

# 10<sup>th</sup> Class Biology (English Medium)

## Complete Book Notes

- Complete Book with Easy Explanation
- Subjective & Objective Questions with Answers
- Board Questions with Answers
- Important Questions with Answers
- Solved Exercises

Chapter 10: Gaseous Exchange

Chapter 11: Homeostasis

Chapter 12: Coordination and Control

Chapter 13: Support and Movement

Chapter 14: Reproduction

Chapter 15: Inheritance

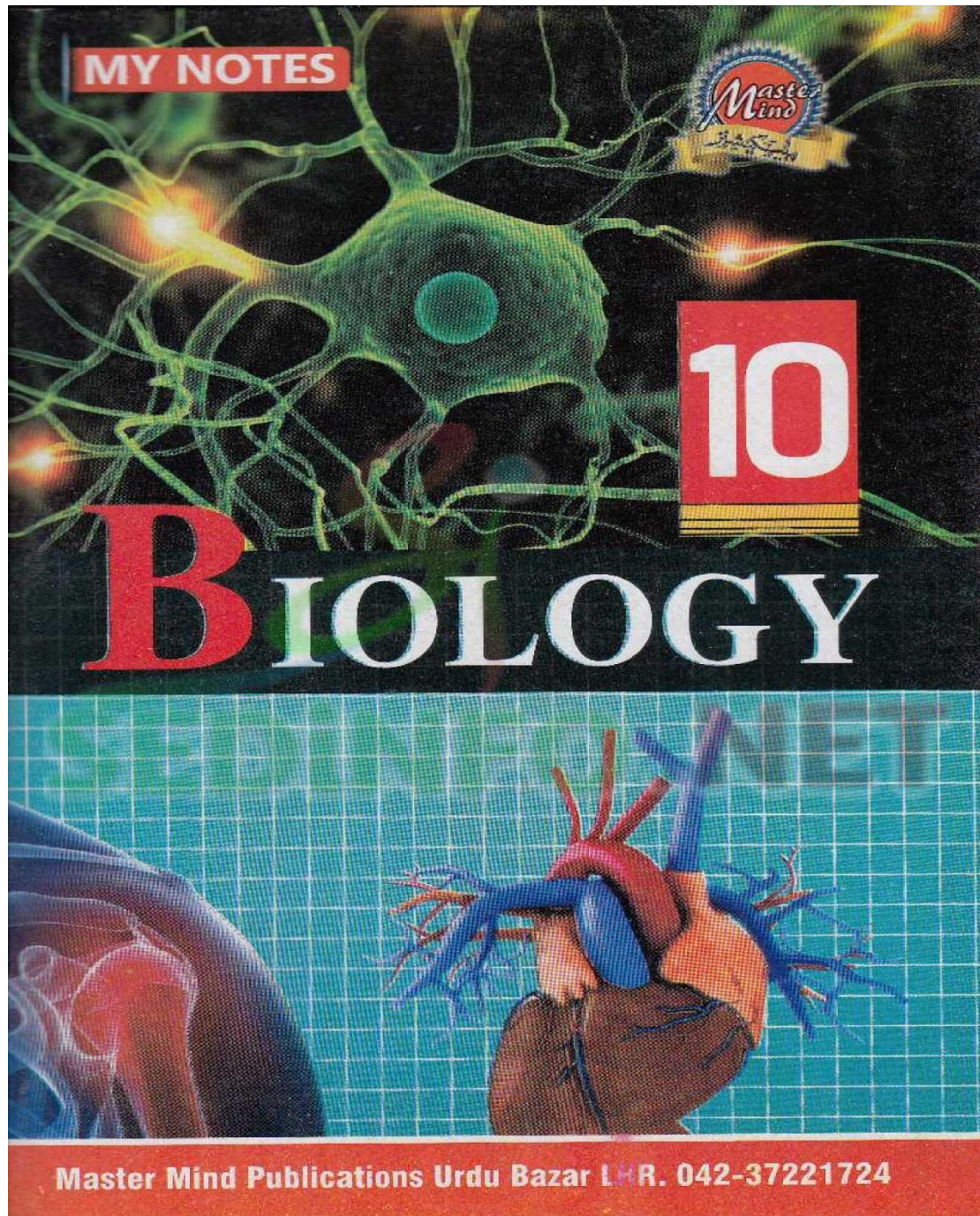
Chapter 16: Man and His Environment

Chapter 17: Biotechnology

Chapter 18: Pharmacology

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## Chapter No. 1

### Gaseous Exchange

#### Short Questions:

**Q.1** Define cellular respiration? (Fsd-2014)

**Ans.** Cellular respiration is the process in which the C-H bonds in food are broken by oxidation reduction reactions and the energy is transformed into ATP.

**Q.2** What is gaseous exchange?

**Ans.** Taking in oxygen and giving out of carbon dioxide is termed as gaseous exchange.

**Q.3** Define breathing.

**Ans.** Breathing is the process through which animals take air in their bodies to get oxygen from it and then give out the air for getting rid of carbon dioxide.

**Q.4** Differentiate between breathing and cellular respiration. (Guj-2014)

Breathing	Cellular respiration
Breathing is only the mechanical process of exchange of gases	Cellular respiration is the mechanical and biochemical process of exchange of gases.

**Q.5** How do stomata exchange gases with the environment?

**Ans.** Stomata: The leaf cells get oxygen from the environment and release carbon dioxide through stomata.

**Q.6** How do lenticels exchange gases with the environment? (Guj-2014)

**Ans.** **Lenticels:** Lenticels are pores in the layer of bark of woody stems and mature roots. The lenticels allow air to pass through them.

**Q.7** How does general surface exchange gases with the environment?

**Ans.** **General Surface:** Gases diffuse in and out of the general surface. The aquatic plants get the oxygen dissolved in water and release carbon dioxide in water.

**Q.8** Name the two parts of respiratory system.

**Ans.** i. Air passageway.  
ii. Lungs

**Q.9** Trace the path of air from the nasal cavity to the alveoli.

**Ans.** Nasal cavity → Pharynx → Larynx → Trachea → Bronchi → Bronchioles → Alveolar ducts → alveoli.

**Q.10** What is nasal cavity?

**Ans.** **Nasal cavity** The nose encloses the nasal cavity. The nasal cavity is divided into two portions by a wall. Each portion is lined by fine hairs and mucous. Hair and mucous filter the dust particles from the air.

**Q.11** What is pharynx?

**Ans.** **Pharynx:** The nasal cavity opens into the pharynx. Pharynx is a muscular passage. Pharynx is common to both food and air.

**Q.12** What is larynx? (Lhr-2014)

**Ans.** **Larynx:** The air goes from the pharynx into the larynx. The larynx is a box, it is made of cartilage. It is present between pharynx and trachea. It is also called the voice box.

**Q.13** What is trachea? (Fsd-2014)

**Ans.** **Trachea:** Larynx continues to the trachea. It is also called the windpipe. It is about 12cm long tube.

**Q.14** What are bronchi?

**Ans.** **Bronchi:** On entering the chest cavity, the trachea divides into two smaller tubes called bronchi. Each bronchus enters into the lung of its side.

**Q.15** What are bronchioles?

**Ans.** **Bronchioles:** The bronchi continue dividing in the lungs until they make several fine tubes called bronchioles.

**Q.16** What are alveolar ducts?

**Ans.** **Alveolar ducts:** The bronchioles end as fine tubules called the alveolar ducts.

**Q.17** What are alveoli?

**Ans.** **Alveoli:** Each alveolar duct opens into a cluster of pouches called alveoli. The alveoli form the respiratory surface in human body.

**Q.18** Write note on lungs: (Guj-2014)

**Ans.** **Lung:** (Fsd-2014)

All the alveoli on one side constitute a lung. Lungs are spongy and elastic organs.

**Chest Wall:** The chest wall is made up of 12 pairs of ribs and the rib muscles called intercostal muscles.

**Diaphragm:** It is a thick muscular structure. It is present below the lungs.

**Left lung:** The left lung is slightly smaller, It has two lobes.

**Right Lung:** The right lung is bigger. It has three lobes.

**Pleural membranes:** (Guj-2014)

Each lung is enclosed by two membranes. They are called.

- Outer pleural membrane
- Inner pleural membrane

## Long Question

**Q.1 Write down the steps of inhalation: (Lhr-2014)**

**Ans. Inhalation (Inspiration)**

- The rib muscles contract and the ribs are raised.
- The dome-shaped diaphragm contracts and is lowered.
- The area of the thoracic cavity is increased.
- The lungs expand and the air pressure within them decreases.
- The air from outside rushes into the lungs to equalize the pressure on both sides.

**Q.2 Write down the steps of exhalation: (Lhr-2014)**

**Ans. Exhalation (Expiration).**

- The rib muscles relax bringing the ribs back to the original position.
- The diaphragm muscles also relax and it gets its raised dome shape.
- The space in the chest cavity is reduced.
- The pressure on the lungs is increased.
- The lungs contract.
- The air is expelled out of them.

**Q.3 State the signs and symptoms, causes and treatments of bronchitis. (Fsd-2014)**

**Ans. Bronchitis:** Bronchitis is the inflammation of the bronchi or bronchioles. There are two major types of bronchitis.

### i. Acute Bronchitis:

It usually lasts about two weeks. The patient recovers with no permanent damage to the bronchi or bronchioles.

### ii. Chronic bronchitis:

In chronic bronchitis, the bronchi develop chronic inflammation. It usually lasts for three months to two years.

### Signs and symptoms: (Lhr-2014)

Cough, mild wheezing, fever, chills and shortness of breath.

### Causes:

It is caused by viruses, bacteria or exposure to chemical irritants.

### Treatment:

Anti-inflammatory drugs.

**Q.4 State the signs and symptoms, causes and treatments of emphysema.**

**Ans. Emphysema:** Emphysema is the destruction of the walls of the alveoli.

### Signs and symptoms:

Shortness of breath, fatigue, recurrent respiratory infections and weight loss.

### Causes:

Pollution, smoking.

### Treatment:

Use of antibiotics

**Q.5 State the signs and symptoms, causes and treatment of pneumonia.**

**Ans. Pneumonia:** Pneumonia is an infection of lungs.

### Double pneumonia.

If this infection affects both lungs then, it is called double pneumonia.

**Signs and Symptoms:**

Cold, high fever, shivering, cough, short of breath and change of skin colour.

**Causes:**

- i. Streptococcus pneumoniae.
- ii. Viral infection.
- iii. Fungal infection.

**Treatment:**

Use of antibiotics.

**Q.6 State the signs and symptoms, causes and treatment of asthma.**

**Ans. Asthma: (Lhr-2014)**

Asthma is a form of allergy, in which there is inflammation of the bronchi, more mucous production and narrowing of the airways.

**Signs and Symptoms:**

- i. Shortness of breath
- ii. Wheezing
- iii. Cough
- iv. Chest tightness

**Causes:**

Different allergens e.g. dust, smoke, perfumes, pollens etc.

**Treatment:**

Different chemicals are used in the form of inhalers.

**Q.7 Write note on lung cancer. (Lhr-2014)**

**Ans. Lung cancer:** Lung cancer is a disease of uncontrolled cell divisions in the tissues of the lung.

**Signs and symptoms:**

- i. Shortness of breath.
- ii. Coughing
- iii. Weight loss

**Causes:**

- i. Smoking
- ii. Carcinogens
- iii. Ionizing radiation
- iv. Viral infection

**Treatment:**

Stop smoking.

**Q.8 Describe the bad effects of smoking. (Lhr-2014)**

**Ans. Bad effects of smoking:**

Smoking is harmful due to the chemicals in cigarettes smoke. Cigarette smoke affects the body from head to toe.

**i. Cancer:**

Smoking leads to cancers in different parts of body.

**ii. Damage the respiratory system:**

Many chemicals in tobacco smoke damage the respiratory system.

**iii. Damage the circulatory system:**

The carbon monoxide present in tobacco smoke lessens the oxygen carrying capacity of haemoglobin. Smoking can cause arteriosclerosis.

**iv. Damage the lungs:**

Smoking damage the lungs and causes T-B and pneumonia.

**v. Damage the teeth:**

Smoking is also responsible for weakening and staining the teeth.

## Multiple Choice Questions

Put a (✓) on the correct answer.

- The process of gaseous exchange involves:
  - Breakdown of C-H bonds to yield energy.
  - Physical movements that take air in and out of body
  - ✓c) Getting oxygen from the air and removing carbon dioxide
  - Transport of oxygen by the blood to different parts of the body
- Most of the gaseous exchange in a leaf occurs through:
  - ✓a) Stomata
  - b) General Surface
  - c) Cuticle
  - d) Lenticels
- How many bronchi are there in the air passageway?
  - a) One
  - ✓b) Two
  - c) Many
  - d) None
- Where does the gaseous exchange occur in humans?
  - a) Pharynx
  - b) Trachea
  - c) Bronchi
  - ✓d) Alveoli
- Which structure actively helps in taking the air out of lungs?
  - a) Nasal cavity
  - b) Bronchus
  - c) Bronchiole
  - ✓d) Diaphragm
- The primary chemical stimulus for breathing is the concentration of?
  - ✓a) Carbon dioxide in blood
  - b) Oxygen in blood
  - c) Carbon dioxide in muscles
  - d) Oxygen in muscles

- Point out the FALSE statement about respiration.
  - a) Gases can easily pass through the walls of the alveoli.
  - b) Gas exchange in lungs is very efficient because lungs provide large surface area
  - ✓c) In emphysema the walls of alveoli break and there is more surface area
  - d) Dust particles can damage the lung by irritating the inner alveoli surface
- A disease involving the breakdown of air sacs of the lungs is:
  - a) Pneumonia
  - b) Bronchitis
  - c) Asthma
  - ✓c) Emphysema
- Which process does NOT occur in the nasal cavity?
  - a) Trapping of large dust particles
  - b) Humidification of the inhaled air
  - c) Warming of the inhaled air
  - ✓d) Exchange of gases
- What type of blood vessels surrounds the alveoli?
  - a) Artery
  - b) Arteriole
  - ✓c) Capillary
  - d) Vein

## Chapter 2

**Homeostasis****Short Questions**

**Q.1 Define Homeostasis. (Guj-2014)**

**Ans.** Homeostasis may be defined as the maintenance of the internal conditions of body at equilibrium, despite changes in the external environment.

**Example:**

The temperature of human body remains at about 37°C in any condition.

**Q.2 Define Osmoregulation. (Lhr,Guj-2014)**

**Ans.** It is maintenance of the amounts of water and salts in body fluids.

**Q.3 Define Thermoregulation. (Guj-2014)**

**Ans.** The maintenance of internal body temperature is called thermoregulation.

**Q.4 Define Excretion.**

**Ans.** Excretion is a process in which, the metabolic wastes are eliminated from body to maintain the internal conditions at equilibrium.

**Q.5 Describe the removal of extra carbon dioxide from plants. (Guj-2014)**

**Ans.** **Removal of Extra Carbon dioxide:** In leaves and young stems, carbon dioxide escapes out through stomata. In young roots, carbon dioxide diffuses through the general root surface, especially through root hairs.

**Q.6 Describe the removal of extra oxygen from plants. (Guj-2014)**

**Ans.** **Removal of Extra Oxygen:** Oxygen is produced in mesophyll cells only during daytime, as a by product of photosynthesis. After its utilization in cellular

respiration, the mesophyll cells remove the extra amount of oxygen through stomata.

