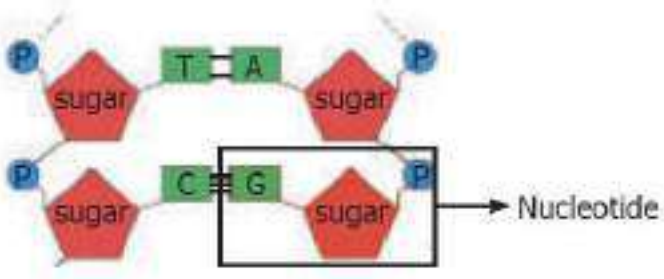


7. Explain the structure of a chromosome.

- The chromosomes are thin, long and thread like structures consisting of two identical strands calledsister 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) andcertain 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 chromosomeknown 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.

i) A sugar molecules – Deoxyribose sugar.

ii) A nitrogenous base. There are two types of nitrogenous bases in DNA. They are;

- Purines (Adenine and Guanine).
- Pyrimidines (Cytosine and Thymine).
- A phosphate group.

III.LONG ANSWER QUESTION

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

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

- 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).

- 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.

- 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.

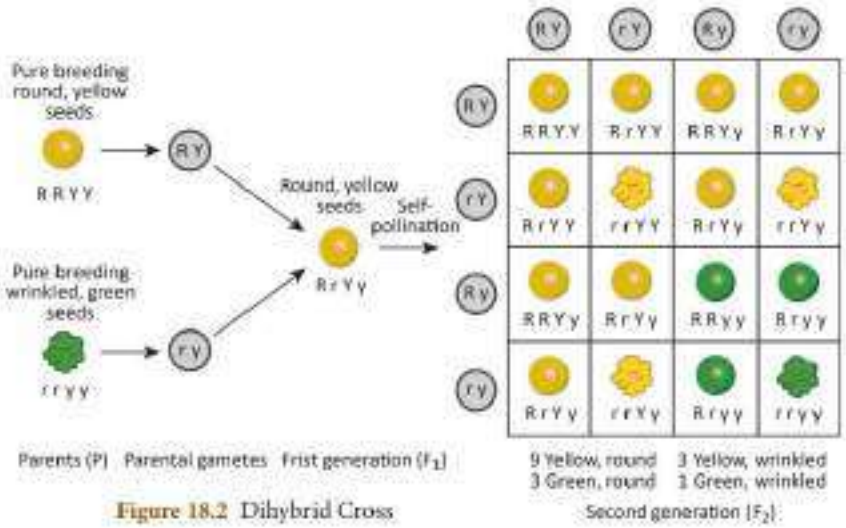


Figure 18.2 Dihybrid Cross

Differences between Monohybrid and Dihybrid cross.

S.No.	Monohybrid cross	Dihybrid cross
1	The inheritance of one pair of contrasting characteristics	The inheritance of two pairs of contrasting characteristics
2	The phenotypic ratio is 3:1	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

- DNA molecule consists of two polynucleotide chains.
- These chains form a double helix structure with two strands which run anti-parallel to one another.
- Nitrogenous bases in the centre is linked by sugar-phosphate units which form the backbone of theDNA.
- Pairing between the nitrogenous bases is very specific and is always between purine and pyrimidinelinked by hydrogen bonds.
  i) Adenine (A) links Thymine (T) with two hydrogen bonds (A = T).
  ii) Cytosine (C) links Guanine (G) with three hydrogen bonds(C = G).
  This is called complementary base pairing.
- Hydrogen bonds between the nitrogenous bases make the DNA molecule stable.
- Each turn of the double helix is 34 A° (3.4 nm). There are ten base pairs in a complete turn.
- The nucleotides in a helix are joined together by phosphodiester bonds.

Biological significance of DNA

- It is responsible for the transmission of hereditary information from one generation to next generation.
- It contains information required for the formation of proteins.
- 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?

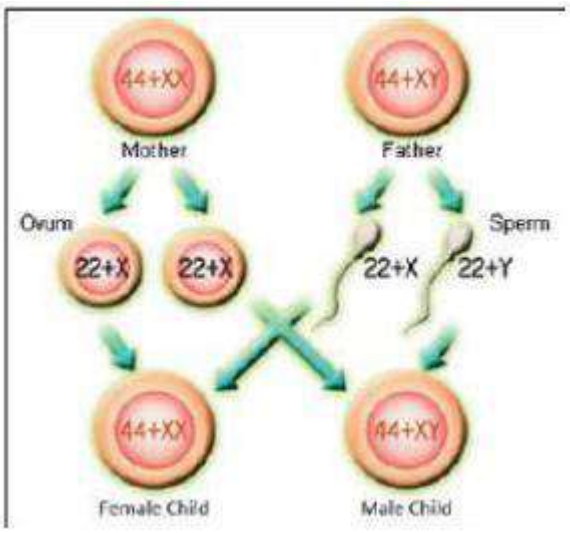
The sex of the new born child is a chance of probability as to which category of sperm fuses with the egg.

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+Y) = Male child (44+XY)
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.



IV.HIGHER ORDER THINKING:

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?

All the plants of F1 generation are tall (Tt).

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

The ratio of tall plants to dwarf plants in F2 generation is 3:1.

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

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+Y) = Male child (44+XY)

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.

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

- The factors for each character or trait remain independent and maintain their identity in the gametes.
- The factors are independent to each other and pass to the offspring (through gametes).
- If the law of independent assortment did not happen, all the genes have been locked with each otherand not a single gene can be able to express independently.
- Independent assortment of genes is important to produce new genetic combinations that increasegenetic variations within a population.

UNIT-19 ORIGIN AND EVOLUTION OF LIFE

I.ANSWER IN A SENTENCE:

1. A human hand, a front leg of a cat, a front flipper of a whale and a bat's wing look dissimilar and adapted for different functions. What is the name given to these organs?

