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BIOLOGY



CLASS-X
2022-2023

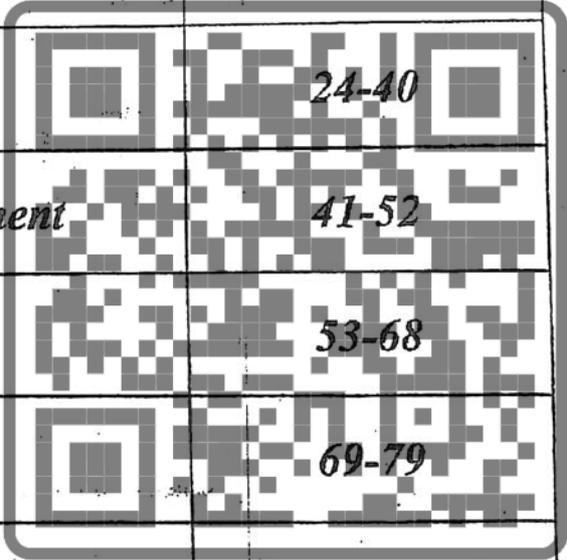


**KHANDO GOTH BLOCK-B NORTH NAZIMABAD NEAR PHELWAN HOTEL
(STANDARD HIGH SCHOOL, KARACHI)
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Chapter # 1

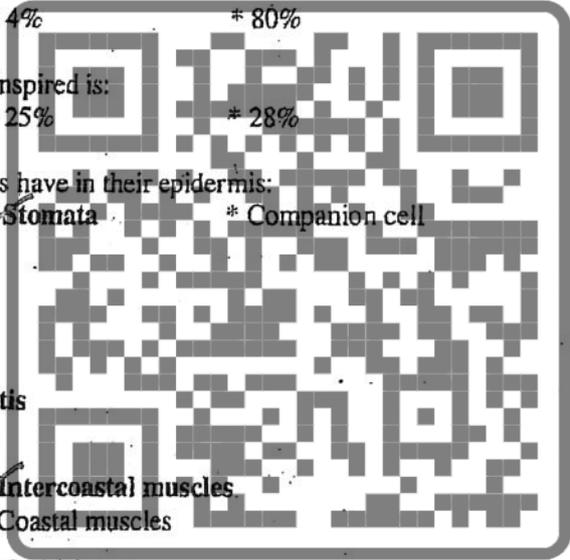
Gaseous Exchange

Multiple Choice Questions

- i. All living organisms must need to exchange oxygen and _____ gases to carry out their vital functions
 * Water Carbon dioxide * Sulphur dioxide * Carbon monoxide
- ii. Plants do carry out gaseous exchange for the process of _____
 * Excretion * Transpiration * Guttation Photosynthesis
- iii. During this process, carbon dioxide gas is taken in while oxygen gas released as by-product is given out.
 * Respiration Photosynthesis * Transpiration * None of these
- iv. Photosynthesis is _____ process.
 Anabolic * Catabolic * Both * None of these
- v. It is Catabolic process which do not require chlorophyll.
 * Photosynthesis Respiration * Excretion * Inspiration
- vi. Each stoma is formed by two special cells called _____
 * Nerve cell * Tissues Guard cells * Respiratory cell
- vii. The opening and closing of stomata depend upon _____ of the guard cells.
 * Size * Shape Turgidity * Presence of chlorophyll
- viii. The total surface area of the respiratory surface in human is about _____ times to the size of the body.
 20 * 30 * 40 * 50
- ix. Our respiratory system consists of paired _____ located inside the thoracic cavity.
 * Kidney Lungs * Eyes * None of these
- x. Each lung is soft, spongy and wrapped in two _____ membranes.
 * Tectonic * Thin Pleural * Neural
- xi. Diaphragm is a sheet present at _____ part of thorax, and separates it from abdominal cavity.
 * Upper * Right side * Left side lower
- xii. Each lung is made up of millions of sub units called _____
 * Villi alveoli * Trachea * Capillaries
- xiii. It is termed as sound box
 * Trachea * Bronchi * Oesophagus Larynx
- xiv. Lungs can be filled with a maximum amount of _____ of air.
 5 liters * 6 liters * 7 liters * 10 liters
- xv. A thick muscular layer beneath lungs is called;
 * Bladder Diaphragm * Kidney * Ureter