**Q.7 Describe the removal of extra water from plants.**

**Ans.** **Removal of Extra Water:** Plants obtain water from soil and it is also produced in the body during cellular respiration. Plants store large amount of water in their cells for turgidity. Extra water is removed from plant body by transpiration. Some plants remove extra water by guttation.

**Q.8 Describe the removal of other metabolic wastes from plants. (Lhr,Guj-2014)**

**Ans.** **Removal of other Metabolic Wastes:** Metabolic wastes are removed from body during leaf fall. Other waste materials that are removed by some plants are resins, gums, latex, and mucilage etc.

**Q.9 What are Hydrophytes? (Guj-2014)**

**Ans.** **Hydrophytes:** Hydrophytes are the plants which live completely or partially submerged in freshwater.

**Properties:**

- They have broad leaves.
- Leaves have large number of stomata on their upper surface.

**Example:**

Waterlily

**Q.10 What are xerophytes? (Fsd-2014)**

**Ans.** **Xerophytes:** Xerophytes live in dry environment.

**Properties:**

- They have less number of stomata.
- They have deep roots.

**Example:** Cacti.

**Q.11 What are halophytes? (Lhr-2014)**

**Ans.** **Halophytes:** Halophytes live in sea waters adapted to salty environments.

**Example:** Sea Grasses.

**Q.12** Write the name of organs which work for homeostasis in humans?

**Ans.** Name of organs:

i. Lungs ii. Skin iii. Kidneys

**Q.13** What is the functional unit of kidney?

**Ans.** The functional unit of the kidneys is called nephron.

**Q.14** What is lithotripsy? (Lhr-2014)

**Ans.** Lithotripsy: Lithotripsy is a method for the removal of kidney stones.

In this method, non-electrical shock waves from outside are bombarded on the stones in the urinary system. Waves hit the dense stones and break them. Stones become sand like and are passed through urine.

## Long Questions

**Q.1** Describe the structure of kidney?

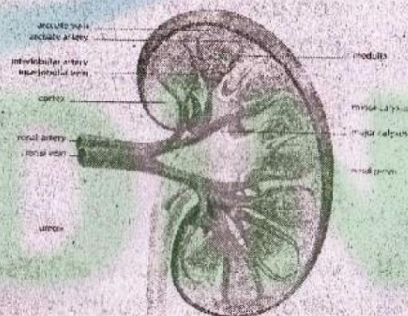
**Ans.** Structure of kidney: Kidneys are dark-red bean shaped organs.

Length = 10cm

Width = 5cm

Thickness = 4cm

Weight=27grams



**Hilus:** Hilus is a depression near the centre of the concave area of kidney. This is the area of kidney through which ureter leaves kidney. Blood vessels, lymphatic vessels and nerves enter and leave kidney from this area.

### Renal Cortex: (Fsd-2014)

Renal cortex is the outer part of kidney. It is dark red in colour.

**Renal medulla:** Renal medulla is the inner part of kidney. It is pale red in colour.

**Pyramids:** Renal medulla consists of several cone shaped areas called renal pyramids.

**Renal Pelvis:** Renal pyramids project into a funnel shaped cavity called renal pelvis. It is the base of ureter.

**Q.2** Describe the structure of nephron and draw labelled diagram.

**Ans.** Structure of Nephron: There are two parts of nephron.

i. Renal Corpuscle.

ii. Renal tubule.

**i. Renal Corpuscle:** The renal corpuscle is not tubular. It has two parts.

\* Glomerulus

\* Bowman's Capsule

**\*Glomerulus:** Glomerulus is a network of capillaries.

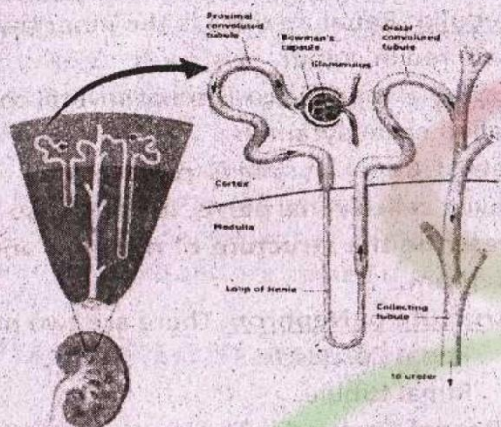
**\*Bowman's capsule:** Bowman capsule is a cup shaped structure that encloses glomerulus.

**ii. Renal Tubule:** The renal tubule is the part of nephron which starts after Bowman's capsule.

- Its first portion is called the proximal convoluted tubule.
- Next portion is U-shaped and is called the loop of Henle.

**Collecting Duct:** The distal convoluted tubules of many nephrons open in a single collecting duct.

**Papillary Ducts:** Many collecting ducts join together to form several hundred papillary ducts which drain into renal pelvis.



**Q.3 Describe the function of kidney?**

**Ans. Functioning of kidney:** The main function of kidney is urine formation. This function takes in three steps.

- i. Pressure Filtration.
- ii. Selective Re-absorption.
- iii. Tubular Secretion.

**i. Pressure Filtration: (Guj-2014)**

The first step is pressure filtration. Blood enters the kidney. From kidney it goes to many arterioles. From arterioles blood goes to glomerulus. The pressure of blood is very high. So most of water salts, glucose and urea of blood is forced out of glomerular capillaries. This material passes into Bowman's capsule. Now this material is called glomerular filtrate.

**ii. Selective Re-absorption:**

The second step is the selective re-absorption. In this step about 99% of the glomerular filtrate is re-absorbed into the

blood capillaries. It occurs through osmosis, diffusion and active transport.

**iii. Tubular Secretion:**

The third step is the tubular secretion. Different ions, creatinine, urea etc. are secreted from blood. They go into the filtrate in renal tubule. The filtrate in renal tubules is known as urine.

**Q.4 What is Osmoregulatory function of kidney?**

**Ans. Osmoregulatory Function of kidney**

**Osmoregulation:** Osmoregulation is defined as the regulation of the concentration of water and salts in blood and other body fluids.

**Role of Kidneys:**

Kidneys play important role in osmoregulation by regulating the water contents of blood.

**Excess of Water:**

When there is excess water in body fluids, kidneys form dilute urine.

**Shortage of Water: (Guj-2014)**

When there is shortage of water in body fluids, kidneys form small amount of concentrated urine.

This whole process is under hormonal control.

**Q.5 Write note on kidney stones?**

**Ans. Kidney stones: (Lhr-2014)**

When urine becomes concentrated, crystal of many salts formed in it. Such large crystals cannot pass in urine and form hard deposits called kidney stones.

**Causes:**

- i. Age
- ii. Diet
- iii. Recurring urinary tract infections

- iv. Less intake of water.
- vi. Alcohol consumption

**Symptoms:**

- i. Severe pain in kidney.
- ii. Vomiting
- iii. Frequent urination.
- iv. Urine with blood and pus.

**Treatment:**

- i. Drinking plenty of water.
- ii. Lithotripsy.

**Q.6 Write note on kidney failure? (Fsd-2014)**

**Ans. Kidney Failure:** Kidney failure means a complete or partial failure of kidneys to function.

**Causes:**

- i. Diabetes mellitus.
- ii. Hypertension.
- iii. Interruption in the blood supply to kidney.
- iv. Drug overdoses.

**Symptoms:**

- i. High level of urea and other wastes in blood.
- ii. Vomiting.
- iii. Frequent urination.
- iv. Swelling of legs, feet and face.

**Treatment:**

- i. Dialysis.
- ii. kidney transplant.

**Q.7 Write note on dialysis?**

**Ans. Dialysis:** Dialysis means the cleaning of blood by artificial ways.

**Methods:** There are two methods of dialysis.

- i. Peritoneal dialysis.
- ii. Haemodialysis

**i. Peritoneal Dialysis:**

In this type of dialysis, the dialysis fluid is pumped for a time into the peritoneal cavity. When we place dialysis fluid in peritoneal cavity, waste materials from peritoneal blood vessels diffuse into the dialysis fluid, which is then drained out.

**ii. Haemodialysis:**

In haemodialysis, patient's blood is pumped through an apparatus called dialyzer. The dialyzer contains long tubes, the walls of which act as semi permeable membranes. Blood flows through the tubes while the dialysis fluid flows around the tubes. Extra water and wastes move from blood into the dialysis fluid. The cleansed blood is then returned back to body.

**Q.8 Write note on kidney transplant? (Guj-2014)**

**Ans. Kidney Transplant:** It is the replacement of patient's damaged kidney with a donor healthy kidney.

**Donor:** The donor may or may not be a relative of the patient.

**Tissue proteins:** Before transplant, the tissue proteins of donor and patient are matched.

**Life time:** The average lifetime for a donated kidney is ten to fifteen years.

**Problems after a Transplant:**

- i. Rejection.
- ii. Infection.
- iii. Imbalances in body salts.
- iv. Bone problems.
- v. Ulcers.

## Multiple Choice Questions

Put a (✓) on the correct answer.

- The human urinary system consists of:
  - Rectum, lung, kidneys, ureters
  - Kidneys, ureters, urinary bladder.
  - Skin, liver, lungs, kidneys
  - ✓ Kidneys, ureters, urinary bladder, urethra
- Which organ is responsible for filtering the blood?
  - Intestine
  - Brain
  - Stomach
  - ✓ Kidney
- The tube between kidney and urinary bladder is the:
  - ✓ Ureter
  - Urethra
  - Renal tubule
  - Nephron
- 'Body balance' of water, salts, temperature and glucose is termed as:
  - Excretion
  - Tubular secretion
  - ✓ Homeostasis
  - Re-absorption
- Which is the correct order for the path taken by urine after it leaves the kidneys?
  - Urethra, bladder, ureters
  - Bladder, ureters, urethra
  - ✓ Ureters, bladder, urethra
  - Bladder, urethra, ureters
- What is the function of the ureter?
  - To store urine.
  - ✓ To carry urine from the kidney to the bladder.
  - To carry urine out of the body
  - To remove waste from the blood

- What waste products are excreted by kidneys?
  - ✓ Urea, water & salts
  - Salts, water and carbon dioxide
  - Urea & water
  - Urea & salts
- The two main function of sweat are:
  - To keep the body cool and to remove excess proteins
  - To keep the body warm and to filter the blood.
  - To filter the blood and to remove waste products
  - ✓ To remove waste products and to cool the body
- Which would NOT be present in the filtrate entering the Bowman's capsule of nephron?
  - Water
  - Calcium ions
  - ✓ Blood cells
  - Urea
- During peritoneal dialysis, the waste materials move from.
  - The abdomen to the dialysis fluid.
  - The dialysis fluid to the peritoneum blood vessels
  - ✓ The peritoneum blood vessels to the dialysis fluid
  - The dialysis fluid to the abdomen

## Chapter 3

**Coordination & Control****Short Questions**

**Q.1** Write names of components of coordinated action. (Guj-2014)

**Ans.** A coordinated action has five components.

- i. Stimulus
- ii. Receptor
- iii. Coordinator
- iv. Effector
- v. Response

**Q.2** What are stimuli? (Guj-2014)

**Ans.** **Stimuli:** A stimulus is any change in environment, which can provoke a response in organism.

**Examples:** Touch, light, cold.

**Q.3** Define receptors? (Fsd-2014)

**Ans.** **Receptors:** The organs, tissues or cells which are specifically built to detect particular type of stimuli are called receptors.

**Examples:** Ear, eye, nose.

**Q.4** What are coordinators? (Lhr-2014)

**Ans.** **Coordinators:** These are the organs that receive information from receptors and send messages to particular organs for proper action.

**Examples:** Brain, Spinal cord.

**Q.5** What are effectors?

**Ans.** **Effectors:** These are the parts of body which receive messages from coordinators and make particular response.

**Examples:** Muscles, glands.

**Q.6** What is response? (Guj-2014)

**Ans.** **Response:** On receiving the message from coordinators, the effector performs action. This action is called response.

**Examples:**

- i. Pulling our hand away from something very hot.
- ii. Movement of the flower of sunflowers towards light.

**Q.7** What are the major components of nervous system?

**Ans.** **Components of nervous system:**

- i. Central nervous system.
- ii. Peripheral nervous system.

**Q.8** Define neuron.

**Ans.** **Neuron:** Neuron is the unit of the nervous system.

Neurons are specialized cells that are able to conduct nerve impulses from receptors to coordinators and from coordinators to effectors.

**Q.9** What are saltatory impulses?

**Ans.** **Saltatory impulses:** The impulses jump over the areas of myelin going from node to node. Such impulses are called saltatory impulses.

**Q.10** What is nerve? (Guj-2014)

**Ans.** **Nerve:** A nerve means the union of several axons that are enveloped by a covering made of lipid.

**Q.11** What is spinal cord?

**Ans.** **Spinal Cord:** The spinal cord is infact a tubular bundle of nerves. It starts from brain stem and extends to lower back.

**Q.12** What are involuntary actions?

**Ans.** **Involuntary actions:** When impulses are not passed to the higher centres of brain, it results in responses

which are not under conscious control. Such responses are called involuntary actions.

**Q.13 What are voluntary actions?**

**Ans. Voluntary Actions:** The responses which are under conscious control are called voluntary actions.

**Q.14 What is reflex action? (Lhr, Guj-2014)**

**Ans. Reflex Action:** The involuntary response produced by the CNS (Central Nervous system) is very quick. Such a response is called reflex action.

**Example:**

The withdrawal of hand after touching a hot object.

**Q.15 What is reflex arc?**

**Ans. Reflex arc:** The pathway followed by the nerve impulses for producing a reflex action is called reflex arc.

**Q.16 What is choroid?**

**Ans.** The middle layer of eye is called choroid. It contains blood vessels and gives the inner eye a dark colour.

**Q.17 What is iris?**

**Ans. Iris:** Behind cornea, choroid bends to form a muscular ring, called iris.

**Q.18 What is pupil?**

**Ans. Pupil:** There is a round hole in the centre of iris called as the pupil.

**Q.19 What is retina?**

**Ans. Retina:** The last and inner layer of eye is called retina. It contains the photosensitive cells called rods and cones.

**Q.20 What are rods?**

**Ans. Rods:** These are photosensitive cells. Rods are sensitive to dim light.

**Q.21 What are cones?**

**Ans. Cones:** These are photosensitive cells. Cones are sensitive to bright light and so distinguish between different colours.

**Q.22 What is fovea?**

**Ans. Fovea:** fovea is dip in retina. It is directly opposite to lens. It is densely packed with cone cells. It is largely responsible for colour vision and sharpness.

**Q.23 What is optic disc?**

**Ans. Optic disc:** Optic disc is a point on retina where the optic nerve enters retina. There are no rods and cones at this point, that is why it is also referred to as blind spot.

**Q.24 What is aqueous humour?**

**Ans. Aqueous humour:** The interior chamber of eye contains a clear fluid which is known as aqueous humour.

**Q.25 What is vitreous humour? (Lhr-2014)**

**Ans. Vitreous humour:** The posterior chamber of eye contains a jelly like fluid known as vitreous humour.

**Q.26 What is rhodopsin and iodopsin?**

**Ans. Rhodopsin:** Rods contain pigment, called rhodopsin.  
**Iodopsin:** Cones contain a pigment called iodopsin.

**Q.27 What is night blindness?**

**Ans. Night blindness:** The deficiency of vitamin A causes poor night vision. This problem is called night blindness.

**Q.28 What is colour blindness?**

**Ans. Colour blindness:** Colour blindness is a disease in which a person is not able to distinguish between colours.

## Long Questions

**Q.1 What are the types of coordination?**

**Ans. Types of coordination:** There are two types of coordination.

- Nervous coordination.
- Chemical coordination.