Homologous organs.

2. Which organism is considered to be the fossil bird?

Archaeopteryx is considered to be the fossil bird.

3. What is the study of fossils called?

The study of fossils is called Palaeontology.

II.ANSWER IN SHORT:

1. The degenerated wing of a kiwi is an acquired character. Why is it an acquired character?

The kiwi was flying bird in New Zealand. At the time there were no enemies on the land in the New Zealand.
Hence, they did not attempt to fly. This happened generation after generation resulting degeneration of wings and loss flight. This character is acquired due to environmental changes. The acquired characters are transmitted to off springs. So the degenerated wing of a kiwi is an acquired character.

2. Why is Archaeopteryx considered to be a connecting link?

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

3. Define Ethnobotany and write its importance.

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

- It provides traditional uses of plant.
- It gives information about certain unknown and known useful plants.
- The ethnomedicinal data will serve as a useful source of information for the chemists, pharmacologistsand practitioners of herbal medicine.
- Tribal communities utilize ethnomedicinal plant parts like bark, stem, roots, leaves, flower bud, flowers,
- fruits, seeds, oils, resins, dyes, gum for the treatment of diseases like diarrhoea, fever, headache,
- diabetes, jaundice, snakebites, leprosy, etc.

4. How can you determine the age of the fossils?

The age of fossils is determined by radioactive elements present in it. They may be carbon, uranium, lead or
potassium.
Radioactive carbon (C14) dating method : This method was discovered by W.F. Libby (1956). Carbon consumption of animals and plants stops after death and since then, only the decaying process of C14 occurscontinuously. The time passed since death of a plant or animal can be calculated by measuring the amount of C14. present in their body.

III.LONG ANSWER QUESTIONS:

1. Natural selection is a driving force for evolution-How?

Natural selection is a driving force for evolution. Origin of new species takes place through the following steps.

- **Overproduction :** Living beings have the ability to reproduce more individuals and form their own

progeny. This will increase reproductive potential leading to overproduction.

- **Struggle for existence :** Overproduction creates an intense competition among the organisms for food

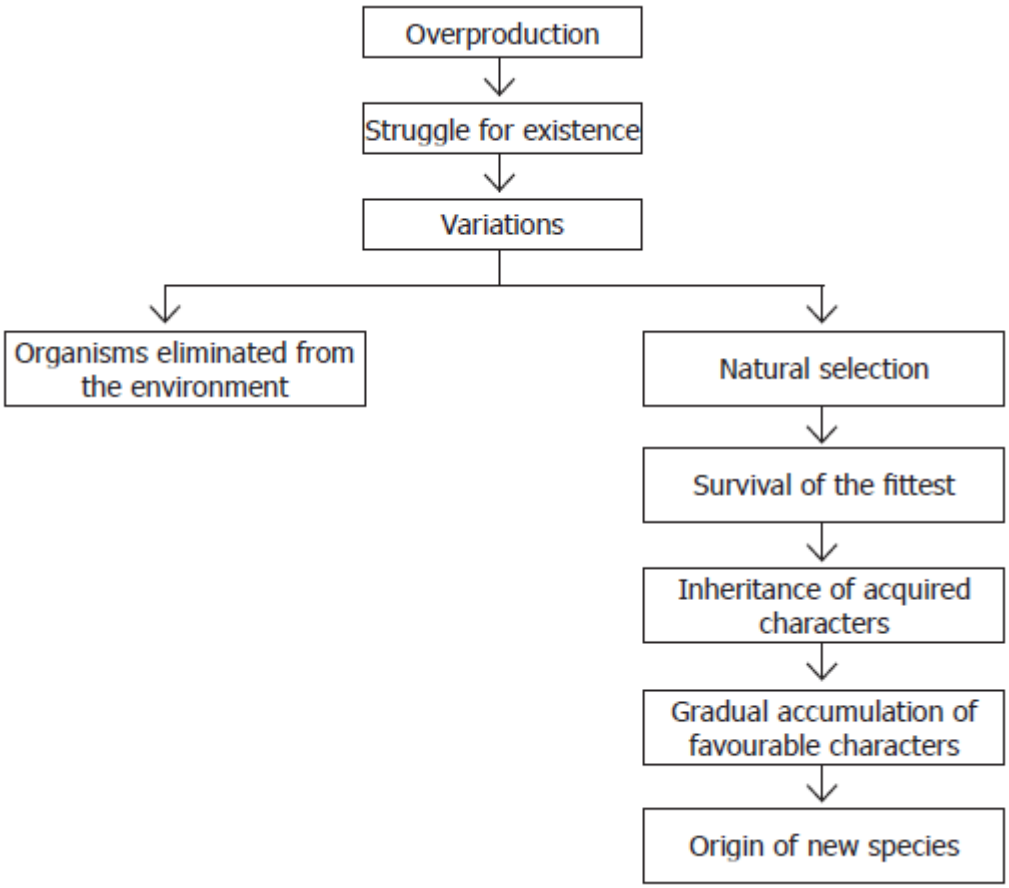
and space leading to struggle.

- **Variation :**Small variations are important for evolution. According to Darwin favourable variations areuseful to the organism. These variations are inherited by offspring from their parents.
- **Survival of the fittest or Natural selection :** During the struggle for existence, the organisms which

can overcome the challenging situation, survive and adapt to the surrounding environment. Organisms which are unable to face the challenges, are unfit to survive and disappear. The process of selection of organisms with favourable variation is called as natural selection.

- Origin of species According to Darwin, new species originates by the gradual accumulation of favourable

variations for a number of generations.