- xvi. A cough, mild wheezing, fever chills and shortness of breath are symptoms of:
 * Pneumonia ✓ * Bronchitis * Emphysema * Asthma
- xvii. No. of bronchi in the air passage way are:
 * 4 * 3 ✓ * 2 * 1
- xviii. Glottis is a narrow opening at the floor of:
 ✓ * Pharynx * Antibiotics * Nostril * Nasal cavity
- xix. In human which process occurs in alveoli?
 ✓ * Gaseous Exchange * Nutrition * Transport * Reproduction
- xx. C-Shaped cartilaginous rings are present in the wall of.
 * Alveoli * Bronchi ✓ * Trachea * Bronchioles
- xxi. Most of the gaseous exchange in a leaf occurs through:
 * Lenticels ✓ * Stomata * Cuticle * General surface
- xxii. Amount of nitrogen in expired air is:
 * 70% ✓ * 79% * 4% * 80%
- xxiii. The percentage of oxygen from air which we inspired is:
 ✓ * 21% * 15% * 25% * 28%
- xxiv. For gaseous exchange the leaf and young stems have in their epidermis:
 * Guard cells * Lenticels ✓ * Stomata * Companion cell
- xxv. The correct list of respiratory disorders is;
 * Asthma, blood, cancer, emphysema, cholera
 * Asthma, pneumonia, haemophilia, typhoid,
 * Asthma, cholera, emphysema, malaria
 ✓ * Asthma, emphysema, pneumonia, bronchitis
- xxvi. The muscles of ribs are called;
 * Cardiac muscles ✓ * Intercoastal muscles
 * Smooth muscles * Coastal muscles
- xxvii. Rate of breathing depends upon concentration of which gas:
 * Hydrogen * Oxygen ✓ * Carbon dioxide * Nitrogen
- xxviii. In which of the following gaseous exchange occur through stomata?
 * The aquatic plants * Wood stems and nature roots.
 * The leaves and young stems ✓ * Young roots
- xxix. The inflammation of bronchi or bronchioles is called:
 * Chest box * Emphysema ✓ * Bronchitis * Pneumonia
- xxx. In man the correct passage of air is:
 * nostrils, nasal cavity, larynx, pharynx, trachea, bronchioles, alveolar, duct alveoli,
 * nasal cavity, nostrils, larynx, pharynx, alveoli, trachea bronchi, bronchioles, alveolar duct,
 ✓ * nostrils, nasal cavity, Pharynx, larynx, bronchi, trachea, bronchioles, alveolar duct,
 alveoli
 * nostrils, nasal, cavity, pharynx, trachea, larynx, bronchi, bronchioles alveolar, duct, alveoli

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Gaseous Exchange

Short Questions with Answers.

Q.1: Define gaseous exchange.

Gaseous exchange

The gas exchange in organisms takes place by the process of diffusion. Efficient gas exchange depends upon following factors:

- Maintenance of diffusion gradient.
- Large surface area in relation to the volume of organism, and
- Presence of moist membrane or respiratory surface for exchange of gases.

Q.2: Which organisms proceed the process of gaseous exchange?

All living organisms must need to exchange oxygen and carbon dioxide gases with their environment to carry out their vital functions such as respiration. In addition to respiration, photoautotrophs like plants do carry out gaseous exchange for the process of photosynthesis.

Q.3: What do you know about gaseous exchange in plants?

Gaseous Exchange in Plants

Plants exchange gases for the processes of photosynthesis and respiration.

Photosynthesis

During daytime, green parts of the plants carry out the process of Photosynthesis to prepare complex food molecules (organic molecules) by utilizing simple molecules such as carbon dioxide gas and water. During this process, oxygen gas released as by-product is given out.