**i. Nervous coordination:**

It is brought by nervous system through nerve impulses.

**ii. Chemical coordination:**

It is brought by the endocrine system.

- Animals have both the nervous and chemical coordination system.
- Plants and other organisms have only chemical coordination.

**Q.2 Describe the structure of neuron.**

**Ans. Structure of neuron:** A neuron has following different parts.

- Cell body
- Dendrites
- Axons
- Schwann cells
- Myelin Sheath
- Nodes of Ranvier

**• Cell body:**

The nucleus and most of cytoplasm of a neuron is located in cell body.

**• Dendrites:**

Dendrites are processes. They extend out from cell body. Dendrites conduct impulses towards cell body.

**• Axons:**

Axons are also processes. They extend out from cell body. Axons conduct impulses away from cell body.

**• Schwann cells:**

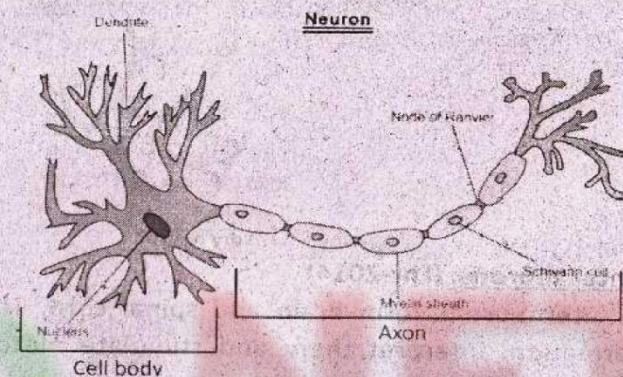
Schwann cells are special neuroglial cells located at regular intervals along axons.

**• Myelin sheath:**

Schwann cells secrete a fatty layer called myelin sheath, over axons.

**• Nodes of Ranvier:**

Between the areas of myelin on an axon, there are non-myelinated points called nodes of Ranvier.



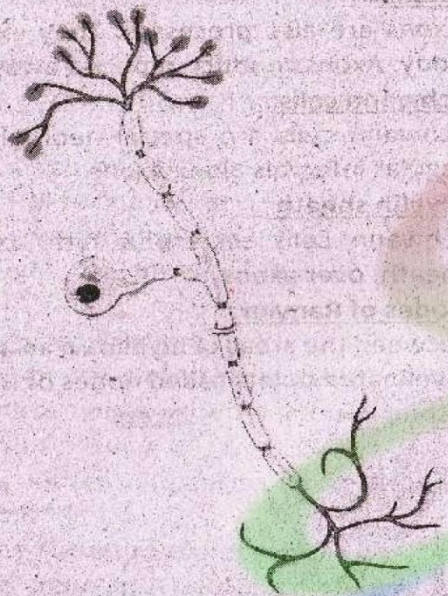
**Q.3 Describe the types of neurons.**

**Ans. Types of Neurons:** On the basis of their function, neurons are of three types.

- Sensory neurons.
- Inter neurons.
- Motor neurons.

**i. Sensory neurons: (Lhr-2014)**

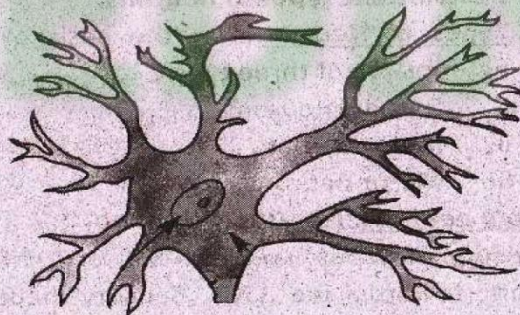
Sensory neurons conduct sensory information from receptors towards the CNS. Sensory neurons have one dendrite and one axon.



Sensory neuron

**ii. Interneurons: (Lhr-2014)**

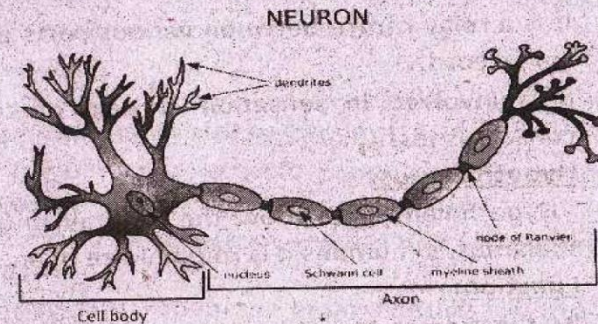
Interneurons form brain and spinal cord. They receive information, interpret them and stimulate motor neurons. They have many dendrites and axons.



Inter Neuron

**iii. Motor neurons:**

They carry information from interneurons to muscle or glands. They have many dendrites but only one axon.

**Q.4 What are the types of nerves?**

**Ans. Types of nerves:** The nerves are classified into three types.

- Sensory nerves.
- Motor nerves.
- Mixed nerves.

**i. Sensory Nerves:**

Sensory nerves contain axons of sensory neurons only.

**ii. Motor Nerves:**

Motor nerves contain axons of motor neurons only.

**iii. Mixed Nerves:**

Mixed nerves contain axons of both motor and sensory neurons.

**Q.5 Describe the structure and function of forebrain.**

**Ans. Forebrain:** Forebrain is the largest area of brain. It is most highly developed in humans.

**Parts of forebrain:**

- Thalamus.
- Hypothalamus.
- Cerebrum.

**i. Thalamus:**

Thalamus lies just below cerebrum.

**Function:**

- It is a relay centre between various parts of brain and spinal cord.
- It is involved in sensation of pain perception and consciousness.

**Hypothalamus:**

Hypothalamus lies above the midbrain and just below thalamus. In humans it is roughly size of an almond.

**Function:**

- Its function is to link nervous system and endocrine system.
- It controls the secretion of pituitary gland.
- It controls the feeling such as pain, rage and sorrow.

**Cerebrum:**

Cerebrum is the largest part of forebrain. It is divided into two cerebral hemispheres.

**Olfactory bulbs:** The anterior parts of cerebral hemisphere.

**Cerebral cortex:** The upper layer of cerebral hemisphere.

Cerebral cortex is divided into four lobes.

- Frontal.
- Parietal.
- Occipital.
- Temporal.

**Function:**

Cerebrum controls skeletal muscles, thinking, intelligence and emotions.

**Q.6 Write a note on midbrain.**

**Ans. Midbrain:** Midbrain lies between hindbrain and forebrain and connects the two.

**Function:**

- It receives sensory information and sends it to the appropriate part of forebrain.
- Midbrain also controls some auditory reflexes and posture.

**Q.7 Describe the structure and function of hindbrain. (Lhr-2014)**

**Ans. Hindbrain:** Hindbrain brain consists of three major parts.

- Medulla Oblongata.
- Cerebellum.
- Pons.

**i. Medulla Oblongata:**

Medulla oblongata lies on the top of spinal cord. Information that passes between spinal cord and the rest of brain pass through medulla.

**Function:**

- It controls breathing, heart rate and blood pressure.
- It also controls vomiting, coughing, sneezing etc.

**ii Cerebellum:**

Cerebellum is behind medulla.

**Function:**

- It coordinates muscle movements.

**iii. Pons:**

Pons is present on top of medulla.

**Function:**

- It assists medulla in controlling breathing.
- It serves as a connection between cerebellum and spinal cord.

**Q.8 What is the function of spinal cord?**

**Ans. Function of spinal cord:**

- It serves as a link between body parts and brain. Spinal cord transmits nerve impulses from body parts to brain and from brain to body parts.
- Spinal cord also acts as a coordinator responsible for some simple reflexes.

**Q.9 Write note on peripheral nervous system.**

**Ans. Peripheral nervous system:**

The peripheral nervous system is composed of nerves and ganglia.

**Nerves:**

Nerves arise or lead to brain and spinal cord.

Cranial nerves → 12 pairs

Spinal nerves → 31 pairs

**Ganglia:**

Ganglia are the clusters of neuron cell bodies outside CNS. The cranial and spinal nerves make two pathways.

- **Sensory Pathway:** Conducting impulses from receptors to CNS.
- **Motor pathway:** Conducting impulses from CNS to effectors. Motor pathway makes two system.

**Somatic Nervous System:**

It is responsible for the conscious and voluntary actions.

**Autonomic Nervous system:**

It is responsible for the activities, which are not under conscious control.

**Q.10 Describe the disorders of the eye. (Lhr-2014)**

**Ans. Disorders of the eye:** There are two disorders.

- Myopia.
- Hypermetropia.

**Myopia:**

The elongation of eyeball results in myopia. Such persons are not able to see distant objects clearly. This image is formed in front of retina. The problem can be rectified by using concave lens.

**Hypermetropia:**

It happens when eyeball shortens such persons are not able to see near objects clearly. The image is formed behind retina. Concave lens is used to rectify this problem.

**Q.11 What are the contributions of Ali Ibn Isa?**

**Ans. Ali Ibn Isa:**

Ali Ibn Isa was a famous Arab scientist. He wrote three books on ophthalmology. He described 130 eye diseases and prescribed 143 drugs to treat these diseases.

**Q.12 What are the contributions of Ibn al-Haytham?**

**Ans. Ibn al-Haytham:**

Ibn al-Haytham was an Arab scientist. He is regarded as the father of optics. The name of his book is "Book of Optics". He discussed the topics of medicine and eye surgery in this book. He also described the principles of pinhole camera.

**Q.13 Describe the structure of external ear.**

**Ans. Structure of external ear:**

External ear consists of the following parts.

- Pinna
- Auditory canal
- Ear drum.

**I. Pinna:** Pinna is the broad external part. It is made of cartilage and covered with skin.

**ii. Auditory Canal:** The second part is auditory canal. The wax and the hairs in auditory canal protect ear from small insects, germs and dust.

**iii. Ear drum:** Auditory canal ends in ear drum. This thin membrane separates external ear from middle ear.

**Q.14 Describe the structure of middle ear.**

**Ans. Structure of middle ear:**

In middle ear, three small bones are present. These bones are called middle ear ossicles.

- i. Malleus.
- ii. Incus.
- iii. Stapes.

**i. Malleus:** Malleus is attached with ear drum.

**ii. Incus:** Incus comes after malleus.

**iii. Stapes:** Stapes is connected with a membrane called oval windows.

Middle ear also communicates with the nasal cavity through Eustachian tube.

**Q.15 Describe the structure of inner ear?**

**Ans. Structure of inner ear:**

Inner ear consists of three parts.

- i. Vestibule.
- ii. Semicircular canals.
- iii. Cochlea.

**i. Vestibule:** Vestibule is present in the centre of inner ear.

**ii. Semicircular canals:** Three canals called semicircular canals are posterior to the vestibule.

**iii. Cochlea:** The cochlea is made of three ducts and wraps itself into a coiled tube. Sound receptor cells are present within the middle duct of cochlea.

**Q.16 Describe the process of hearing.**

**Ans. Process of hearing:**

The pinna of the external ear focuses and directs sound waves into auditory canal. The sound waves strike ear drum and produce vibrations in it. The vibrations strike middle ear and produce further vibrations in malleus, incus and stapes. From stapes, the vibrations strike the oval windows and then reach the fluid filled middle duct of cochlea. The fluid of cochlea is moved and receptor cells are stimulated. The receptor cells generate a nerve impulse, which travel to brain and interpreted as sound.

**Q.17 Explain the role of ear in the maintenance of body balance.**

**Ans. Role of ear in maintenance of balance:**

Semicircular canal and vestibule help to maintain the balance of body. Semicircular canals contain sensory nerves which can detect any movement of head. Vestibule can detect any changes in the posture of body. The neurons coming from these two receptors reach cerebellum through auditory canal.

**Q.18 Differentiate between hormone and endocrine system.**

**Ans. Hormone:** A hormone is a specific messenger molecule synthesized and secreted by an endocrine gland.

**Endocrine system:**

The activities such as growth reproduction, maintenance of glucose concentration in blood, reabsorption of water in kidneys etc need to be regulated. Endocrine system performs this job.

**Q.19 Write note on pituitary gland.**

**Ans. Pituitary Gland:**

It is pea shaped gland attached to the hypothalamus of brain.

There are two lobes of pituitary gland.

- i. anterior lobe.
- ii. Posterior lobe.

**Harmones and their function:**

- i. Somatotrophin → It promotes the growth of body.
- ii. Vasopressin → It increases the rate of reabsorption of water from nephrons.
- iii. Oxytocin → It is necessary for the ejection of milk from breast.

**Q.20 Write note on thyroid gland.**

**Ans. Thyroid Gland:** This is the largest endocrine gland in human body. It is present in neck region, below larynx.

**Harmones and their Function:**

- i. Thyroxin → It increases the break down of food.
- ii. Calcitonin → It decreases the level of calcium ions in blood.

**Q.21 Write note on adrenal glands:**

**Ans. Adrenal Glands:**

Two adrenal glands are situated above kidney. Each adrenal gland consists of two parts.

- i. The outer part is cortex.
- ii. The inner part is medulla.

**Harmones and their function:**

- i. Adrenaline → It prepares our body to overcome emergency situations.
- ii. Corticosteroid → It maintains the balance of salts and water in blood.

**Q.22 Write note on pancreas:**

**Ans. Pancreas:** This organ has two functions.

- i. Exocrine gland.
- ii. Endocrine gland.

**Harmones and their function:**

- i. Glucagon → It influences the liver to release glucose in blood.
- ii. Insulin → It influences the liver to take excess glucose from blood.

**Q.23 Write note on gonads:**

**Ans. Gonads:** Gonads produce gametes. There are two gonads.

- i. Testes → Male gonad.
- ii. Ovaries → Female gonad.

**Harmones and their function:**

- i. Testosterone → It is responsible for the development of male secondary sex characters.
- ii. Estrogen → It is responsible for the development of female secondary sex characters.

**Q.24 Describe the feedback mechanisms.**

**Ans. Feedback Mechanism:**

Feedback mechanism means the regulation of a process by the output of the same process.

Feedback mechanisms are of two types.

- i. Negative feedback.
- ii. Positive feedback.

**i. Negative feedback:**

In negative feedback, the output of a process decreases or inhibits the process.

**Example:**

When the blood glucose concentration rises, pancreas secretes insulin. It decreases the blood glucose concentration. Decline in the blood glucose

concentration to a normal set point inhibits the secretion of insulin.

When blood glucose concentration drops below normal, pancreas secretes glucagon. It raises the blood glucose concentration.

In this case, rise in the blood glucose concentration to a normal set point inhibits the secretion of glucagon.

**Positive Feedback:**

In positive feedback, the changes resulting from a process increase the rate of process.

**Example:**

Suckling action of an infant stimulates the production of a hormone in mother. This hormone works for the production of milk, more suckling leads to more hormone, which in turn leads to more milk production.

**Q.25 Write note on paralysis.**

**Ans.** **Paralysis:** Paralysis is the complete loss of function by one or more muscle groups.

**Causes:** Damage in the central nervous system.

**Symptoms:**

- i. Weak paralysis through out the body.
- ii. Paralysis in one side of body.
- iii. Paralysis in lower parts.
- iv. Paralysis in all four limbs.