2. How do you differentiate homologous organs from analogous organs?

S.No.	Homologous organs	Analogous organs
1	They have inherited from common ancestors with similar developmental pattern in embryos	They have different origin with different development pattern
2	Homologous organs look dissimilar and adapted for different functions	The analogous organs look similar and perform similar functions
3	Example 1: Forelimb of a frog and man seem to be built from the same basic design of bones but they perform different functions	Example 1 : Wings of birds and bats look similar. But in birds wings are covered by feathers all along the arm but the wings of bats is skin folds stretched between elongated fingers
4	Example 2 : A human hand, a front leg of a cat, flipper of a whate and a bat's wing look dissimilar and adapted for different functions	Example 2 : Penguins and fish both have fin–like structures to swim aquatic environments. These locomotory organs have different origin but look similar and perform similar function

3. How does fossilization occur in plants?

The process of formation of fossil in the rocks is called fossilization. Common methods of fossilization includes
petrifaction, molds and cast, carbonization, preservation, compression and infiltration.

- **Petrifaction :**Minerals like silica slowly penetrate in and replace the original organic tissue and formsa rock like fossil. This method of fossilization can preserve hard and soft parts. Most bones and woodfossils are petrified.
- **Mold and Cast :**A replica of a plant or animal is preserved in sedimentary rocks. When the organismgets buried in sediment it is dissolved by underground water leaving a hollow depression called a mold.It shows the original shape but does not reveal the internal structure. Minerals or sediment fill the hollowdepression and forms a cast.
- **Preservation :**Original remains can be preserved in ice or amber (tree sap). They protect the organismsfrom decay. The entire plant or animal is preserved.
- **Compression :**When an organism dies, the hard parts of their bodies settle at the bottom of the sea bedand are covered by sediment. The process of sedimentation goes on continuously and fossils are formed.
- **Infiltration or Replacement :**The precipitation of minerals takes place which later on infiltrate the cellwall. The process is brought about by several mineral elements such as silica, calcium carbonate andmagnesium carbonate. Hard parts are dissolved and replaced by these minerals.

IV.HIGHER ORDER THINKING:

1. Arun was playing in the garden. Suddenly he saw a dragon fly sitting on a plant. He observed the wings of it. He thought it looked similar to a wing of a crow. Is he correct? Give reason for your answer.

No, He is not correct. The wing of crow and the wing of dragon fly have different developmental origin and structural design but perform similar function. They are known as analogous organs.

2. Imprints of fossils tell us about evolution- How?

- The study of fossils helps us to understand the line of evolution of many invertebrates and vertebrates.
- Fossil records show that the evolution has taken a gradual process from simple to complex organisms.
- The origin of modern birds is supported by the evidences from palaeontology.
- Fossils provide solid evidence that organisms from the past are not the same as those found today.
- By comparing the morphological, or anatomical, record of both modern species and fossils, palaeontologistscan infer the ancestors of those species.

3. Octopus, cockroach and frog all have eyes. Can we group these animals together to establish a common evolutionary origin? Justify your answer.

No, they can't be grouped together. The eye of Octopus is similar in their anatomy and abilities to eyes of vertebrates, but they have photoreceptor cells not just in their eyes, but also in their skin, insects have compound eyes and vertebrates have highly specialised eyes; however, all of them perform the same function that is a vision. But the eyes of Octopus, cockroach and frog have different origin. So they can't be grouped together to establish a common evolutionary origin.

UNIT-20: BREEDING AND BIOTECHNOLOGY

I.ANSWER IN A SENTENCE:

1. Give the name of wheat variety having higher dietary fibre and protein.

Tritical (6n) is a hybrid of wheat variety having higher dietary fibre and protein.

2. Semi-dwarf varieties were introduced in rice. This was made possible by the presence of dwarfing gene in rice. Name this dwarfing gene.

Name of the dwarfing gene is Dee-geo-woo-gen(DGWG)a dwarf variety from china.

3. Define genetic engineering.

Genetic engineering is the manipulation and transfer of genes from one organism to another organisms to create a new DNA called as recombinant DNA (rDNA). Genetic engineering is also called as recombinant DNA technology.

4. Name the types of stem cells.

- **Embryonic stem cells:** They can be extracted and cultured from the early embryos.
- **Adult stem cells or somatic stem cells:** They are found in the neonatal (new born) and adults.

5. What are transgenic organisms?

Plants or animals expressing a modified endogenous gene or a foreign gene are known as transgenic organisms.

6. State the importance of Biofortification .

Biofortification is used to develop the crop plants enriched with high levels of desirable nutrients like vitamins,proteins and minerals.

II.SHORT ANSWER QUESTION

1. Discuss the method of breeding for disease resistance.

Plant diseases are caused by pathogens like viruses, bacteria and fungi. This affects crop yield. Hence, it is important to develop disease resistant varieties of crops, that would increase the yield and reduce the use of fungicides and bactericides.

2. Name three improved characteristics of wheat that helped India to achieve high productivity.

- Higher yield with better quality. eg: Protein Rich Atlas 66
- Resistance to diseases. eg: Himgiri
- Shorter duration / Semidwarf. eg: Sonalika and KalyanSona

3. Name two maize hybrids rich in amino acid lysine

Lysine (Amino acid) rich maize hybrids are;

- Protina,
- Shakti and
- Rathna

4. Distinguish between

a. Somatic gene therapy and germ line gene therapy

b. Undifferentiated cells and differentiated cells

a) Differences between Somatic gene therapy and Germ line gene therapy.

S.No.	Somatic Gene Therapy	Germline Gene Therapy
1	It is the replacement of defective gene in somatic cell.	It is the replacement of defective gene in germ cell (sperm and egg).
2	Correction of genetic defects is beneficial to patient. It may not be carried to next generation.	It may not be carried to next generation and will be beneficial to next generation.

b) Differences between Undifferentiated cells and Differentiated cells.