Respiration

Respiration takes place in all living cells. It is the process in which food is oxidized to release energy. In aerobic respiration, it involves taking in of oxygen and given out of carbon dioxide.

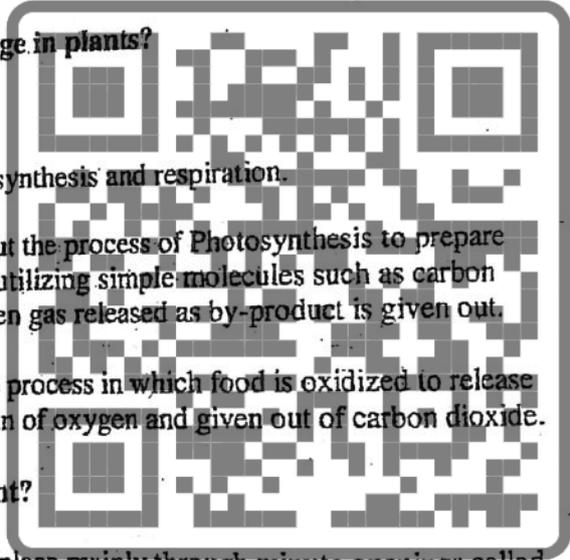
Q.4: How gaseous exchange takes place in plant?

The process of exchange of gases in plants takes place mainly through minute openings called stomata present in leaves. The roots and stem do exchange gases for respiration.

- Each of the stomata is surrounded by two guard cells, and these cells contain chloroplasts.
- Chloroplast contain chlorophyll with thicker inner while thinner and elastic outer cell walls.
- The opening and closing of stomata depend upon turgidity of the guard cells.
- During daytime, as a result of ongoing process of photosynthesis, photosynthetic solutes cause increase in turgidity of the guard cells. Thus, stomata are opened and the process of taking in of carbon dioxide and giving out of oxygen begins until it becomes dark.

Q.5: Why the stomata generally open during day-time?

During daytime, (as a result of ongoing process of photosynthesis, photosynthetic solutes causes increase in turgidity of the guard cells. Thus stomata are opened and the process of taking in of carbon dioxide and giving out of oxygen begins until it becomes dark.



Q.6: Which parts of the plant intake CO₂ and give out O₂, take in O₂ oxygen and give out CO₂ during day-time?

Stomata

Q.7: Write differences between respiration and photosynthesis?

Respiration	Photosynthesis
Occurs in all living organisms.	Occurs only in phototrophs (all green plants, algae and some bacteria).
The entire process occurs in Mitochondria.	The entire process occurs in Chloroplasts.
Glucose and oxygen are the reactants of this process.	Carbon dioxide, water and light energy are the reactants of this process.
Carbon dioxide, water, and energy (ATP) are the by-products.	Glucose, oxygen and water are the by-products.
Undergoes Catabolic Process.	Undergoes Anabolic Process.
Oxygen is taken in and carbon dioxide is liberated out.	Producing food and capturing energy.
In this process, food particles are broken down to release energy.	In this process, food is synthesized by capturing energy.
It is an exergonic reaction as energy is released.	It is an endothermic reaction as it requires energy.
This process does not require sunlight since cellular respiration occurs all the time.	This process requires sunlight since photosynthesis occurs only in the presence of sunlight.
The chemical reaction of cellular Respiration is $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$	The chemical reaction of photosynthesis is $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

Q.8: What do you know about gaseous exchange in plants?

Gaseous exchange in animals

Like plants, animals do exchange gases with their environment for the respiration process. In order to obtain energy from food, they take in oxygen and give out carbon dioxide continuously through their moist, respiratory surfaces.

Respiratory gases move across moist, respiratory surfaces by diffusion.

The respiratory gases are passed across the respiratory surface by dissolving in water. Moreover, respiratory surfaces must be large enough in relation to the volume of that animal for efficient gas exchange.