**Q.26 Write note on epilepsy.**

**Ans.** **Epilepsy:** Epilepsy is a nervous disorders in which there is abnormal and excessive discharge of nerve impulses in brain.

**Causes:**

- i. Unprovoked seizures.
- ii. Genetic or developmental causes.
- iii. Brain tumours.
- iv. Infection in central nervous system.

**Treatment:** Anticonvulsant or antiepileptic drugs.

## Multiple Choice Questions

Put a (✓) on the correct answer.

1. Processes that carry nerve impulses away from the cell body are called.  
 ✓ a) Axons                                      b) Dendrites  
 c) Synapses                                    d) Myelin sheath
2. The portion of the nervous system that is involuntary in action:  
 a) Somatic nervous system  
 b) Motor nervous system  
 ✓ c) Autonomic nervous system  
 d) Sensory nervous system
3. Which neurons are present inside the central nervous system?  
 a) Sensory neurons only  
 b) Motor neurons only  
 c) Sensory and motor neurons both  
 ✓ d) Interneurons only
4. The part of the brain responsible for muscle movement, interpretation of the senses and the memory is the.  
 a) Pons    b) Medulla oblongata  
 ✓ c) Cerebrum                                    d) Cerebellum
5. Apart from hearing, what other major body function is performed by the ear?  
 a) Hormone secretion  
 ✓ b) Body balance  
 c) Reduction in nerve pressure  
 d) all of these

6. The myelin sheath is formed by \_\_\_\_\_ which wrap around the axons of some neurons.  
 a) Nodes of Ranvier      b) Axons  
 c) Dendrites              ✓d) Schwann cells
7. This is NOT a part of the hindbrain.  
 a) Pons                      b) Medulla oblongata  
 ✓c) Cerebrum              d) Cerebellum
8. If you look at an intact human brain, what you see the most is a large, highly convoluted outer surface. This is the.  
 ✓a) Cerebrum              b) Cerebellum  
 c) Pons                      d) Medulla oblongata
9. Insulin and glucagon are produced in the.  
 a) Hypothalamus          b) Anterior Pituitary  
 c) Liver                      ✓d) Pancreas
10. All of these are hormones except.  
 a) Insulin                    b) Thyroxin  
 c) glucagon                ✓d) Pepsinogen

## Chapter 4

**Support and Movement****Short Questions**

Q.1 Define skeleton.

Ans. Skeletal system or skeleton is defined as the framework of hard, articulated structures that provide physical support, attachment for skeletal muscles, and protection for the bodies of animals.

Q.2 What is endoskeleton and exoskeleton?

Ans. **Endoskeleton:** The skeleton that is on the inside of body is called endoskeleton.

**Exoskeleton:**

The skeleton that is on the outside of body is called exoskeleton.

Q.3 differentiate between cartilage and bone.

Ans. **Cartilage****Bone**

i) Cartilage is a dense, clear blue white firm connective tissue.	i) Bone is the hardest connective tissue in body.
ii) The cells of cartilage are called chondrocytes.	ii) The mature bone cells are called osteocytes.
iii) Cartilage contain a single type of cell.	iii) Bone contains different types of cell.

Q.4 What is compact bone and spongy bone? (Guj-2014)

Ans. **Compact Bone:** The hard outer layer of a bone is called compact bone.

**Spongy Bone:** The interior of bone is soft and porous. It is called spongy bone.

**Q.5** What is the difference between movement and locomotion?

**Ans.** **Movement:** Movement is a general term meaning the act of changing place or position by entire body or by its parts.

**Locomotion:**

Locomotion is the movement of an animal as a whole from one place to another.

**Q.6** Define origin and insertion. (Lhr, Guj-2014)

**Ans.** **Origin:** One end of a skeletal muscle is always attached with some immovable bone. This end of muscle is called the origin.

**Insertion:** Other end of muscle is attached with a moveable bone and is called the insertion.

**Q.7** What is flexor muscle and flexion?

**Ans.** When a muscle contracts and bends the joint, it is known as flexor muscle and the movement is called flexion.

**Q.8** What is extensor muscle and extension?

**Ans.** When a muscle contracts and straightens the joint, it is known as extensor muscle and the movement is called extension.

## Long Questions

**Q.1** What is role of skeleton in support and movement?

**Ans.** **Role of skeleton:** The big functions of skeletal system are:

- i. Protection.
- ii. Support.
- iii. Movement.

**i. Protection:** Skeleton provides protection to many internal organs.

**Example:**

- Skull protects brain.
- Vertebral column protects spinal cord.
- Ribs protect most of our other internal organs.

**ii. Support:** Vertebral column provides the main support to our body.

**iii. Movement:** In our body, skeleton works very closely with the muscular system to help us move.

**Q.2** Describe the types of cartilage. (Fsd, Lhr-2014)

**Ans.** **Types of cartilage:** There are three types of cartilage.

- i. Hyaline cartilage.
- ii. Elastic cartilage.
- iii. Fibrous cartilage.

**i. Hyaline Cartilage:** Hyaline cartilage is strong yet flexible. It is found covering the ends of the long bones, in the nose, larynx, trachea and bronchial tubes.

**ii. Elastic Cartilage:** Elastic cartilage is quite strong but has elasticity due to a network of elastic fibers in addition to collagen fibers. It is found in epiglottis, pinna etc.

**iii. Fibrous Cartilage:** Fibrous cartilage is very tough and less flexible. It is due to large number of thick collagen fibers present in knitted form. It is found in intervertebral discs.

**Q.3** What are the main components of the axial skeleton and the appendicular skeleton of human?

**Ans.** **Axial Skeleton:** Axial skeleton consists of the 80 bones in the head and trunk of body. It is composed of five parts.

- i. Skull contains 22 bones. (Cranial = 8) (Facial = 14).
- ii. There are 6 middle ear ossicles.
- iii. There is also a hyoid bone in neck.
- iv. Vertebral column contains 33 bones.
- v. The chest is made of a chest bone called **sternum** and 24 ribs.

#### **Appendicular skeleton:**

Appendicular skeleton is composed of 126 bones.

- Pectoral girdle is made of 4 bones.
- Arms have 6 bones.
- Both hands have 54 bones.
- Pelvic girdle has 2 bones.
- Legs have 6 bones.
- Both feet have 54 bones.

**Q.4 Describe the types of joints and give examples. (Lhr,Guj-2014)**

**Ans. Joint:** A joint is the location at which two or more bones make contact.

### **Types of Joints**

**i. Immoveable Joints:** Such joints allow no movement.

#### **Examples:**

The joints between the skull bones.

**ii. Slightly moveable Joints:** Such joints allow slight movements.

#### **Examples:**

The joints between the vertebrae.

**iii. Moveable Joints:** They allow a variety of movements.

#### **Examples:**

Shoulder joint, hip joint, elbow joint, knee joint etc.  
The main types of moveable joints are.

- Hinge joints.
- Ball and socket joints.

**Hinge Joints:** Hinge joints move back and forth like the hinge on a door. They allow movements in one plane only.

#### **Examples:**

Knee joint, elbow joint.

**Ball and Socket Joints:** (Fsd-2014)

Ball and socket joint allow movement in all directions.

**Example:** Hip joints, shoulder joints.

**Q.5 What are ligaments and tendons? What function do they perform? (Guj-2014)**

**Ans. Ligaments:** Ligaments are bands of connective tissue. Ligaments are strong but flexible bands and join one bone to another at joints.

**Function of ligaments:** They prevent dislocation of bones at joints.

**Tendons:** Tendons are also bands of connective tissue. Tendons are tough bands and attach muscles to bones.

**Function of Tendons:** When a muscle contracts tendon exerts a pulling force on the attached bone, which moves as a result.

**Q.6 Explain antagonism in muscle action selecting biceps and triceps as example:**

**Ans. Antagonism:** When one muscle contracts the other relaxes and this phenomenon is known as antagonism.

#### **Example:**

Biceps is a flexor muscle on the front of the upper arm bone while triceps is an extensor muscle on the back of arm. Both these muscles have their origin at pectoral girdle and insertion at one of the two bones of forearm.

When biceps contracts, the forearm is pulled upward. It is the flexion, triceps muscle relaxes. When triceps muscle contracts, forearm is pulled down. It is extension at elbow joints. During it, biceps muscle relaxes.

In this way biceps and triceps make up an antagonistic pair of muscles.

**Q.7 Describe the disorders of skeletal system. (Lhr-2014)**

**Ans. Disorders of skeletal system:** There are following disorders.

i. Osteoporosis.

ii. Arthritis.

**i. osteoporosis:**

In osteoporosis, there is a decrease in the density of bones due to loss of calcium and phosphorous. It may be due to malnutrition, lack of physical activities or deficiency of estrogen hormone.

**ii. Arthritis:**

Arthritis means inflammation in joints. It is characterised by pain and stiffness in joints.

### Types of Arthritis

- **Osteo Arthritis: (Guj-2014)**

In this arthritis, fusion of the bones at joint may occur and joints may become totally immovable.

- **Rheumatoid Arthritis: (Guj, Lhr-2014)**

It involves the inflammation of the membranes at joints.

- **Gout:**

It is characterised by the accumulation of uric acid crystals in moveable joints.

## **Multiple Choice Questions**

Put a (✓) on the correct answer.

- Find the ball and socket joint.**
  - Joint in the finger bones
  - Joint of neck and skull bones
  - Joint at elbow
  - ✓ d) Joint at pelvic girdle and leg bones
- All these are the parts of axial skeleton of humans except.**
  - Ribs
  - ✓ c) Shoulder girdle
  - Sternum
  - ✓ d) Vertebral column
- The disorders in which there is an accumulation of uric acid in joints:**
  - ✓ a) Gout
  - Rheumatoid arthritis
  - Osteoporosis
  - d) Osteo arthritis
- What is correct about tendons?**
  - Tendons are flexible and they join muscles with bones
  - Tendons are non-elastic and they join bones with bones
  - ✓ c) Tendons are non-elastic and they join muscles with bones
  - d) Tendons are flexible and they join muscles with muscles
- How many bones make our skull?**
  - a) 14 ✓
  - b) 22
  - c) 24
  - d) 26
- What are the main components of a bone?**
  - a) Marrow, spongy bone, wax
  - b) Marrow, compact bone, wax
  - c) Compact bone and marrow
  - ✓ d) Compact bone, spongy bone, marrow

7. What do some bones produce?  
 a) Mucous                      b) Hormones  
 c) Oxygen                      ✓d) Blood cells
8. How would you define skeletal system?  
 a) All the bones in body  
 b) All the muscles and tendons  
 c) All the body's organs, both soft and hard tissues  
 ✓d) All the bones in body and the tissues that connect them
9. Find the INCORRECT statement.  
 a) Bone is where most blood cells are made.  
 b) Bone serves as a storehouse for various minerals  
 ✓c) Bone is a dry and non-living supporting structure  
 d) Bone protects and supports the body and its organs
10. The purpose of rib cage is to.  
 a) Protect the stomach  
 b) Protect the spinal cord  
 ✓c) Protect heart and lungs.  
 d) Provide an object to which lungs attached

## Chapter 5

**Reproduction****Short Questions****Q.1 Define Reproduction.**

**Ans.** Reproduction is defined as the production of individuals of the same species.

**Q.2 What are the types of reproduction?**

**Ans.** **Types of Reproduction:** There are two basic types of reproduction.

i. Asexual reproduction.

ii. Sexual reproduction.

**i. Asexual Reproduction:** Asexual reproduction means simple cell division that produces an exact duplicate of an organism.

**ii. Sexual Reproduction:** Sexual reproduction involves the joining of male and female sex cells.

**Q.3 Name the methods of asexual reproduction.**

**Ans.** i. Binary Fission.

ii. Fragmentation.

iii. Budding.

iv. Spore formation.

v. Parthenogenesis.

vi. Vegetative propagation.

**Q.4 Define Binary Fission. (Fsd-2014)**

**Ans.** It is the simplest and most common method of asexual reproduction. Binary fission means "division into two". It occurs in bacteria, amoeba, planaria etc.

**Q.5 What is fragmentation?**

**Ans.** As certain worms grow to full size, they spontaneously break up into 8 or 9 pieces. Each piece develops into a

mature worm, and the process is repeated. If a planarian breaks into many pieces instead of two, it will also be called as fragment.

**Q.6 What is fragmentation?**

**Ans.** In this type of asexual reproduction a bud develops as a small outgrowth on parent's body. The bud enlarges and detaches from the parent body. It grows into new organism. Budding occurs in yeast, hydra, corals etc.

**Q.7 What is parthenogenesis?**

**Ans.** In parthenogenesis, an unfertilized egg develops into new offspring, some fishes, frog, and insects reproduce by means of parthenogenesis.

**Q.8 Define vegetative propagation? (Fsd-2014)**

**Ans.** When vegetative parts of plants give rise to new plants the process is called vegetative propagation.

**Q.9 Describe the advantages of vegetative propagation of plants.**

**Ans. Advantages:**

- i. Beneficial characteristics can be preserved.
- ii. Number of plants can be increased at a rapid rate.
- iii. Plants are able to face unfavorable conditions.
- iv. Seedless fruit plants can be grown.

**Q.10 Describe the disadvantages of vegetative propagation of plants.**

**Ans. Disadvantages:**

- i. The plants do not have genetic variations.
- ii. Species specific diseases can attack.
- iii. The destruction of an entire crop.

**Q.11 What is alternation of generation? (LHR-2014)**

**Ans. Alternation of Generation:** The phenomenon in which two different generations alternate with each other during life cycle is known as alternation of generations.

**Q.12 Define Pollination?**

**Ans.** Pollination is defined as the transfer of pollen grains from flower's anther to stigma.

**Q.13 Define Germination?**

**Ans.** Seed germination is a process by which a seed embryo develops into a seedling.

**Q.14 Define Sexually Transmitted Diseases?**

**Ans.** Sexually transmitted diseases (STDs) are defined as the diseases that are transmitted through sexual act.

**Example:** AIDS.

**Q.15 What is semen? (Lhr-2014)**

**Ans.** Semen is a material containing sperms in a fluid it consists of 10% sperms and 90% fluid.

## Long Questions

**Q.1 Describe the spore formation in rhizopus. (Lhr-2014)**

**Ans.** When Rhizopus reaches reproductive age, its body cells form thick walled spore sacs called sporangia. Inside each sporangium, a cell divides many times and forms many daughter cell called spores each spore is covered with a thick wall called cyst and it can survive unfavorable conditions when sporangia are mature, they burst and release spores. Under favorable conditions, the spores germinate and develops into new Rhizopus.

**Q.2 Describe the ways of natural vegetative propagation?**

**Ans. Natural vegetative propagation:** Vegetative Propagation occurs naturally in several ways.

**i. Bulbs:** Bulbs are short underground stems surrounded by thick, fleshy leaves that contain stored food. Adventitious roots emerge under the base of bulb while shoots emerge from the top of the base.

**Examples:** Tulips, onions and lilies reproduce by bulbs.

**ii. Corms:** Corms are short and swollen underground stems containing stored food. Buds are present at the top of corm from a bud, shoot grows and forms a new plant.

**Examples:** Dasheen and garlic reproduce by corms.

**iii. Rhizomes:** Rhizomes are horizontal underground stems with scale leaves. There are enlarged portions called nodes on rhizomes. Buds are produced at nodes. The buds present on the upper surface of rhizome give rise to shoot. The lower surface of rhizome produces adventitious roots.