S.No.	Undifferentiated cells	Differentiated cells
1	They are unspecialized mass of cells. So these cells could still become any kind of cell that the body needs.	They become specialized cells for doing certain jobs.
2	Example: Cells in early embryos are undifferentiated. The cells are multiplying, but they haven't started become specific types of cells.	Example: These cells become a liver cell, a blood cell, or a neuron, muscle cells, skin cells, etc.

5. State the applications of DNA fingerprinting technique.

Applications of DNA Fingerprinting

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

6. How are stem cells useful in regenerative process?

- Sometimes cells, tissues and organs in the body may be permanently damaged or lost due to geneticcondition or disease or injury.
- In such situations stem cells are used for the treatment of diseases which is called stem-cell therapy.
- In treating neurodegenerative disorders like Parkinson’s disease and Alzheimer’s disease neuronal stemcells can be used to replace the damaged or lost neurons.

7.Differentiate between outbreeding and inbreeding.

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

III.LONG ANSWER QUESTION:

1. What are the effects of hybrid vigour in animals.

The superiority of the hybrid obtained by cross breeding is called as heterosis or hybrid vigour.

Effects of hybrid vigour in animal breeding

- Increased production of milk by cattle
- Increased production of egg by poultry
- High quality of meat is produced
- Increased growth rate in domesticated animals

Example 1: Cross breed of fowls:

White Leghorn X Plymouth Rock

↓

Hybrid fowl - yield more eggs

Example 2: Cross breed of cows:

Developed by mating the bulls of exotic breeds and cows of indigenous breeds.

Brown Swiss X Sahiwal

↓

Karan Swiss - yield 2-3 times more milk than indigenous cows.

2. Describe mutation breeding with an example.

Mutation is defined as the sudden heritable change in the nucleotide sequence of DNA in an organism. It is a process by which genetic variations are created which in turn brings about changes in the organism. The organism which undergoes mutation is called a mutant. The factors which induce mutations are known as mutagens or mutagenic agents. Mutagens are of two types namely physical mutagens and chemical mutagens.

i) **Physical mutagens :**Radiations like X-rays, α, β and γ-rays, UV rays, temperature etc. which induce mutations are called physical mutagens

ii) **Chemical mutagens :**Chemical substances that induce mutations are called chemical mutagens. e.g. Mustard gas and nitrous acid. The utilisation of induced mutation in crop improvement is called mutation breeding.

Achievements of mutation breeding : Some achievements of mutation breeding are

- Sharbati Sonora wheat produced from Sonora-64 by using gamma rays.
- Atomita 2 rice with saline tolerance and pest resistance.
- Groundnuts with thick shells**.**

3. Biofortification may help in removing hidden hunger. How?

Hidden hunger (Micronutrient deficiencies) may occur when one or more vitamins and minerals importantfor human health are consistently inadequate in a person's diet. Diets based mostly on staple crops, such as maize, wheat and rice, which provide large amounts of energy but relatively low amounts of essential bioavailable vitamins and minerals, frequently result in hidden hunger. Biofortification may help in removing hidden hunger.

i) Biofortification is the scientific process of developing crop plants enriched with high levels of desirablenutrients like vitamins, proteins and minerals.

ii) Biofortification is a complementary intervention to supplementation and fortification.

iii) Biofortified staple foods can help close the intake gap of targeted micronutrient deficiencies in most othercases and increase the daily intake of micronutrients throughout a person's life cycle.

iv) Some examples of crop varieties developed as a result of biofortification are given below :

a) Protina, Shakti and Rathna are lysine rich maize hybrids (developed in India).
b) Atlas 66, a protein rich wheat variety.
c) Iron rich fortified rice variety.
d) Vitamin A enriched carrots, pumpkin and spinach.

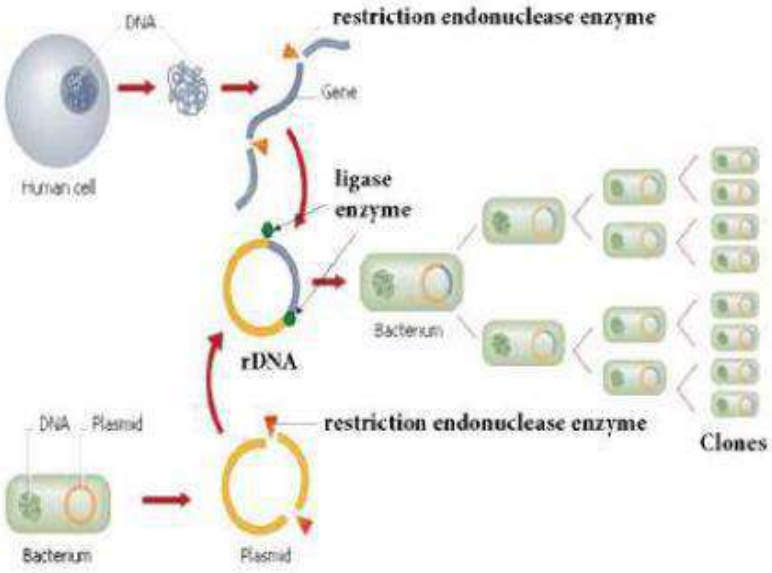
4. With a neat labelled diagram explain the techniques involved in gene cloning.

The carbon copy of an individual is oft en called a clone. However, more appropriately, a clone means to make a genetically exact copy of an organism. In gene cloning, a gene or a piece of DNA fragment is inserted into a bacterial cell where DNA will be multiplied (copied) as the cell divides.

A brief outline of the basic steps involved in gene cloning are :

- Isolation of desired DNA fragment by using restriction enzymes
- Insertion of the DNA fragment into a suitable vector (Plasmid) to make rDNA

- Transfer of rDNA into bacterial host cell (Transformation)
- Selection and multiplication of recombinant host cell to get a clone v.
- Expression of cloned gene in hostcell.