Q.9: What are the respiratory medium of different organisms?

The respiratory medium

Unicellular organisms: In unicellular organisms like Protozoa, the plasma membrane serves as the respiratory surface.

Multicellular organisms: In multicellular animals, their body surface or some internal surface could serve as the respiratory surface.

Aquatic animals: The respiratory medium for aquatic animals is water. The amount of molecular oxygen present in water is about 5%.

Terrestrial animals: The respiratory medium for Terrestrial animals is air. The amount of molecular oxygen present in air is about 21%.

Q.10: What are the main properties of respiratory surfaces?

Properties of Respiratory Surfaces:

Respiratory surface in animals depends upon the structure, habitat and activity of animal.

Respiratory surface of animal's bear following properties:

- Permeable
- Large Surface Area In Relation To Volume
- Wet
- Thin.

In unicellular organisms, gas exchange occurs over the entire surface area

Q.10: Why do we have to breathe through nostrils rather than oral cavity?

Because Atmospheric air enters into these ducts through a pair of openings called external nostrils, which lead separately into nasal cavity. It is lined internally by mucous secreting cells. Hairs are also present in nasal cavity which filtered out of dust particles and microorganisms.

Q: Why do we deep breathe during or immediately after exercise?

When you exercise and your muscles work harder, your body uses more oxygen and produces more carbon dioxide. To cope with this extra demand, your breathing has to increase.

Q: What is "oxygen debt"?

The breaking down of lactic acid requires additional amount of oxygen which is termed as "oxygen debt". The extra amount of oxygen is obtained through deep breathes.

Q: Name animals which use their body surface for gaseous exchange.

Hydra, Sponges, flatworms, frog

Q: Why smoking is dangerous? How it is related with respiratory disorders?

Smoking can cause lung disease by damaging your airways and the small air sacs (alveoli) found in your lungs.

Lung diseases caused by smoking include COPD, which includes emphysema and chronic bronchitis

Cigarette smoking causes most cases of lung cancer

Extended Response Questions with Answers

Q.11: What measures would you take to avoid respiratory disorders?

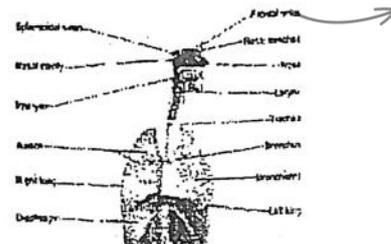
- Don't Smoke. ...
- Avoid Exposure to Indoor Pollutants That Can Damage Your Lungs. ...
- Minimize Exposure to Outdoor Air Pollution. ...
- Prevent Infection. ...
- Get Regular Check-ups. ...
- Exercise.

Q.12: Discuss human respiratory system with the help of suitable illustrations.

Respiratory System of Man

In human, the process of respiration involves breathing, gaseous exchange and cellular respiration. The respiratory system of man consists of paired lungs and the air passage ways.

Paired lungs of man are situated in the thoracic cavity.



The Respiratory System

The thoracic cavity is separated from the abdomen by a muscular partition called diaphragm
Air Passage ways:

Air is drawn into the lungs by inter-connected system of branching ducts..

Nasal cavity:

- Atmospheric air enters into these ducts through a pair of openings called external nostrils, which lead separately into nasal cavity. It is lined internally by mucous secreting cells.
- Hairs are also present in nasal cavity which filtered out of dust particles.
- The air then leads through the internal nostrils into the pharynx.

Pharynx:

Pharynx leads air into larynx through an opening called glottis.

Glottis:

Glottis is guarded by a flap of tissue called epiglottis. During swallowing food or drink, the epiglottis closes the glottis to prevent any food to enter into the trachea.

Larynx:

Larynx or sound box is a small chamber. It consists of a pair of vocal cords for producing sound.

Trachea:

The internal opening of nasal sacs opens into a long tube, Trachea. Its internal lining is ciliated and bears mucus to avoid dust and germs.