**Examples:** Ginger, ferns and water lilies reproduce by rhizomes.

**iv. Stem Tubers:** Stem tubers are the enlarged portions of an underground stem. There are aggregations of tiny buds in the form of "eyes" along the surface of the tuber. Each bud develops into shoot that grows upward and also produces roots.

**Examples:** Potatoes and yams reproduce by tubers.

**v. Suckers:** Suckers are lateral stems close to ground level. A sucker grows underground from some distance and then turns up, producing the new plant.

**Examples:** Mint and chrysanthemum reproduce in this way.

**vi. Vegetative propagation by Leaves:** There are fleshy leaves. Adventitious buds are present at the margins of

leaves. When leaf falls on ground the buds grow into new plants.

**Examples:** It is seen in Bryophyllum.

**Q.3 Write a note on cutting and grafting? (Guj-2014)**

**Ans. Cutting:** In this method, cutting may be taken mainly from the stems or roots of parent plant. These cuttings must have a meristematic region from which growth can occur. When cuttings are placed in a suitable soil and under right conditions, they form roots and shoots. Roots and shoots grow and develop into a plant.

**Examples:** Roses, ivy, grapevines and sweet potato are propagated by cutting.

**Grafting:** In grafting a piece of stem is cut from the plant and is attached with another plant with established root system. After a while, the vascular bundles of the attached stem piece and the host plant are connected to each other. The stem piece and the plant begin to grow together.

**Examples:** This method is used to propagate many roses, peach trees, plum trees and various seedless fruits.

**Q.4 What is tissue culture and cloning?**

**Ans. Cloning:** Cloning is the latest method of vegetative propagation. In this method, identical offsprings are produced from a single parent using its vegetative tissue or cell.

**Tissue Culture:** Tissue culture is the technique applied in cloning.

**Explanation:** Tissues are taken from any part of plant. These tissues are put in a suitable nutrient medium. The tissue cells start mitosis and produce masses of

cells called calluses. Calluses are transferred to other medium that contains different hormones for the formation of roots, stem and leaves. Calluses make these structures and grow into new small plants. The small plants are then planted in pots and then in fields.

**Q.5 Define sporophyte generation and gametophyte generation.**

**Ans.** In the life cycle of plants, two different generations alternate with each other.

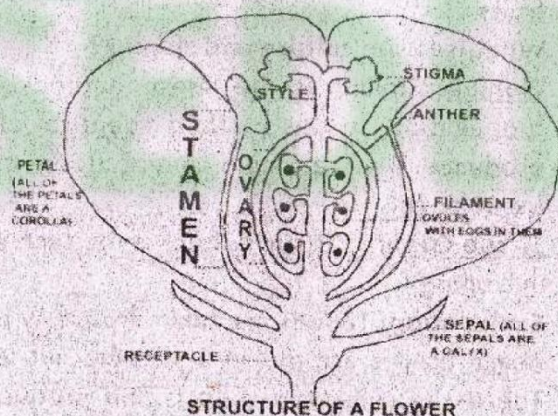
**Sporophyte Generation:** One generation is diploid and produces spores. It is called sporophyte generation.

**Gametophyte Generation:** The other generation is haploid and produces gametes. It is called gametophyte generation.

**Q.6 Describe the structure of flower.**

**Ans. Structure of flower:** It has four whorls.

- i. Calyx
- ii. Corolla
- iii. Androecium
- iv. Gynoecium



**i. Calyx:** Calyx is the outermost whorl. It is usually green in colour. Its individual units are called sepals. Sepals protect the inner whorl at bud stage.

**ii. Corolla:** Corolla is the next inner whorl. It is often coloured brightly. Its individual units are called petals. They serve to attract bees, birds etc. which are the agents of pollination.

**iii. Androecium:** The third whorl is androecium. Androecium is the male reproductive part of flower. Its units are called stamens. Each stamen has a thread like filament. Anther is attached at its free end. Anther has pollen sacs in which pollen grains are produced through meiosis.

**iv. Gynoecium:** The fourth whorl is gynoecium. Gynoecium is the female reproductive part of flower. Its units are called carpels. Each carpel is made up of the basal ovary, middle style and upper stigma. Inside ovary, there are one to many ovules.

**Q.7 Outline the life cycle of a flowering plant?**

**Ans. Life cycle of flowering plant:** Pollen grains are produced in pollen sacs when pollen grains mature, they are transferred to stigma. On reaching the stigma, the tube nucleus of pollen grain constructs a pollen tube. The pollen tube contains a tube nucleus and two sperms. The tube grows through style and ovary and enters ovule. Here, it bursts and releases the sperms. Both sperms enter the female gametophyte. One sperm fuses with egg and forms a diploid zygote. The other sperm fuses with diploid fusion nucleus and form a triploid (3N) nucleus called endosperm nucleus. Since the process of fertilization involves two fusions, it is

called double fertilization. Zygote develops into embryo and endosperm nucleus develops into endosperm tissue. Ovule then becomes seed and ovary changes into fruit. When seeds mature, they are dispersed. If seeds get suitable conditions, their embryos develop into new plants.

**Q.8 Describe the types of pollination?**

**Ans. Types of Pollination:** There are two types of pollination.

- i. Self-pollination.
- ii. Cross pollination.

**i. Self-Pollination:** Self-pollination is defined as the transfer of pollen grains from the anther to the stigma of the same flower or other flower of the same plant.

**ii. Cross Pollination:** Cross pollination is transfer of pollen grains from the flower on one plant to the flower on other plant of the same species.

**Q.9 What structural adaptations will you find in insect pollinated flowers?**

**Ans. Structural adaptations of insect pollinated flowers.**

- i. Their size is generally large.
- ii. Their petals are brightly coloured.
- iii. They produce nectar.
- iv. The faces of flowers are upwards.
- v. Stamens and stigmas are enclosed inside ring of petals.
- vi. Pollen grains are in small number, heavy and sticky.
- vii. Stigma is pinhead shaped with no branches.

**Q.10 What structural adaptations will you find in wind pollinated flowers.**

**Ans. Structural Adaptations of wind pollinated flowers:**

- i. Their size is generally small.
- ii. Their petals are green or dull in colour.

- iii. They do not produce nectar.
- iv. Their flowers hang down for easy shaking.
- v. Stamens and stigmas hang out of ring of petals.
- vi. Pollen grains are in large number and light with smooth surface.
- vii. Stigma has feathery branches for catching pollen.

**Q.11 Describe the structure of seed. (Guj-2014)**

**Ans. Structure of seed:** Angiosperm seeds consist of three distinct parts.

- i. Seed coat.
- ii. Embryo.
- iii. Endosperm.

**Seed Coat:** seed coat develops from the integument. It may be a paper thin layer or thick and hard. Seed coat protects embryo from mechanical injury and from drying out.

**Embryo:** Embryo is actually an immature plant. It consists of a radicle, a plumule and one or two cotyledons. The radicle of embryo develops into new root while the plumule develops into new shoot.

**Endosperm Tissue:** In angiosperms, the stored food derived from the endosperm tissue. This tissue is rich in oil or starch and protein. In many seeds, the food of the endosperm is absorbed and stored by cotyledons.

**Q.12 Explain how the epigeal and hypogeal germinations are different. (Guj-2014)**

**Ans. Epigeal germination:** In epigeal germination, the hypocotyl elongates and forms a hook, pulling the cotyledons above ground.

**Example:** The seeds of beans and cotton germinate in this way.

**Hypogeal Germination:** In hypogeal germination, the epicotyl elongates and forms the hook. In this type of germination, the cotyledons stay underground.

**Example:** The seeds of pea and maize germinate in this way.

**Q.13** What conditions are necessary for the germination of seeds? (Fsd-2014)

**Ans.** **Conditions for seed Germination:** The most important conditions are.

- i. Water.
- ii. Oxygen.
- iii. Temperature.

**i. Water:** Seeds of most plants have low water content, and germination cannot occur until seed coat or other tissues have imbibed water. The absorbed water is used in the digestion of the stored food and it also helps in the elongation of hypocotyl and epicotyl.

**ii. Oxygen:** Oxygen is essential for the respiration in the cells of embryo.

**iii. Temperature:** Seeds differ greatly in their temperature requirements for germination. The optimum temperature for the germination of the seeds of most plants ranges from 25-30°C.

**Q.14** Describe the processes of spermatogenesis and oogenesis:

**Ans.** **Spermatogenesis:** Some cells present in the walls of the seminiferous tubules of testes divide repeatedly by mitosis to form large number of diploid spermatogonia.

**Primary Spermatocytes:** Some spermatocytes produce primary spermatogonia.

**Secondary spermatocytes:** Each primary spermatocyte undergoes meiosis-I and produces two haploid daughter cells called secondary spermatocytes.

**Spermatids:** These cells undergo meiosis-II. In this way four haploid spermatids are produced from each primary spermatocyte.

**Sperms:** The spermatids are non-motile and many changes occur in them to convert them into motile cells. Their nuclei shrink and some structures are formed e.g. a corner called acrosome, a tail and a mitochondrial ring. After these changes, the spermatids are called sperms.

**Oogenesis:**

**Follicles:** Some cells of ovary prepare structures called follicles.

**Oogonia:** In follicles many diploid oogonia are present.

**Primary Oocytes:** Some oogonia produce diploid primary oocytes. One of the primary oocytes completes meiosis-I and produces two haploid cells.

**First polar body:** The smaller cell is called first polar body.

**Secondary Oocyte:** The larger one is called secondary oocyte.

**Second polar Body + Egg Cell:** The Secondary Oocyte completes meiosis-II and produces two haploid cells:.

- i. A second polar body.
- ii. An egg cell.

**Q.15** Define fertilization? Describe the mechanism of fertilization? (Fsd-2014)

**Ans.** **Fertilization:** Fusion of male and female gametes is called fertilization.

**Mechanisms of fertilization:** There are two mechanisms by which fertilization can take place.

- i. External Fertilization.
- ii. Internal Fertilization.

**i. External Fertilization:** In external fertilization, egg cells are fertilized outside of body. External fertilization occurs mostly in aquatic environment. It requires both the male and the female animals to release their gametes into their surroundings at almost the same time. For external fertilization the animals have to release great number of gametes. In external fertilization there is a risk of loss of gametes.

**Examples:** External Fertilization occurs in.

- Many invertebrates.
- Fishes.
- Amphibians.

**Internal Fertilization:** In internal fertilization egg cells are fertilized within the reproductive tract of female.

**Example:** It occurs in:

- Reptiles.
- Mammals.
- Birds

**Q.16 Write a note on male reproductive system of rabbit.**

**Ans. Male Reproductive System:** The male reproductive system of rabbit consists of.

- i. A pair of testes.
- ii. The associated ducts.
- iii. Glands.

**i. A pair of testes:** Testes are located in a bag of skin called the scrotum. Scrotum hangs below the body. Each testis consists of a mass of coiled tubes called the

seminiferous tubules. In these tubules the sperms are formed.

**ii. The associated ducts:** When sperms are mature, they accumulate in the collecting ducts of testes.

- **Epididimys:** Form collecting ducts, sperms pass to epididimys.
- **Vas Deferens:** From epididimys, sperms move to a sperm duct called vas deferens.
- **Urethra:** Both sperm ducts join urethra. The urethra transports both sperm and urine.
- **Glands:** As the sperm pass down the ducts from testes to urethra, the associated glands add various secretions.
- **Seminal Vesicles:** Seminal vesicles produce secretions that provide nutrients for sperms.
- **Prostate gland:** Prostate gland produces a secretion that neutralizes the acidity of the fluid.
- **Cowper's glands:** Cowper's glands produce secretions that lubricate the ducts.

**Q.17 Write a note on the female reproductive system of rabbit. (Lhr, Guj-2014)**

**Ans. Female reproductive system:** The female reproductive system of rabbit consists of:

- i. Ovaries.
- ii. Associated ducts.

**i. Ovaries:** Ovaries are small oval organs situated in abdominal cavity just ventral to kidneys. Like most animals, female rabbits have a pair of ovaries. The outer region of ovary produces egg cells. A cluster of specialized cells called follicle surrounds and nourishes each egg cell.

**ii. Associated Ducts:**

- **Fallopian Tubes:** From ovaries, egg cells are released in fallopian tubes. Fertilization occurs in fallopian tubes.
- **Uterus:** From fallopian tubes, the fertilized egg is carried to uterus.
- **Horns:** The uterus of rabbit is divided into two separate parts or horns.
- **Birth Canal:** The uterus horns join and open into vagina or birth canal.
- **Cervix:** Cervix is the portion of uterus, which separates it from birth canal, where sperms of male are deposited.

**Q.18** Describe the fertilization and development in rabbit.

**Ans.** **Fertilization:** Rabbits can breed throughout the year but male rabbits are commonly sterile during the summer months.

Male rabbit deposits its sperms in the vagina of female. Sperms swim through cervix and uterus to fallopian tubes where they fertilize the egg cells, released from ovary.

**Development:** After fertilization, zygote is carried to uterus. By this time the zygote has started dividing and is now called embryo. The embryo is implanted in uterus walls. A connection, called placenta, is established between embryo and uterus wall. Embryo develops into new offspring in 30-32 days, after which it is born.

**Q.19** Why do we consider that overpopulation is a global problem?

**Ans.** **Overpopulation:** When population growth exceeds the carrying capacity of an area or environment, it results in overpopulation.

**Overpopulation is a Global Problem:** Many problems are associated with human overpopulation.

- The overpopulated areas face severe shortage of fresh water and natural resources.
- Overpopulation results in deforestation and loss of ecosystems.
- It leads to more pollution and global warming.
- There is high infant and child mortality rate in overpopulated areas due to poverty.
- Overpopulation raises demands for more housing units, more hospitals, more jobs, more educational institutions, increase in food crops etc.

We have to check overpopulation otherwise we will have to face huge problems because of our limited resources.

**Q.20** Write note on AIDS.

**Ans.** **AIDS:** Aids stands for Acquired Immuno Deficiency Syndrome. It is caused by human Immuno deficiency virus (HIV). The virus destroys white blood cells, which results in loss of resistance against infections. It is a fatal disease.

**Spreading:** It spreads through transfer of body fluids such as blood and semen.

**Main Causes:**

- Unprotected sexual activities.
- Use of infected needles.
- Transfusion of infected blood.

**Q.21** Give an introduction of Pakistan's National AIDS Control Program.

**Ans.** **NACP:** Pakistan's Federal Ministry of Health established NACP in 1987.

**Objectives of NACP:**

- To help the public for the prevention of HIV transmission.

ii. Safe blood transfusion.

iii. Reduction of STDs.

**Services Through Media:** The NACP started services through TV, radio channels and print media in 2005.

**NGOs:** At least 54 NGOs are working in Pakistan for HIV/AIDS public awareness. NGOs serve as members of the provincial consortium on HIV/AIDS. NGOs are present in all the provinces of Pakistan.

## Multiple Choice Questions

Put a (✓) on the correct answer.