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

Using genetic engineering techniques medicinally important valuable proteins or polypeptides that form the potential pharmaceutical products for treatment of various diseases have been developed on a commercial scale.

Pharmaceutical products developed by rDNA technique :

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

IV. HIGHER ORDER THINKING

1. A breeder wishes to incorporate desirable characters into the crop plants. Prepare a list of characters he will incorporate.

The desirable characters into the crop plants :

i) Higher yield.
ii) Resistance to diseases.
iii) Insects/Pests Resistance.
iv) Drought resistant.
v) Shorter duration.
vi) Frtilizer responsive.

vii) The nutritional quality with respect to its

- Protein content and quality of protein,
- Oil content and
- Mineral content**.**

2. Organic farming is better than Green Revolution. Give reasons.

i) When we hear about organic farming we think of clean, unadulterated food, while when people hear about the green revolution labs with genetically mutated seeds and plants come to mind.

ii) The basic idea of the green revolution is to improve the yield of crops by using:

- Chemical fertilizers,
- Pesticides and
- Genetically altered seeds/plants.

iii) Pesticides are not only bad for plants, but also for humans. If we spray too many pesticides on our plants they too, like the chemical fertilizers, get washed into the local water sources and can be consumed if the spraying happened close to the harvest of the crops.

iv) Because of tremendous benefits on environmental, social and health front, organic agriculture seems to be emerging as an alternative to 'green revolution technology'.

3. Polyploids are characterised by gigantism. Justify your answer.

An organism having more than two sets of chromosomes is called polyploidy.

Quantitative changes in the mass of chromosomes and genes must have played a very important part in the development of plants towards greater variability including the size of the organisms and with it more appropriate adaptations to the demands of their environment. Mostly gigantism is usual consequence in plants. It seems as though doubling the number of chromosomes will increase the size of the organism also.

4. 'P' is a gene required for the synthesis of vitamin A. It is integrated with genome of 'Q' to produce
genetically modified plant 'R'.
i. What is P, Q and R?
ii. State the importance of 'R' in India.

i) P = Beta Carotene Gene
Q = Plasmid of vector
R = Transgenic Organism

ii) **The importance of 'R' (Transgenic Organism) in India :**The transgenic plants are much stable, with improved nutritional quality, resistant to diseases and tolerant to various environment conditions. Similarly transgenic animals are used to produce proteins of medicinal importance at low cost and improve livestock quality. In India, transgenic organism provide an opportunity to increase food and feed production efficiently by generating plants with higher yields and greater nutritional benefits in reasonably short times.

UNIT-21 HEALTH AND DISEASES

I.ANSWER IN A SENTENCE:

1. What are psychotropic drugs?

The drugs which act on the brain and alter the behaviour, consciousness, power of thinking and perception are called **Psychotropic drugs**. They are also referred as **mood altering drugs**.

2. Mention the diseases caused by tobacco smoke.

1.Lung cancer 2.Bronchitis 3.Pulmonary tuberculosis 4.Emphysema 5.Hypoxia and 6.Oral cancer

3. What are the contributing factors for Obesity?

Obesity is due to genetic factors, physical inactivity, eating habits (overeating) and endocrine factors.

4. What is adult onset diabetes?

Type-2 Non-Insulin Dependent Diabetes Mellitus (NIDDM) is called as adult onset diabetes.

5. What is metastasis?

The cancerous cells migrate to distant parts of the body and affect new tissues. This process is called **metastasis**.

6. How does insulin deficiency occur?

Insulin deficiency occurs due **destruction of β-cells of the pancreas**.

VII.SHORT ANSWERS:

1. What are the various routes by which transmission of human immuno deficiency virus takes place ?

HIV is transmitted generally by

i) Sexual contact with infected person

ii) Use of contaminated needles or syringes especially in case of intravenous drug abusers

iii) By transfusion of contaminated / infected blood or blood products

iv) From infected mother to her child through placenta.

2.How is a cancer cell different from a normal cell ?

	Cancer cell	Normal cell
1.	These cells divide in an unregulated / uncontrolled manner.	These cells divide in a regulated manner.
2.	Their life span is not definite.	They have a definite life span.
3.	They remain immature and undifferentiated.	They mature into specialized cells.

3.Differentiate between Type-1 and Type-2 diabetes mellitus.

Factors	Type-1 Insulin dependent diabetes mellitus (IDDM)	Type-2 Non-insulin dependent diabetes mellitus (NIDDM)
Prevalence	10-20%	80-90%
Age of onset	Juvenile onset (< 20 years)	Maturity onset (>30 years)
Body weight	Normal or Underweight	Obese
Defect	Insulin deficiency due to destruction of β-cells	Target cells do respond to insulin
Treatment	Insulin administration is necessary	Can be controlled by diet, exercise and medicine

4. Why is a dietary restriction recommended for an obese individual ?

Calorie restriction for weight reduction is safe and most effective. Low calorie, normal protein, vitamins and mineral, restricted carbohydrate and fat, high fiber diet can prevent overweight.

5. What precautions can be taken for preventing heart diseases ?

i) Diet management :

a) **Food to avoid or reduce :**High calories, low saturated fat and cholesterol rich food, low carbohydrates and common salt.

b) **Food to take :**Diet rich in polyunsaturated fatty acids (PUFA), fibre diet, fruits and vegetables, protein, minerals and vitamin.

ii) **Physical activity:** Regular exercise, walking and yoga are essential for body weight maintenance.

iii) **Addictive substance avoidance:** Alcohol consumption and smoking are to be avoided.