Bronchi:

At its lower end, trachea divides into two smaller branches called bronchi. Each bronchus leads the air into lung of its side.

Bronchioles:

Inside each lung, each bronchus progressively divides into very fine branches called bronchioles.

Lungs:

Lungs are paired, soft, spongy, and highly vascularized structures..

- Each lung is soft, spongy and pinkish in appearance.
- Each lung is enclosed by two, thin membranes known as pleural membranes.
- Each lung is made up of millions of alveoli.

Alveoli:

The alveoli are considered as the respiratory surfaces of lung. Each alveolus is surrounded by extensive network of blood capillaries. It is the site of exchange of respiratory gases.

Process of Breathing:

In order to perform exchange of gases, the air must first be brought into the lungs from the atmosphere. It is achieved through the process of breathing or Ventilation. The process of breathing consists of two phases, viz., Inspiration and expiration.

Inspiration:

It is the process through which atmospheric air is directed through the air passage ways up to the alveoli in the lungs.

Expiration:

It is just reverse of inspiration. During this process the air moves out from the lungs. Both, intercostal muscles and diaphragm are relaxed.



Q.13: Explain the process of ventilation in man.

Ventilation:

In order to perform exchange of gases, the air must first be brought into the lungs from the atmosphere. It is achieved through the process of breathing or Ventilation. The process of breathing consists of two phases, viz., Inspiration and expiration.

Inspiration:

It is the process through which atmospheric air is directed through the air passage ways up to the alveoli in the lungs. It involves contraction of intercostal muscles and diaphragm.

Expiration:

It is just reverse of inspiration. During this process the air moves out from the lungs. Both, intercostal muscles and diaphragm are relaxed.

Q.14: Write short note on Gaseous Exchange in Alveoli.

Gaseous Exchange in Alveoli:

The gaseous exchange takes place at the level of alveoli. Oxygen brought in by air is taken up by the hemoglobin of RBCs of blood and vice versa the carbon dioxide brought by the blood is given out to the air present in alveoli. This gaseous exchange involves diffusion which becomes possible at this level because both alveolus and blood capillaries, are only one cell layered in thickness. It has been estimated that both lungs contain about 700 million alveoli with a surface area equal to that of tennis court or 20 times the body's entire skin surface.

Q.15: What are respiratory disorders? Write their cause and symptoms.

Respiratory Disorders:

Bronchitis:

Cause: The inflammation of the air passage ways is termed as Bronchitis. It is caused either by smoking or by some bacteria.

Symptoms: It is characterized by cough, increased mucous secretion, shortness of breath and low fever.

Emphysema:

Cause: It is related to the progressive destruction to the alveoli due to long term exposure usually to the industrial pollutants.

Symptoms: It is characterized by laborious breathing. It causes cough with phlegm production.

Pneumonia:

Cause: It is an infectious disease usually caused by special bacteria, viruses or fungi. In pneumonia, the alveoli are infected so they may be filled with fluid or pus.

Symptoms: The breathing becomes difficult. The patient suffers from fever, cough, chill and chest pain.

Asthma:

Cause: It is an inflammatory condition of air-ways of lungs. Asthma is actually an allergic response to pollens, dust, smoke, fur, feathers and number of other substances.

Symptoms: It is characterized by shortness of breath, chest pain, fever, wheezing sound during expiration and cough.

It may obstruct the air-ways making it difficult to breath for its patient.

Lung Cancer:

Cause: it is associated with smoking. Due to smoke or air pollution, abnormal cells appear in lungs which may spread to other tissues.

Symptoms: The major signs and symptoms are cough with blood, shortness of breath, repeated lung infections, weight loss, bone ache, hoarseness, weakness, fatigue, etc.