- Growing an entire new plant from part of the original plant is called:
  - Budding
  - Regeneration
  - ✓c) Fragmentation
  - d) Vegetative propagation
- Rhizopus reproduces asexually by.
  - Binary fission
  - Budding
  - ✓c) Spore formation
  - d) Endospore formation
- A corm develops into new garlic plant. This is the process of.
  - ✓a) Vegetative propagation
  - b) Regeneration
  - c) Meiosis
  - d) Gametogenesis
- Which is NOT an advantage of grafting?
  - ✓a) The graft is identical to the parent plant
  - b) Grafting allows the propagation of seedless fruits
  - c) The graft combines the characteristics of two plants
  - d) Grafting may allow for the faster production of desirable fruits

- Pollination is the transfer of pollens from:
  - ✓a) Anther to stigma
  - b) Stigma to anther
  - c) Sepal to petal
  - d) Petal to sepal
- Double fertilization in plants means.
  - a) Fusion of two sperms with two egg cells.
  - ✓b) Fusion of one sperm with egg cell and other sperm with fusion nucleus.
  - c) Fusion of two sperms with a single egg cell.
  - d) Fusion of tube nucleus with fusion nucleus and sperm with egg cell
- After fertilization in plants, the fruit develops from.
  - a) Ovule wall
  - ✓b) Ovary wall
  - c) Petals
  - d) Anther
- Which part of the female reproductive system receives egg cells from the ovary?
  - ✓a) Fallopian tube
  - b) Uterus
  - c) Vagina
  - d) Cervix
- Inside testes, the sperms are produced in.
  - a) Vas deferens
  - b) Sperm duct
  - ✓c) Seminiferous tubules
  - d) Collecting ducts
- Which of these cells has haploid number of chromosomes?
  - a) Spermatogonium
  - b) Primary spermatocyte
  - ✓c) Secondary spermatocyte
  - d) All of these

## Chapter 6

**Inheritance****Short Questions****Q.1 Define genetics.****Ans.** Genetics is the branch of biology in which we study inheritance.**Q.2 Define inheritance.****Ans.** Inheritance means the transmission of characteristics from parents to offspring.**Q.3 What are traits? (Lhr-2014)****Ans.** Characteristics which are transmitted from parents to offspring are called traits.**Q.4 What are genes? (Lhr-2014)****Ans.** The chromosomes carry the units of inheritance called the genes.**Q.5 What are nucleosomes?****Ans.** DNA wraps around histone proteins and forms round structures, called nucleosomes.**Q.6 What is transcription? (Fsd,Guj-2014)****Ans.** The specific sequence of DNA nucleotides is copied in the form of messenger RNA nucleotides. This process is called transcription.**Q.7 Define translation. (Fsd,Guj-2014)****Ans.** The mRNA carries the sequence of its nucleotides to ribosome. The ribosome reads this sequence and joins specific amino acids, according to it, to form protein. This step is known as translation.**Q.8 Define loci.****Ans.** The locations or positions of genes on chromosomes are known as loci.**Q.9 What are alleles?****Ans.** The alternate forms of a gene are called alleles.**Example:**

If an individual has Aa gene pair, 'A' and 'a' are the alleles of one another.

**Q.10 Define genotype. (Fsd,Lhr,Guj-2014)****Ans.** The specific combination of genes in an individual is known as genotype.**Q.11 Describe the types of genotype.****Ans.** There are two types of genotype.

i. Homozygous Genotype.

ii. Heterozygous Genotype.

**i. Homozygous Genotype:**

The genotype in which the gene pair contains two identical alleles, is called homozygous genotype.

**Example:** AA or aa.**ii. Heterozygous Genotype:**

The genotype in which the gene pair contains two different alleles, is called heterozygous genotype.

**Example:** Aa**Q.12 What is dominant allele?****Ans.** When in the heterozygous condition one allele masks or prevents the expression of the other, it is called the dominant allele.**Q.13 What is recessive allele?****Ans.** The allele which is not expressed is called recessive allele.**Q.14 Define phenotype. (Fsd,Guj-2014)****Ans.** The expression of the genotype in the form of trait is known as phenotype.**Q.15 Why Mendel select pea plant for his experiments? (Guj-2014)**

**Ans.** He gave following reasons for this selection.

- i. It has a number of different traits.
- ii. It has contrasting traits.
- iii. It is self-fertilizing, cross fertilizing is also possible.
- iv. It has a short but fast life cycle.

**Q.16 Define variation.**

**Ans.** Variation is a characteristic in an individual that differs from the typical characteristics of other individuals of same species.

**Q.17 Define evolution.**

**Ans.** Organic evolution is the change in the characteristics of a population or species of organisms over the course of generations.

**Q.18 What are the types of variations?**

**Ans.** There are two types of variations.

- i. Discontinuous Variations
- ii. Continuous Variations.

### (i) Discontinuous Variations

Discontinuous variations show distinct phenotypes. The phenotypes of such variations cannot be measured.

**Example:**

Blood groups are a good example of such variations.

### (ii) Continuous Variations

In continuous variations, the phenotypes show a complete range of measurements from one extreme to the other.

**Examples:**

- i. Heights
- ii. Weights

**Q.19 What is the theory of special creation?**

**Ans.** "The study of evolution determines the ancestry and relationships among different kinds of organisms. The anti-evolution ideas support that all living things had

been created in their current form only a few thousands years ago. It is known as theory of special creation".

**Q.20 Define artificial selection. (Lhr, Guj-2014)**

**Ans.** "Intentional breeding between individuals for certain traits or combination of traits".

**Example:** Numerous breeds of sheep, goat, cow, hen etc, has been produced by artificial selection.

**Q.21 What is natural selection? (Guj-2014)**

**Ans.** Natural selection is the process by which the better genetic variations become more common in successive generations of a population.

**Examples:**

- i. Selection of dark colored mouse.
- ii. Selection of dark colored moth.

**Q.22 What are breeds and cultivars?**

**Ans.** In artificial selection, the bred animals are known as breeds, while bred plants are known as cultivars.

## **Long Questions**

**Q.1 Describe the structure of chromatin.**

**Ans. Structure of chromatin:** Chromosome is made of chromatin material. Chromatin is a complex material. It is made of DNA and proteins. DNA wraps around histone proteins and forms round structures, called nucleosomes. DNA is also present between nucleosomes. In this way, the nucleosomes and the DNA between them look like "beads on a string". The fibers consisting of nucleosomes condense into compact forms and get the structure of chromosomes.

**Q.2 Describe Watson crick Models of DNA.**

**Ans. Watson Crick Model of DNA.**

- i. A DNA molecule consists of two polynucleotide strands.

- ii. These strands are coiled around each other in the form of a double helix.
- iii. Outside double helix, there is a phosphate-sugar.
- iv. Inside double helix, there are nitrogenous bases.
- v. The nitrogenous bases of opposite nucleotides from pairs through hydrogen bonds.
- vi. Adenine forms pair with thymine.
- vii. Cytosine forms pair with guanine.
- viii. There are two hydrogen bonds between adenine and thymine ( $A = T$ ).
- ix. There are three hydrogen bonds between cytosine and guanine ( $C \equiv G$ ).

**Q.3 Describe replication of DNA.**

**Ans. DNA replication.**

- i. The DNA double helix is unwound.
- ii. The two strands are separated.
- iii. Each strand acts as a template to produce another strand.
- iv. Its N bases make pairs with the N bases of new nucleotides.
- v. In this way, both template strands make new polynucleotide strands in front of them.
- vi. Each template and its new strand get together and form a new DNA double helix, identical to the original.

**Q.4 Describe Mendel's law of segregation.**

**Ans. Mendel's Law of segregation:** Mendel concluded that the traits under study were controlled by genes. In each organism, the genes are present in pairs. During gamete formation, the genes of each pair segregate from each other and each gamete receives one gene

from the pair. When the gametes of male and female parents unite, the resulting offspring again gets the genes in pairs. These conclusions were called the law of segregation.

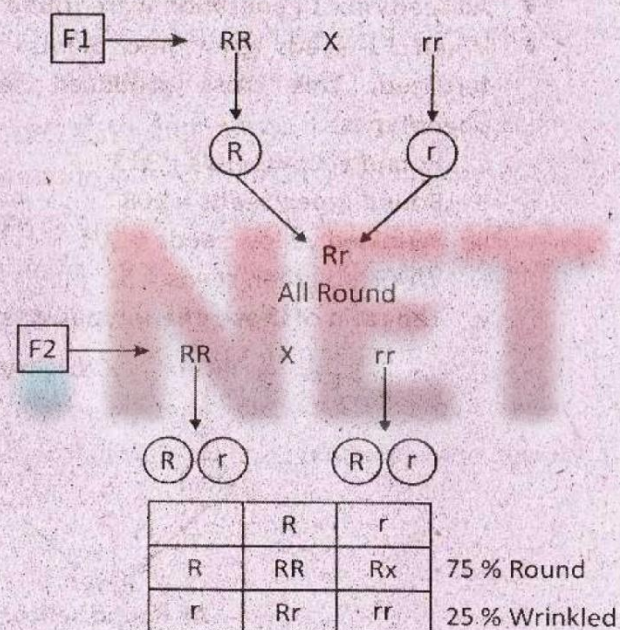
**Explanation:** Mendel crossed a true breeding round seeded plant with a true breeding wrinkled seeded plant.

- All seeds were round. The following year, Mendel planted these seeds and allowed the new plants to self-fertilize. As a result, he got 7324 seeds:

Round = 5474

Wrinkled = 1850

3round: 1 wrinkled.

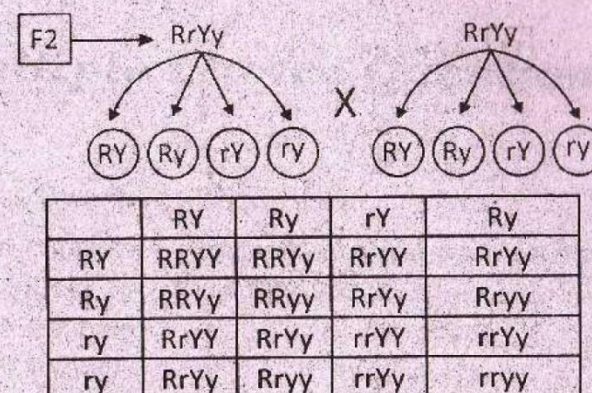
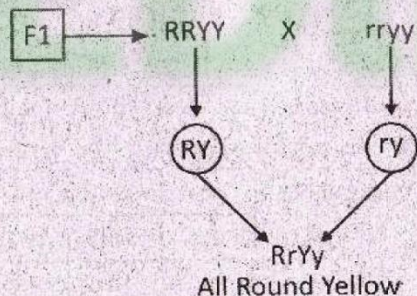


**Q.5 Describe Mendel's Law of independent Assortment. (Guj-2014)**

**Ans. Mendel's Law of independent Assortment.** It states as: "the alleles of a gene pair segregate independently from the alleles of other gene pairs".

**Explanation:** He performed experiments on two seed traits.

- Shape.
  - Colour
- The trait of round seeds was dominant over wrinkled.
  - Yellow seed colour was dominant over green.
- Mendel crossed a true breeding plant that had round yellow seeds with a true breeding plant having wrinkled green seeds.
- All seeds in F1 generation were round yellow.
  - When F1 seeds grew into plants, they were self-fertilized. This cross produced seeds with four phenotypes.
- Round yellow seeds = 315
  - Round green seeds = 108
  - Wrinkled yellow seeds = 101
  - Wrinkled green seeds = 32
  - The ratio of these phenotypes was 9:3:3:1



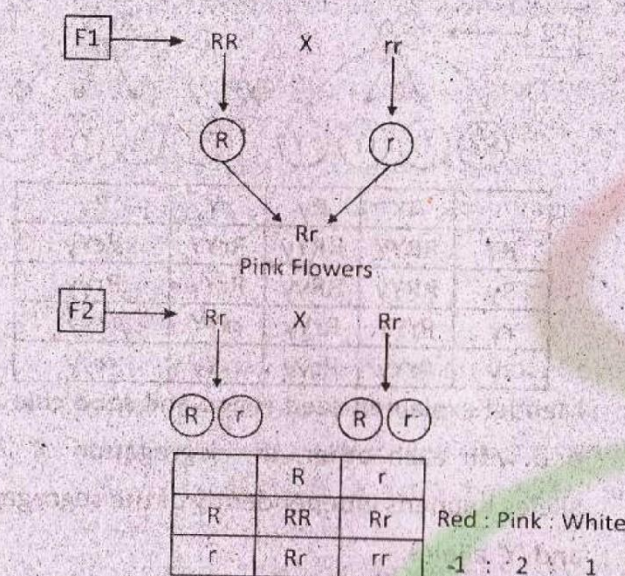
Mendel explained seed shape and seed colour are not tied with each other, the segregation of 'R' and 'r' alleles happens independently of the segregation of 'Y' and 'y' alleles.

**Q.6 Explain the phenomenon of incomplete dominance with the help of example.**

**Ans. Incomplete Dominance:** Incomplete dominance is the situation where, in heterozygous genotypes, both the alleles express as a blend and neither allele is dominant over the other. As a result of this blending, an intermediate phenotype is expressed.

**Example:** In four O clock plant.

- The true breeding plants RR have red flowers.
- The true breeding plants rr have white flowers.



**Q.7** What do you mean by co dominance give an example?

**Ans.** **Co-dominance:** Co-dominance is the situation where two different alleles of a gene pair express themselves completely, instead of showing a dominant recessive relationship. As a result, the heterozygous organism shows a phenotype that is different from both homozygous parents.

**Example:** An example of co-dominance is the expression of human blood group AB.

In blood group AB alleles  $I^A$  and  $I^B$  are co-dominant.

## Multiple Choice Questions

Put a (✓) on the correct answer.

- An organism's expressed physical trait, such as seed colour or pod shape, is called its.
  - Genotype
  - ☒ Phenotype
  - Karyotype
  - Physical type
- An organism has two different alleles for a single trait. Its genotype is said to be.
  - Homozygous
  - ☒ Heterozygous
  - Hemizygous
  - Homologous
- In the cross pollination between a true breeding yellow pod plant and a true breeding green pod plant, where green pod colour is dominant, the resulting offsprings (F1 generation) will be.
  - $\frac{1}{4}$  green,  $\frac{3}{4}$  yellow
  - All yellow
  - $\frac{1}{4}$  yellow,  $\frac{3}{4}$  green
  - ☒ All green
- How many genetically different kinds of gametes an individual with genotype  $AAbb$  can produce?
  - ☒ 1
  - 2
  - 4
  - 8
- Which of the following statements regarding genes is FALSE?
  - Genes are located on chromosomes
  - Genes consist of a long sequence of DNA
  - A gene contains information for the production of a protein
  - ☒ Each cell contains a single copy of every gene.

6. Mendel's primary contribution to our understanding of inheritance was.
- The idea that genes are found on chromosomes.
  - ✓ Explanation of the patterns of inheritance.
  - The discovery of alleles.
  - Determining that informations contained in DNA are for protein synthesis.
7. A purple flowered pea plant has the genotype PP. Which of the following statements about this plant is FALSE?
- ✓ a) Its phenotype will be white flowers.
  - b) It has a homozygous dominant genotype.
  - c) When bred to a white flowered plant, all offspring will be purple flowered.
  - d) All the gametes produced will have the same flower colour allele.
8. Charles Darwin proposed that organisms produce many more offspring than can possible survive on the limited amount of resources available to them. According to Darwin, the offspring that are most likely to survive are those that.
- a) Are born first and grow fastest
  - b) Are largest and most aggressive
  - c) Have no natural predators
  - ✓ d) Are best adapted to the environment

## Chapter 7

# Man and His Environment

## Short Questions

Q.1 What is an environment?

Ans. The surrounding of living organisms is called its environment.