II.LONG ANSWER QUESTIONS:

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

i) **Education and counselling:** Education and proper counselling will help the alcoholics to overcome their problems and stress, to accept failures in their life.

ii) **Physical activity:** Individuals undergoing rehabilitation should be channelized into healthy activities like
reading, music, sports, yoga and meditation.

iii) **Seeking help from parents and peer groups:** When a problematic situation occurs, the affected individuals should seek help and guidance from parents and peers. This would help them to share their feeling of anxiety, wrong doing and get rid of the habit.

iv) **Medical assistance:** Individual should seek help from psychologists and psychiatrists to get relieved from this condition and to lead a relaxed and peaceful life. Alcohol de-addiction and rehabilitation programmes are helpful to the individual so that they could get rid of the problem completely and can lead a normal and healthy life.

2. Changes in lifestyle is a risk factor for occurrence of cardiovascular diseases. Can it be modified ? If yes, suggest measures for prevention.

Yes, it can be modified. Our lifestyle is not only our best defense against heart diseases, it's also our responsibility. A heart-healthy lifestyle includes the ideas listed below. By following these simple steps we can reduce all of the modifiable risk factors for heart diseases.

i) Diet management:

a) **Food to avoid or reduce :**High calories, low saturated fat and cholesterol rich food, low carbohydrates and common salt.

b) **Food to take :**Diet rich in polyunsaturated fatty acids (PUFA), fibre diet, fruits and vegetables, protein, minerals and vitamin.

ii) **Physical activity:** Regular exercise, walking and yoga are essential for body weight maintenance.

iii) **Addictive substance avoidance:** Alcohol consumption and smoking are to be avoided.

iv) **Aim for a healthy weight :**Good nutrition, controlling calorie intake and physical activity are the only way to maintain a healthy weight. Obesity places you at risk for high cholesterol — the very factors that heighten our risk of cardiovascular disease.

v) **Reduce stress :**There is a relationship between corcoronary heart disease risk and stress in a person's life that may affect the risk factors for heart diseases.

III.HIGHER ORDER THINKING:

1. What is the role of fat in the cause of atherosclerosis?

Deposition of cholesterol in the blood vessels usually develops slowly over many years beginning from childhood, they may form a fatty streak to a fibrous complicated **plaque**. It leads to the narrowing of blood vessels leading to

atherosclerosis in the large and medium sized arteries that supply the heart muscle with oxygen.

2. Eating junk food and consuming soft drinks results in health problems like obesity, still children prefer. What are the suggestions you would give to avoid children eating junk food/ consumption of soft drinks?

i) **Start with a Balanced Breakfast :**have a protein-rich breakfast item to keep hunger levels sustained until a midmorning snack or lunchtime.

ii) **Keep Junk Food Away :**The statement "Out of sight, out of mind," holds so much truth when it comes to how to get rid of and fight junk food cravings! Instead of packaged pastries and chips located in the comfort of home, avoid their purchase altogether.

iii) **Purchase Healthier Foods:** Fill the diet with more whole grains, lean proteins, healthful fats, and fresh fruits and veggies.

iv) **Find Distractions :**If truly having temptation to eat junk food , try to find some sort of distraction. A quick walk or piece of gum can not only fight junk food cravings, but save on hundreds of unwanted calories!

v) **Drink Plenty of Water :**Thirst is often mistaken for hunger. So instead of reaching for that snack, pour up a glass of water! Staying hydrated further aids in digestion and promotes a healthy metabolism.

3. Regular physical exercise is advisable for normal functioning of human body. What are the advantages
of practising exercise in daily life?

i) Exercising regularly can improve your mood and reduce feelings of anxiety and depression.

ii) Exercise is crucial to supporting a fast metabolism and burning more calories per day. It also helps you maintain your muscle mass and weight loss.

iii) Physical activity helps you build muscles and strong bones. It may also help prevent osteoporosis.

iv) Engaging in regular physical activity can increase your energy levels. This is true even in people with persistent fatigue and those suffering from serious illnesses.

v) Daily physical activity is essential to maintaining a healthy weight and reducing the risk of chronic disease.

vi) Moderate exercise can provide antioxidant protection and promote blood flow, which can protect your skin and delay signs of aging.

vii) Regular exercise improves blood flow to the brain and helps brain health and memory. Among older adults, it can help protect mental function.

4. A leading weekly magazine has recently published a survey analysis which says that number of AIDS patient in the country is increasing day by day. The report says that the awareness among the people about AIDS is still very poor. You are discussing the magazine report in your class and a team of your class decides to help people to fight against the dreadful disease.
a) What problem you face when trying to educate the people in your village near by your school?
b) How do you overcome the problem? Problem we face while educate village people about HIV.
i) Illiteracy among village people.
ii) Lack of scientific knowledge about HIV and AIDS.
iii) Social and religious restrictions.
iv) Lack of knowledge about effects or consequences of AIDS.
Steps to be taken to overcome the problem.
i) Using locally available educated people for campaign.
ii) Using health workers to impart knowledge about causative agent HIV and its prevention.
iii) Using news and social medias to create awareness
iv) Using school and college students to impart knowledge about effects or consequences of AIDS through cultural programmes.

IV.VALUE BASED QUESTIONS:
1. Once a person starts taking drugs or alcohol it is difficult to get rid of the habit. Why?
Drug and alcohol consumption has an inherent addictive nature associated with euphoria and a temporary feeling of well-being. Repeated intake of drugs increases the tolerance level of the body's receptors, leading to more consumption of drugs.

2. Men addicted to tobacco lead to oxygen deficiency in their body. What could be the possible reason?
1. Carbon monoxide of tobacco smoke binds to haemoglobin of RBC and decreases its oxygen carrying capacity and it takes the place of oxygen in the blood causing hypoxia in body tissues.
2. Smoking causes inflammation of lung's alveoli and decreases the surface area for O_2 diffusion into blood. Thus men, addicted to tobacco, have oxygen deficiency in their body.