Solved Exercise from Book:
Multiple Choice Questions

Choose the correct answer

- i. The biological functions which perform gaseous exchange:
 * Photosynthesis * Respiration * Both a & b * Growth
- ii. Plants do exchange of gases through:
 * Roots * Stomata * Stem * All of these
- iii. Each stoma is formed by:
 * one guard cell * two guard cells * three guard cells * four guard cells
- iv. Respiratory surface possesses following property:
 * thin and wet * permeable * very large * all of these
- v. Inspiration involves:
 * Contraction of intercostals muscles * contraction of diaphragm
 * Inward movement of ribs * Both a & b
- vi. Larynx is located on:
 * Lungs * Trachea * Bronchus * Bronchiole
- vii. The respiratory surface of human is:
 * Nostril * Bronchiole * Alveoli * Trachea
- viii. Increase in rate of breathing is due to the following:
 * increase CO₂ in blood * Increase O₂ in blood
 * decrease CO₂ in blood * decrease O₂ in blood
- ix. Which of the following disorder is associated with degeneration of alveoli?
 * Bronchitis * Lung cancer * Asthma * Emphysema
- x. Which of the following disorder is associated with inflammation of air passage ways?
 * Bronchitis * Lung cancer * Asthma * Emphysema



Chapter # 2 Homeostasis

Multiple Choice Questions

- i. Rubber plant secretes.
 Latex * Rubber * Resin * Mucilage
- ii. The process of guttation occurs only at _____
 * Day time Night * Whole day * In the evening
- iii. Human Urinary system consists of.
 All of these * Kidneys * Ureter * Urinary bladder
- iv. The waste products secreted by kidneys contains.
 * Salts, water and carbon dioxide * Urea and salts
 Urea, water and salts
- v. By drinking plenty of water how many stones can be avoided?
 * 20% 90% * 30% * 50%
- vi. The U-shaped part of renal tubule is called:
 * renal pelvis * bowman capsule * glomerulus Loop of Henle
- vii. During peritoneal dialysis, the waste materials move from:
 * The abdomen to the dialysis fluid * The dialysis fluid to the peritoneum blood vessels.
 The dialysis fluid to the abdomen The peritoneum blood vessels to the dialysis fluid
- viii. The plant which have broad leaves.
 Halophytes * Xerophytes Hydrophytes * Bryophytes
- ix. In an adult man the average urine formation in a day is:
 * 3 litre * 4 litre 1.4 litre * 1.3 litre
- x. The name of tube between kidney and urinary bladder is.
 * Urethra Ureter * Nephron * Renal tubula
- xi. The loss of water in the form drops from tips of leaf is called.
 Guttation * Excretion * Transpiration * Evaporation
- xii. The longitudinal section of kidney shows the outer part.
 * renal Pelvis * Renal medulla Renal cortex * Renal Pyramids
- xiii. Maintenance of balance in the amounts of water minerals, temperature and glucose in body is called.
 * Reabsorption Homeostasis * Excretion * Tubular secretion
- xiv. The maintenance of internal body temperature is called.
 * Guttation * Osmoregulation * Excretion Thermoregulation
- xv. Which organ filter the blood.
 Kidney * Intestine * Brain * Stomach
- xvi. Resins are removed by plants:
 * Keekar * Grasses * Lady finger Conifers
- xvii. Cacti are example of:
 Xerophytes * Halophytes * Hydrophytes * None of these

Homeostasis

Short Questions with Answers

Q.1: Define term homeostasis.

Homeostasis

The maintenance of a constant internal environment by a living organism is called homeostasis. Homeostasis means "Steady state" or "Staying similar". According to Claude Bernard that living organisms face two environments.

Q.2: What are the aspects of homeostasis? Define them.

Various Aspects of Homeostasis

There are three aspects of homeostasis.

Osmoregulation:

The maintenance of internal water and salt conditions by Osmosis between the organism and its environment is called osmoregulation.

Excretion:

The removal of harmful wastes substances from the living body is called excretion.

Thermoregulation:

The maintenance of internal body temperature within a tolerable range is called thermoregulation.

Q.3: Why homeostasis is necessary for living organisms?