Q.2 Define Ecology?

Ans. The study of interrelationship between organisms and their environment.

Q.3 Define species?

Ans. A species is a group of organisms which can interbreed freely in nature, to produce fertile offspring.

Q.4 What is population?

Ans. A group of organisms of same species of a specific area at a time.

Q.5 Define community?

Ans. All the populations that live in a habitat and interact with one on other.

Q.6 What is an ecosystem? (Lhr, Guj-2014)

Ans. The interaction between biotic community and abiotic components. It is unit of environment.

Q.7 Define biosphere? (Lhr-2014)

Ans. Biosphere is a thin layer surrounding the earth. It consists of all organisms.

Q.8 What is the range of biosphere?

Ans. It ranges from floor of oceans to tops of mountains. It is 20km thick.

**Q.9 Give example of natural ecosystem and artificial ecosystem?**

**Ans.** Natural ecosystem, lake, forest, ponds while Artificial ecosystem, aquarium.

**Q.10 Differentiate between biotic and abiotic components.**

**Ans.** All non-living components of environment are called abiotic components. All living components of environment are called biotic components.

**Q.11 What are the producers? Give example. (Lhr-2014)**

**Ans.** Producers are autotrophs. They synthesize organic compounds by photosynthesis. e.g. plants, algae and photosynthetic bacteria.

**Q.12 Define consumers? Give example.**

**Ans.** They are heterotrophs. They cannot synthesize their food and depend on plants. e.g. Animals, fungi.

**Q.13 Define primary consumers? Give example.**

**Ans.** They directly feed on herbivores. e.g. Fox and frog.

**Q.14 What are secondary consumer? Give example.**

**Ans.** They feed on primary consumers e.g. wolf, owl.

**Q.15 What are tertiary consumers? Give example.**

**Ans.** They feed on secondary consumers e.g. lion, tiger.

**Q.16 Define herbivores? Give example.**

**Ans.** They feed on plants or plants products. e.g. Grasshopper, cattle, deer.

**Q.17 What do you mean by omnivores. Give example.**

**Ans.** The consumers that feed on animal's flesh and plants. e.g. man, cat.

**Q.18 What are carnivores? Give example.**

**Ans.** The consumers that feed only on flesh of animals e.g. lion, tiger.

**Q.19 What are decomposers? Give example.**

**Ans.** The organisms that break down complex organic matter of dead animals and plants. e.g. Fungi and bacteria.

**Q.20 What do you mean trophic level?**

**Ans.** Trophic level is the level at which an organism feeds in food chain.

**Q.21 What is the direction of flow of energy in ecosystem?**

**Ans.** The flow of energy in different trophic level is unidirectional.

**Q.22 What is the primary source of energy for all ecosystems?**

**Ans.** The sun is primary source of energy.

**Q.23 How energy flow in an ecosystem?**

**Ans.** Energy flow in the form of food chain. Sun → producers → Herbivores → Carnivores → Decomposers.

**Q.24 Define flow of material in an ecosystem.**

**Ans.** Material flow in the ecosystem by means of food chain and food web.

**Q.25 Define food chain? (Lhr, Guj-2014)**

**Ans.** The series in which an organism eats the preceding one and is eaten by the next one.

**Q.26 Draw a simple food chain?**

**Ans.** Producers → Primary consumers → secondary consumers → tertiary consumers.

**Q.27 What is food web? (Guj-2014)**

**Ans.** A network of food chains which are interconnected at various trophic levels.

**Q.28 What is ecological pyramids? (Lhr-2014)**

**Ans.** A representation of the number of individuals or amount of biomass in various trophic levels of a food chain.

**Q.29 Define the term biomass.**

**Ans.** The total amount of living or organic matter in an ecosystem.

**Q.30 Who developed the concept of ecological pyramids?**

**Ans.** An English ecologist, Charles Elton in 1927.

**Q.31 What is pyramid of numbers?**

**Ans.** It is the graphical representation of the number of individuals per unit area at various trophic levels.

**Q.32 What is pyramid of Biomass?**

**Ans.** It is the graphic representation of biomass present per unit area at different trophic levels.

**Q.33 Define Biogeochemical cycle?**

**Ans.** The cyclic pathways through which materials move from environment to organisms and back to environment.

**Q.34 Define carbon cycle?**

**Ans.** The cyclic pathway in which carbon is returned to atmosphere as soon as it is removed.

**Q.35 What are the causes of upset of carbon cycle?**

**Ans.** Human activities such as deforestation and burning of fossil fuels are main causes of upset of carbon cycle.

**Q.36 Define atmospheric nitrogen fixation?**

**Ans.** Thunderstorms and lightning convert atmospheric gaseous nitrogen to oxides of nitrogen. The oxides of nitrogen dissolve in water and form nitrous acid and nitric acid then react with salt to produce 'nitrates'.

**Q.37 Define biological nitrogen fixation.**

**Ans.** Bacteria have the ability to transform gaseous nitrogen into nitrates.

**Q.38 Define industrial nitrogen fixation?**

**Ans.** Hydrogen is combined with atmospheric nitrogen under high temperature and pressure.

**Q.39 Define ammonification and nitrification.**

**Ans.** Ammonification is the breakdown of proteins of dead organisms and nitrogenous wastes to ammonia. Nitrification is the conversion of ammonia into nitrites and nitrates.

**Q.40 What is assimilation?**

**Ans.** The utilization of nitrates by organisms (plants) is called assimilation.

**Q.41 Define denitrification. (Guj-2014)**

**Ans.** A biological process in which nitrates and nitrites are reduced to nitrogen gas by denitrifying bacteria.

**Q.42 What are intraspecific and interspecific interaction?**

**Ans.** The interactions between members of same species are called intraspecific interactions. The interactions between members of different species are called interspecific interactions.

**Q.43 Define competition?**

**Ans.** In ecosystem, organisms compete for the utilization of natural resources i.e. nutrients food and space, this is called competition.

**Q.44 Define Predation. Give example.**

**Ans.** It is an interaction between two animals of two different species in which one organism feeds on other organism e.g. frog preys upon insects.

**Q.45 What is predator?**

**Ans.** An organism that attacks, kills and feeds on other organism is called predator.

**Q.46 What are carnivorous plants? Give example.**

**Ans.** The plants which feed on insects to fulfil their nitrogen requirements. e.g. pitcher plant, sundews, venus fly trap.

**Q.47 Define symbiosis? (Lhr-2014)**

**Ans.** It is a relationship between members of different species in which they live together for a period of time.

**Q.48 Define Parasitism? (Guj-2014)**

**Ans.** It is a type of symbiosis in which one smaller partner gets food and shelter from the body of host and in e.g. Mosquito, leech and in return harms it.

**Q.49 Define ectoparasite and endoparasite.**

**Ans.** Ectoparasite: live on the surface of host body and get food from them e.g. Mosquito.

Endoparasites: live inside the host body and get food from there. e.g. tapeworm plasmodium.

**Q.50 What is host?**

**Ans.** An organism on which a parasite live and feed e.g. Man is a host for mosquito.

**Q.51 Define Mutualism? Give example.**

**Ans.** It is a type of symbiosis in which both partners get benefit and neither is harmed e.g. Mutualism of termites and protozoan.

**Q.52 What is commensalism? Give example.**

**Ans.** It is a type of symbiosis in which one partner is benefited while the other is neither benefited nor harmed.

**Example:** Epiphytes plants.

**Q.53 Define Global warming? (Fsd-2014)**

**Ans.** The addition of green house gases increases the temperature of earth. This is called global warming.

**Q.54 What is IPCC?**

**Ans.** In 1990, the united nations established intergovernmental panel on climate change.

**Q.55 Write the effects of global warming.**

**Ans.** 1- Polar ice-caps and glaciers are melting faster.  
2- Sea levels is Expanding and rising.  
3- Floods increases.

**Q.56 Define the term green house effect. (Fsd-2014)**

**Ans.** It is the phenomenon in which CO<sub>2</sub> increase in atmosphere which act like the glass of greenhouse. It does not allow the inner heat to escape, thus increases the temperature of the earth.

**Q.57 Define acid rain.**

**Ans.** The rain that contain sulphuric acid and nitric acid. Its pH ranges from 3-6.

**Q.58 Write the effects of acid rain.**

**Ans.** 1- It damages the bark and leaves of trees.  
2- It destroys the nutrients of water, resulting death of aquatic life.  
3- It corrodes metallic surfaces.

**Q.59 What is deforestation?**

**Ans.** Deforestation means clearing of forests by natural causes or humans.

**Q.60 What are the effects of deforestation.**

**Ans.** It includes floods, Droughts, soil erosions, global warming and loss of habitat of many species.

**Q.61 Define over population?**

**Ans.** Increase in population beyond the carrying capacity of an area.

**Q.62 What is urbanization?**

**Ans.** Urbanization means growing of cities.

**Q.63 What are the effects of urbanization?**

**Ans.** The basic facilities like health education, shelter, water, electricity are very difficult to provide by Government.

**Q.64 Define pollution?**

**Ans.** Any undesirable change in the physical, chemical or biological characteristics of air, water or land that harmfully effect living organisms.

**Q.65 Define Air Pollution?**

**Ans.** It is defined as the change of composition of air by harmful substances.

**Q.66 Define pollutants?**

**Ans.** The substances that actually cause pollution are called pollutants.

**Q.67 What is noise?**

**Ans.** Unwanted, unpleasant and annoying Sounds are termed as noise.

**Q.68 What are the effects of air pollution?**

**Ans.** Global warming, smog formation, acid rain and ozone depletion are main effects of air pollution.

**Q.69 Define the effects of noise pollution?**

**Ans.** Hearing loss, depression and hypertension are the effects of noise pollution.

**Q.70 Define smog formation?**

**Ans.** Smog is formed when hydrocarbons and nitrogen oxides combine in the presence of sunlight.

**Q.71 Define acid rain?**

**Ans.** Sulphur dioxide and nitrogen oxides reacts with water and produce acid rains.

**Q.72 What is the function of ozone layer?**

**Ans.** Ozone layer absorbs ultraviolet rays of sun radiation.

**Q.73 Define ozone depletion.**

**Ans.** Air pollutants CFCs destroy the ozone molecules and break the ozone layer.

**Q.74 What are the effects of ozone depletion?**

**Ans.** The UV rays increase the temperature of earth and causes skin cancers.

**Q.75 Define Afforestation?**

**Ans.** It is the establishment of new forests by planting on non-forest areas.

**Q.76 Define water pollution?**

**Ans.** It is the change in composition of water by the addition of harmful substances.

**Q.77 What are the causes of water pollution?**

**Ans.** Sewage, domestic wastes and industrial wastes are main causes of water pollution.

**Q.78 What are the effects of water pollution?**

**Ans.** Polluted water reduce the growth and development of plants. Heavy metals cause cancer, arthritis and kidney diseases.

**Q.79 Define Eutrophication?**

**Ans.** Enrichment of water with inorganic nutrients is called eutrophication.

**Q.80 Define land pollution?**

**Ans.** Any type of wastes spreaded on the soil is termed as land pollution.

**Q.81 What do you mean by 3R.**

**Ans.** It is a principle to ensure sustainable use of natural resources. 3R include reduce, reuse and recycle of resources.

**Q.82 What is conservation?**

**Ans.** It means the use of natural resources i.e, food, petrol, water.

**Q.83 What is WWF?**

**Ans.** It is called as world wildlife fund for nature. It is working for conservation of nature.

**Q.84 What do you know about dengue fever?**

**Ans.** Dengue fever is a viral infection transmitted through mosquito edes aegypti.

**Q.85 What do you know about R1, R2 and R3.**

**Ans.** The R1 : Reduce : less use of natural resources

The R2 : Reuse : Use things again and again

The R3 : Recycle : Materials can be recycled.

**Q.86 What is R4?**

**Ans.** We can add the R4 i.e. Reforest. Trees should be planted.

## Long Question

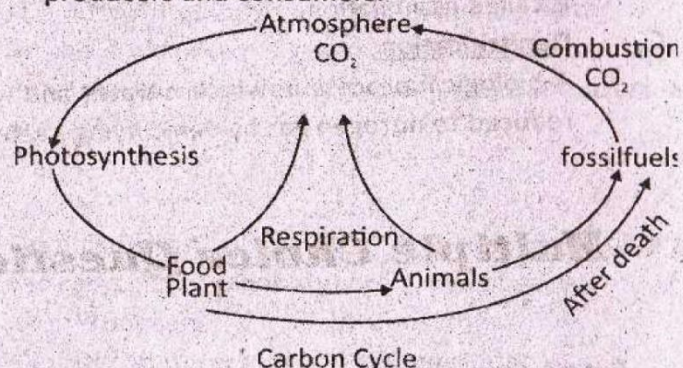
**Q.1 Write a note on carbon cycle.**

**Ans.** A cyclic pathway in which carbon is returned to atmosphere as soon as it is removed.

The major source of carbon is carbon dioxide in atmosphere. Carbon is also present in the form of fossil fuel. The burning of fossil fuels released  $\text{CO}_2$  in atmosphere. Plants used  $\text{CO}_2$  from atmosphere in photosynthesis and convert carbon into organic compounds.

This carbon enters in food chain and used by herbivores, carnivores, and decomposers.  $\text{CO}_2$  is

released back to environment by respiration of producers and consumers.



**Q.2 What are the different stages of Nitrogen cycle? (Fsd,Guj-2014)**

**Ans.** The flow of nitrogen between organisms and environment is called nitrogen cycle.

**A Formation of Nitrates.**

**i Nitrogen Fixation: (Lhr-2014)**

The conversion of nitrogen gas into nitrates is called nitrogen fixation.

**Atmospheric nitrogen fixation:** Thunderstorms and lightning convert atmospheric nitrogen into nitrates.

**Biological nitrogen fixation:** It is done by nitrogen fixing bacteria.

**ii. Ammonification and nitrification.**

The break down of dead organisms into ammonia is called ammonification. It is done by ammonifying bacteria. The conversion of ammonia into nitrates and nitrites is called nitrification. It is done by nitrifying bacteria.

**B Assimilation.**

The utilization of nitrates by plants for making protein is called assimilation.

**C Denitrification.**

A biological process in which nitrates and nitrites are reduced to nitrogen gas by denitrifying bacteria.

## Multiple Choice Question

Put a (✓) on the correct answer.

- Which of the following is the abiotic component of the ecosystem?
  - Producers
  - Herbivores
  - Carnivores
  - ✓d) Oxygen
- When we eat onions, our trophic level is.
  - ✓a) Primary consumer
  - Secondary consumer
  - Decomposer
  - Producer
- Identify the correctly matched pair.
  - Rainfall biotic factors in ecosystem
  - Global warming formation of fossil fuels
  - ✓c) Renewable natural resource air
  - Corn secondary consumer
- In the food chain tree → caterpillar → robin → hawk → coyote, which is the secondary consumer?
  - Caterpillar
  - Robin
  - ✓c) Hawk
  - Coyote

- In ecosystems, the flow of \_\_\_\_\_ is one way, while \_\_\_\_\_ is/are constantly recycled.
  - Minerals energy
  - Energy minerals
  - Oxygen energy
  - ✓d) Glucose water
- In the food chain "grass → rabbit → fox → bear → mushroom", how many types of decomposers are present?
  - ✓a) 1
  - b) 2
  - c) 3
  - d) 4
- Organisms in the ecosystem that are responsible for the recycling of plant and animal wastes are.
  - Producers
  - Consumers
  - ✓c) Decomposers
  - d) Competitors
- Which form of Nitrogen is taken by the producers of the ecosystem?
  - Nitrogen gas
  - Ammonia
  - Nitrites
  - ✓d) Nitrates

## Chapter 8

**Biotechnology**

## Short Questions

**Q.1 Define fermentation. (Guj-2014)**

**Ans.** Fermentation is the process in which there is incomplete oxidation reduction of glucose. In biotechnology the term fermentation means the production of only product by the mass culture of micro organisms.