3. Name any three foods that are to be avoided and included in the diet of a diabetic patient. Why should it be followed?

Food to be avoided in diet

i) Refined sugar
ii) Saturated fat and
iii) White bread, pasta and rice.

Food to be included in diet

i) Millets
ii) Green leafy vegetables and
iii) Wheat.

4. How can informational efforts change people's HIV knowledge and behaviour?

AIDS related health programmes, health education and campaigns which aim to influence people's behaviour.

Informational efforts have changed people's HIV knowledge and behaviour regarding HIV, including

i) Screening of blood for HIV before transfusion
ii) Use of disposable needles and syringes in hospitals and clinics.
iii) Safe sex and advantages of using condoms and
a. Attitude towards people infected with HIV.

UNIT NO 22: ENVIRONMENTAL MANAGEMENT

I.ANSWER IN A SENTENCE

1. What will happen if trees are cut down?

Effect of cutting trees
i) Ecological problems like floods and drought
ii) Soil erosion
iii) Loss of wild life
iv) Extinction of species
v) Imbalance of biogeochemical cycles
vi) Alteration of climatic conditions and
vii) Desertification.

2. What would happen if the habitat of wild animals is disturbed?

The habitat provides food, shelter and protection to the animals. If the habitat is disturbed then the animals
become unprotected and may decline in numbers and become endangered.

3. What are the agents of soil erosion?

Agents of soil erosion are
i) High velocity of wind,
ii) Air currents,
iii) Flowing water,

iv) Landslide,
v) Human activities (deforestation, farming and mining) and
vi) Overgrazing by cattle.

4. Why fossil fuels are to be conserved?

Conservation of fuels is essential due to following reasons:
i) They are limited. Once they are exhausted there will be none.
ii) There are no ideal alternative for fossil fuels.
iii) We have to use in a control way to control global warming.

5. Solar energy is a renewable energy. How?

Solar energy is the energy obtained from the sun. It is a renewable free source of energy that is sustainable and totally inexhaustible, unlike fossil fuels which are finite.

6. How are e-wastes generated?

E-wastes are generally called as electronic wastes. They are generated from the spoiled, outdated, nonrepairable electrical and electronic devices.

II.SHORT ANSWER QUESTIONS:

1. What is the importance of rainwater harvesting?

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

2. What are the advantages of using biogas?

Advantages of biogas
i) It burns without smoke and therefore causes less pollution.
ii) An excellent way to get rid of organic wastes like bio-waste and sewage material.
iii) Left over slurry is a good manure rich in nitrogen and phosphorus
iv) It is safe and convenient to use
v) It can reduce the amount of greenhouse gases emitted.

3. What are the environmental effect caused by sewage?

(i) Untreated sewage or waste water generated from domestic and industrial process is the leading polluted of water source in India.

(ii) Sewage water result in agriculture contamination and environmental degradation

4. What are the consequences of deforestation?

Consequences of Deforestation – Deforestation gives rise to ecological problems like floods, drought, soil erosion, loss of wild life, extinction of species, imbalance of biogeochemical cycles, alteration of climatic conditions and desertification.

III.LONG ANSWER QUESTIONS:

1. How does rainwater harvesting structures recharge ground water?

Rainwater harvesting is a technique of **collecting and storing rainwater** for future use. It is a traditional method of storing rain water in underground tanks, ponds, lakes, check dams and used in future. The main purpose of rainwater harvesting is to make the rainwater percolate under the ground so as to recharge

'groundwater level'.

Methods of rainwater harvesting :

i) **Roof top rainwater harvesting:** Roof-tops are excellent **rain catchers**. The rain water that falls on the roof of the houses, apartments, commercial buildings etc. is collected and stored in the surface tank and can be used for domestic purpose.

ii) **Recharge pit:** In this method, the rainwater is first collected from the roof tops or open spaces and is directed into the **percolation pits** through pipes for filtration. After filtration the rainwater enters the **recharge pits** or **ground wells**.

iii) Digging of tanks or lakes (eris)

iv) Oaranis.

2. How will you prevent soil erosion?

i) Retain vegetation cover, so that soil is not exposed.

ii) Cattle grazing should be controlled.

iii) Crop rotation and soil management improve soil organic matter.

iv) Runoff water should be stored in the catchment.

v) Reforestation, terracing and contour ploughing.

vi) Wind speed can be controlled by planting trees in form of a shelter belt.

3. What are the sources of solid wastes? How are solid wastes managed?

Sources of solid waste :i) Municipal wastes ii) Hospital wastes iii) Industrial wastes and iv) e-wastes **Solid-waste management** It involves the collection,

treatment and proper disposing of solid material that is discarded from the household and industrial activities.

i) **Segregation:** It is the separation of different type of waste materials like biodegradable and non biodegradable wastes.

ii) **Sanitary landfill :**Solid wastes are dumped into low lying areas. The layers are compacted by trucks to allow settlement. The waste materials get stabilised in about 2-12 months. The organic matter undergoes decomposition.

iii) **Incineration :**It is the burning of non-biodegradable solid wastes (medical wastes) in properly constructed furnace at high temperature.

iv) **Composting :**Biodegradable matter of solid wastes is digested by microbial action or earthworms and converted into humus.

v) **Recycling of wastes :**

a) Papers from old books, magazines and newspapers are recycled to produce papers in paper mills.

b) Agricultural wastes like coconut shells, jute cotton stalk, bagasse of sugarcane can be used to make paper and hard board. Paddy husk can be used as livestock fodder.

c) Cow dung and other organic wastes can be used in gobar gas plant to provide biogas and manure for fields.

4. Enumerate the importance of forest.

Importance of forest.