**Q.2 What are the types of carbohydrate fermentation?**

**Ans.** Types of carbohydrate fermentation: It is of two types.

- i. Alcoholic fermentation.
- ii. Lactic acid fermentation.

**i. Alcoholic Fermentation:** This fermentation is carried out by many types of yeast such as saccharomyces cerevisiae. It is used to produce bread, beer, wine and distilled spirit.

**ii. Lactic Acid Fermentation:** In this process, pyruvic acid is reduced to lactic acid. It is carried out by many bacteria e.g. Streptococcus and many lactobacillus species. It is used for souring milk and also for production of various types of cheese.

**Q.3 Name any two industrial products made by fermentation. Also describe their uses in the industry.**

**Ans.** Products

Uses

- |                 |   |
|-----------------|---|
| i. Ethanol      | Used as solvent; used in the production of vinegar and beverages. |
| ii. Acrylic Aid | Used in the Production of plastics.                               |

**Q.4 What is genetic engineering?**

**Ans.** Genetic engineering or recombinant DNA technology involves the artificial synthesis, modification, removal, addition and repair of the genetic material.

**Q.5 What are the objectives of genetic engineering?**

**Ans.** The important objectives are.

- i. Isolation of a particular gene.
- ii. Production of particular RNA and protein molecules.
- iii. Production of varieties of plants.
- iv. Treatment of genetic defects in higher organisms.

**Q.6 Define recombinant DNA.**

**Ans.** The vector DNA and the attached gene of interest are collectively called recombinant DNA.

**Q.7 What is Genetically Modified Organism (GMO)?**

**Ans.** The organism in which DNA from some other organism has been transferred.

**Q.8 Define cloning.**

**Ans.** It is a method of asexual reproduction in which identical offsprings are produced from a vegetative tissue or cell of the parent.

**Q.9 What are transgenic organisms?**

**Ans.** The organisms with modified genome are called transgenic organisms.

**Q.10 Define vector.**

**Ans.** The DNA or bacteriophage etc. That transfers the isolated gene of interest to the host cell is called vector.

## Long Questions

**Q.1** Define biotechnology and describe its importance. (Lhr, Fsd, Guj-2014)

**Ans.** **Biotechnology:** Biotechnology is defined as the use of living organisms in processes for the manufacture of useful products or for services.

**Importance:**

The scope for biotechnology is so wide that it is difficult to recognize the limits. The following are some areas of the application of biotechnology.

i. **Biotechnology in the field of medicine:**

- Biotechnologists synthesized insulin and interferon.
- Biotechnologists produced a large number of vaccines and antibodies.
- Various enzymes are being synthesized.

ii. **Biotechnology in the Field of food and Agriculture:**

- Fermented foods, malted foods, various vitamins and dairy products are produced by using microorganisms.
- Wine and beer are produced in beverage industry.
- Transgenic plants are being developed.
- Transgenic goats, chickens, cows give more food and more milk.

iii. **Biotechnology and Environment:**

- Biotechnology is also being used for dealing with environmental issues.
- Bacterial enzymes are used to treat sewage water to purify.
- Microbes are being developed to be used as biopesticides, biofertilizers, biosensors etc.

- Transgenic microorganisms are also used for the recovery of metals, cleaning of spilled oils and for many other purposes.

**Q.2** Describe the applications of fermentation. (Guj-2014)

**Ans.** **Applications of Fermentation:** Foods and industrial products are obtained by using fermentation.

- **Fermented Foods:** The following groups are included in the fermented foods.
- **Cereal Products:** Bread is the most common type of fermented cereal product. Wheat dough is fermented by *S. cerevisiae* along with some lactic acid bacteria.
- **Dairy Products:** Cheese and yogurt are important fermentation products. Cheese is produced by lactic acid bacteria. Yogurt is made from milk by different lactic acid bacteria.
- **Fruit and Vegetable Products:** Fermentation is used to preserve pickle, fruits and vegetables.
- **Beverage Products:** Beer is produced by fermentation. Grapes can be directly fermented by yeasts to wine.
- **Industrial Products:** Formic acid, ethanol, glycerol and acrylic acid are produced by fermentation.

**Q.3** What is a fermenter? What are the two types of fermentation carried out in fermenters? (Lhr, -2014)

**Ans.** **Fermenter:** Fermenter is a device that provides optimum environment to microorganisms to grow into a biomass, so that they can interact with a substrate, forming the product.

**Types of Fermentation:**

- Batch fermentation.
- Continuous fermentation.

**i. Batch fermentation: (Guj-2014)**

The discontinuous fermentation process divided into batches.

**ii. Continuous fermentation: (Guj-2014)**

The fermentation in which substrate is added to the fermenter continuously, at a fixed rate.

**Q.4 Describe the objectives of genetic engineering.**

**Ans. Objectives of Genetic Engineering:**

- Isolation of a particular gene.
- Production of particular RNA.
- Production of particular protein molecules.
- Improvement in the production of enzymes and drugs.
- Production of varieties of plants having particular desirable characteristics.
- Treatment of genetic defects in higher organisms.

**Q.5 What basic steps a genetic engineer adopts during the manipulation of genes?**

**Ans. Basic Step in Genetic Engineering:** Following are the basic steps.

**i. Isolation of The Gene of Interest:** Gene of interest is cut from the total DNA of donor organism.

**ii. Insertion of the Gene into a Vector:** The gene of interest is attached with the vector DNA by using endonuclease and ligase.

**iii. Transfer of Recombinant DNA into host organism:** Recombinant DNA is transferred to the target host.

**iv. Growth of the GMO:** The GMO are provided suitable culture medium for growth to give as much copies of the gene of interest as needed.

**v. Expression of the gene:** The GMO contains the gene of interest and manufactures the desired product, which is isolated from culture medium.

**Q.6 Describe the achievements of genetic engineering in medicine, agriculture and environment.**

**Ans. Achievements of Genetic Engineering:** Various achievements of genetic engineering are as follows.

**i. Medicine:**

- GMO bacteria became able to synthesize insulin.
- E. coli bacterium is capable to synthesize the human growth hormone.
- Hormone thymosin is produced.
- Beta endorphin is produced.
- The enzyme urokinase is produced.
- Genetic engineering can also be used to cure blood diseases.

**ii. Agriculture and Environment:** Genetic engineers have developed plants that can fix nitrogen directly from the atmosphere. Such plants need less fertilizers.

**Q.7 What are single cell proteins? Describe their importance.**

**Ans. Single cell protein:** The protein content extracted from pure or mixed cultures of algae, yeasts, fungi or bacteria is called single cell protein.

**Importance:**

- The microorganisms grow very vigorously and produce a high yield of protein.
- Algae grown in ponds produce 20 tons of protein per year.
- Single cell proteins contain high vitamin content.
- In the production of single cell proteins, industrial wastes are used as raw materials for microorganisms.
- It helps in controlling pollution.
- Single cell proteins contain all essential amino acids.
- The production of single cell proteins is independent of seasonal variations.

## Multiple Choice Questions

Put a (✓) on the correct answer.

- Find the correct match for the fermentation product and the organism involved.
  - Formic acid *Saccharomyces*
  - ✓ b) Ethanol *Saccharomyces*
  - Ethanol *Aspergillums*
  - Glycerol *Aspergillums*
- Which one is NOT an objective of genetic engineering?
  - ✓ a) Production of cheese and yogurt by lactic acid bacteria
  - Isolation of a particular gene or part of a gene
  - Production of RNA and protein molecules
  - Correction of genetic defects in higher organisms
- Which of these is an anti viral protein?
  - Urokinase
  - Thyroxin
  - Insulin
  - ✓ d) Interferon
- The first step in genetic engineering is.
  - Growth of the genetically modified organism
  - Transfer of the Recombinant DNA into the host organism
  - ✓ c) Isolation of the gene of interest
  - d) Insertion of a gene into a vector

## Chapter 9

## Pharmacology

### Short Questions

**Q.1 Define pharmacology.**

**Ans.** Pharmacology is the study of drug composition, properties and medical applications. The sources of drugs are also studied in pharmacology.

**Q.2 Define drug. (Lhr-2014)**

**Ans.** Any substance that, when absorbed into the body of a living organism, alters normal body function is known as a drug.

**Q.3 Define pharmaceutical drug.**

**Ans.** A pharmaceutical drug is defined as any chemical substance used in the diagnosis, cure, treatment, or prevention of disease.

**Q.4 Define addictive drugs. (Guj-2014)**

**Ans.** Some drugs often make person dependent on them, or addicted. These may be called as addictive drugs.

**Q.5 What are analgesics?**

**Ans.** Analgesics reduce pain.

**Examples:** Aspirin, paracetamol.

**Q.6 What are antibiotics?**

**Ans.** Antibiotics inhibit or kill bacteria and treat bacterial infections.

**Examples:** Tetracycline, cephalosporin.

**Q.7 What are sedatives?**

**Ans.** Sedatives induce sedation by reducing irritability or excitement.

**Example:** Diazepam.

**Q.8 What are vaccines? (Lhr, Guj-2014)**

**Ans.** Vaccines are used to develop immunity against viral and bacterial infections.

**Example:** Vaccines against small pox, whooping cough, hepatitis B etc.

**Q.9 What is marijuana? To which category of addictive drugs, it belongs? (Guj-2014)**

**Ans.** **Marijuana:** marijuana is obtained from the flowers, stems, and leaves of the marijuana plant. Small doses of marijuana result in a feeling of well-being that lasts two to three hours.

**Category:** Marijuana is a hallucinogen, which is smoked.

**Q.10 Who discovered penicillin?**

**Ans.** Sir Alexander Flemming discovered the antibiotic penicillin from the fungus *penicillium notatum*.

## Long Questions

**Q.1 What are the sources of drugs? Give examples.**

**Ans.** **Sources of Drugs:** Drugs are obtained from the following sources.

**i. Synthetic Drugs:** Such drugs do not occur naturally but are synthesized in laboratory.

**Example:** Aspirin.

**ii. Drugs from plants and Fungi:** Many important medicines are obtained from plants and fungi.

**Examples:**

- The antibiotic penicillin comes from fungus.
- The digitalis is made from foxglove.

- The morphine is made from opium.

**iii. Drugs from animals:** Drugs obtained from animals are usually their glandular products.

**Examples:** Fish liver oils, musk, bees' wax etc.

**iv. Drugs from minerals:** Several common drugs are produced from minerals.

**Examples:** Tincture of iodine, powder form of silver nitrate.

**v. Drugs from Bacteria:** Many antibiotics are obtained from bacteria.

**Examples:** Streptomycin.

**Q.2 Write a note on sedatives, narcotics and hallucinogens. (Lhr-2014)**

**Ans.** **Sedatives:** These are addictive drugs. These drugs interact with central nervous system to depress its activities. Sedative drugs induce dizziness, lethargy, slow brain function and depression. Long term use of sedative induce suicidal thoughts.

**Narcotics:** These are addictive drugs. Narcotics are strong painkillers. These are used to relieve pain for patients with chronic diseases such as cancer. These are also used to relieve acute pain after operations. But some people may abuse narcotics for ecstatic effects.

**Examples:** Heroin, morphine, codeine.

**Hallucinogens:** These are addictive drugs. Hallucinogens are the drugs that cause changes in perception, thought, emotion and consciousness.

**Examples:** Marijuana.

**Q.3 Describe the main groups of antibiotics.**

**Ans.** **Antibiotics:** An antibiotic is a drug that kills or retards the growth of bacteria. They are the chemicals produced by or derived from microorganisms.

**Main Groups of Antibiotics:** There are three major groups of antibiotics.

- i. Cephalosporins.
- ii. Tetracyclines.
- iii. Sulpha drugs

**i. Cephalosporins:** Cephalosporins interfere with synthesis of bacterial cell wall and so are bactericidal. Cephalosporins are used to treat pneumonia, sore throat, tonsillitis, bronchitis etc.

**ii. Tetracycline:** These are broad spectrum bacteriostatic antibiotics. They inhibit bacterial protein synthesis. Tetracyclines are used in the treatment of infections of respiratory tract, urinary tract, intestine etc.

**iii. Sulpha Drugs:** Sulpha drugs are synthetic antibiotics that contain sulfonamide group. Sulfonamides are broad spectrum bacteriostatic antibiotics. They inhibit the folic acid synthesis in bacteria. They are used to treat pneumonia and urinary tract infections.

**Q.4 Write a note on resistance against antibiotics.**

**Ans. Antibiotic Resistance: (Guj-2014)**

Antibiotics are extremely important in medicine, but unfortunately bacteria are capable of developing resistance to them. Such bacteria are not affected by commonly used antibiotics.

**Ways of developing resistance:**

- Internal mechanism of bacteria stops the working of antibiotic.
- Bacteria transfer the genes responsible for antibiotic resistance.
- Use in diseases in which they have no efficacy.

**Serious and growing problem:**

- Some infectious diseases are becoming more difficult to treat.
- Some of the resistant bacteria can be treated with more powerful antibiotics.
- Some infections do not eliminate with new antibiotics.

**Q.5 Describe the mode of action of vaccines.**

**Ans. The Mode of Action of Vaccines:** When a vaccine that is weakened or dead pathogen is introduced into bloodstream, the white blood cells are stimulated. B lymphocytes recognize the weakened or dead pathogens as enemies and start producing antibodies against them. These antibodies remain in blood and provide protection against pathogens. If real pathogens enter blood, the already present antibodies kill them.

## Multiple Choice Questions

Put a (✓) on the correct answer.

1. Antibiotics are used for the.
  - a) Treatment of viral infections
  - ✓ b) Treatment of bacterial infections
  - c) Immunization against infections
  - d) Both 'a' and 'b'
2. The substances used for the treatment, cure, prevention or diagnosis of disease are called.
  - ✓ a) Medicinal drugs
  - b) Narcotics
  - c) Hallucinogens
  - d) Sedatives

3. **Aspirin is categorized as.**  
a) A drug from animals  
✓b) A synthetic drug  
c) A drug from plants  
d) A drug from minerals
4. **The drugs used to reduce pain are known as.**  
✓a) Analgesics                      b) Antiseptics  
c) Antibiotics                      d) Sedatives
5. **Which of the following drugs is obtained from plants?**  
a) Aspirin                      ✓b) Opium  
c) Cephalosporin                      d) Insulin
6. **Which of these addictive drugs are also used as painkillers?**  
a) Narcotics                      b) Sedatives  
c) Hallucinogens                      ✓d) All can be used.
7. **Sulfonamides affect bacteria in the following way.**  
a) Break the cell wall  
b) Inhibit protein synthesis  
c) Stop the synthesis of new cell wall  
✓d) Stop the synthesis of folic acid
8. **What is true about vaccines?**  
✓a) Protect against the future viral and bacterial infections  
b) Treat the existing bacterial infections only  
c) Treat existing infections and also protect against future infections  
d) Protect against viral infections only