(i)Forests are an important component of our environment.

(ii)Forests consist of economically and medicinally valuable microorganisms, flowering plants, shrubs, climbers and dense trees.

(iii) Forests provide a vast habitat for wild animals.

(iv) Forests also contribute to the economic development of our country.

(v)Forests are important source for a wide range of renewable natural resource.

(vi) They provide wood, food, fodder, fibre and medicine.

(vii) Forests act as carbon sink, regulate climatic conditions, increase rainfall, reduce global warming, prevent natural hazards like flood and landslides, protect wildlife and also act as catchments for water conservation.

(viii) They also play a vital role in maintaining the ecological balance.

5. What are the consequences of soil erosion?

Removal of **upper layer of soil** by wind and water is called soil erosion. Soil erosion causes a significant loss of humus, nutrients and decrease the fertility of soil.

i) **Fertility loss and land degradation:** The direct and primary effect of soil erosion is soil loss and nutrient leaching resulting in reduction of land productivity.

ii) **Air Pollution :**Wind erosion picks up dust particles of the soil and throws them into the air, causing air pollution.

iii) **Destruction of Infrastructure :**Soil erosion can affect infrastructural projects such as dams and drainages. The accumulation of soil sediments in dams and drainages can reduce their operational lifetime and efficiency.

iv) **Desertification :**Soil erosion is a major driver of desertification. It gradually transforms a habitable land into deserts.

v) **Water Pollution:** Soils eroded from agricultural lands carry pesticides, heavy metals, and fertilizers which are washed into streams and major water ways. This leads to water pollution and damage to marine and freshwater habitats.

vi) **Clogging of Waterways :**Accumulated sediments can also cause clogging of water ways and raises the water level leading to flooding.

6. Why is the management of forest and wildlife resource considered as a challenging task?

i) People living in and around forests are dependent on forest ie plants and animals products for various aspects of their life such as livelihood.

ii) The forest department of the government who judicially allowed for owning the land and controlling the resources from forests.

iii) The industrialists who use forest products such as timber, leaves, latex and raw materials for their industries.

iv) Global warming and climate change results in water scarcity and changes in rainfall pattern in forest area.

v) Lack of proper law enforcement and lack of sufficient number of guards lead to indiscriminate illegal poaching affects wildlife populations and the environment.

IV.HIGHER ORDER THINKING

1. Although coal and petroleum are produced by degradation of biomass, yet we need to conserve them. Why?

The formation of coal and petroleum is a very slow process and takes very long period of time for renewal. The coal and petroleum reserves can get exhausted if we continue using them at a rapid rate. So it is necessary to conserve or save coal and petroleum resources for the future use, which can be done by reducing their consumption.

2. What are the objectives for replacing non-conventional energy resources from conventional energy resources?

The objective in using non-conventional (Renewable) resources is to reduce the pessimistic environmental effects associated with conventional (Non-renewable) resources such as coal, petroleum and natural gas. Reusable or non-conventional energy is greener and keeps our planet clean. We need to make sure our future generation need not have to walk around with an oxygen mask on their face.

3. Why is the Government imposing ban on the use of polythene bags and plastics? Suggest alternatives. How is this ban likely to improve the environment?

Government is imposing ban on polythene bags and plastics, because they are non-biodegradable substances and harmful to the environment .

Alternatives to Polythene bags and plastics : Instead of polythene bag, "Paper Bags" and "cloth bags " and instead of non-biodegradable plastics, bio-plastics can be used as they are biodegradable and will get decomposed and they will not pollute the environment.

This ban will improve the environment in the following ways :-

i) It will help to prevent land and water pollution .

ii) It will lead to less productions of polythenes , which help in reduction of harmful gases from factories.

V.VALUE BASED QUESTIONS:

1. Why is it not possible to use solar cells to meet our energy needs? State three reason to support to your answer.

Solar cells are not used in our daily routine because :

i) Solar cells work on the basis of solar energy which is not provided at night. Moreover in the winter season sunlight is minimal.

ii) They take lot of time in completing any work depending on the intensity of light. For Eg : solar cookers take much time in cooking food in low intensity of light.

iii) The installing cost of solar cell panel is high as the silicon wafer is very expensive also same for the silver which is used in connecting solar cells.

iv) Only DC electricity is produced by SPV (Solar Photovoltaic system).To operate any AC device, this dc has to be converted in as by using inverters.

v) The efficiency of energy conversion is low as compared to other means of generating electricity.

2. How would you dispose the following wastes?
a. Domestic wastes like vegetable peels
b. Industrial wastes like metallic cans
Can the disposal protect the environment? How?
a) Disposal of vegetable peels and metallic cans

i) Peels and scrapings from fruit and vegetables can be composted along with other degradable matter.

ii) Industrial waste like metallic cans can be recycled as they are non - biodegradable.

b) Disposal can protect environment :

i) Biodegradable matter of solid wastes such as Peels and scrapings from fruit are digested by microbial action or earthworms and converted into humus.

ii) Recycling of industrial waste like metallic cans helps to reduce air pollution, water pollution, greenhouse gas emissions and often a conservation of global resources.

3. List any three activities based on 3R approach to conserve natural resources.

First 'R' - Reuse : Bring cloth bags to the store with you instead of asking shopkeeper for new paper or polythene bags. You can use cloth bags again and again. You can save some trees and can prevent pollution caused by polythene bags.

Second 'R' – Reduce : When we reduce the use of electric power, we reduce the amount of toxic fumes released by power plants, conserve the earth's natural resources and protect ecosystems from destruction.

Third 'R' – Recycle : Many of the things we use every day, like paper bags, soda cans, and milk cartons, are made out of materials that can be recycled. Recycled items are put through a process that makes it possible to create new products out of the materials from the old ones.