Important of homeostasis:

- Homeostasis helps an organism to survive and utilize its environment in best possible way.
- Homeostasis helps the organisms to protect its internal environment from the harmful effects of fluctuations in the external environment. iii. The organism adjust themselves according to the external environmental changes.
- Living organism have been evolved and adapted according to the environment in which they live

Q.4: How organism maintain internal environment?

Organisms maintain internal condition by feedback mechanism.

Q.5: What do you know about excretion in plants?

Excretion in Plants

The removal of harmful wastes substances from the living body is called excretion.

There is no proper excretory system in plants like animals. plants use different mechanism for removal of their waste products

Waste Products: The main waste products produce in plants are: carbon dioxide and oxygen, water. Nitrogenous wastes.

Removal of CO₂ and O₂:

CO₂ is the waste product produce in respiration. Oxygen is the byproduct of photosynthesis. Plants remove these gases through stornata or whole-body surface. Carbon dioxide is released at night and oxygen in the daytime.

Removal of water:

Water in excess to the need of plant body is also considered as waste product extra water is removed from plant transpiration and guttation.

Q.6: How plant remove the extra water? Define excretion in plants.

Removal of water:

Water in excess to the need of plant body is also considered as waste product extra water is removed from plant transpiration and guttation.

(a) Transpiration

Transpiration is the removal of water in the form of vapours from aerial part of plant. It occurs only at day time.

(b) Guttation

Guttation is the removal of water in the form of liquid from the margin of leaves through special pores, hydathodes. It only occurs at night when water pressure is high in leaves and low temperature environment is present.

Q.7: What are the secondary products of plants?

Plants produce some secondary products like latex, resin and gum.

- These secondary products are insoluble, harmless compounds.
- Some plants produce special types of gums for example Neem or keekar etc.
- The extra amount of these is removed from special pores called lenticels.
- The coniferous plants produce resins like material while the rubber plants produce latex which remove from scars like openings.

Some of these carnivorous plants and okra produce mucilaginous material to capture insects.

Q.8: What do you know about osmoregulation in animals?

Osmoregulation in Animals

Animals also live in aquatic and terrestrial habitat.

According to their environment their cells require more critical balance of water and solutes. Water continuously leaves and enters the cells with solutes to keep the water and solute in constant quantity which are required for smooth metabolic functions.

Q.9: How organism maintain osmoregulation in terrestrial environment?

Osmoregulation in terrestrial condition

Terrestrial conditions are harsh for living organism because the direct contact of heat to body causes loss of water which leads to dehydration. Only arthropods, some molluscs reptiles, birds and mammals can survive in this habitat

because:

- Their bodies are covered by exoskeleton or thick skin, which prevent loss of water.
- They conserve water by reabsorption in kidneys and rectum.
- Some of them can produce water from fats catabolism with the help of peroxysomes i.e. camel, kangaroos.
- Continuously drinking of water or using liquid food.



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Q.10: Define excretion.

Excretion:

Process of removal of toxic compound and waste from body is called excretion. These toxic compounds are mainly NH or urea or uric acid are generally called nitrogenous waste. If these compounds retain in the body and accumulate, they can damage the cells or organs therefore they must be removed from the body

Q.11: Write main groups of plants according to water availability?

Types of plants:

Plants can be differentiated into the following three main groups on the basis of availability of water.

- i. Hydrophytes
- ii. Mesophytes
- iii. Xerophyte
- iv. Hydrophytes:

Q.12: What do you know about process of homeostasis in man?

Homeostasis In Man

Humans have well developed homeostasis systems. The main organs which involved in homeostasis are

- i. Skin
- ii. Lungs
- iii. Kidneys

Skin:

The skin is considered as the largest organ of the body, basically functions as a protective organ as the first line of defense but it also works efficiently as a homeostatic organ by maintaining temperature, water and salt.

Lungs:

They maintain levels of O₂ and CO₂ in the blood, body fluid and cells. Maintain rate of respiration and continuous flow of energy.

Kidneys:

Kidneys are called filters of the body fluids; they maintain internal water by removing excessive water by excreting them through urine.

Q.13: What are the various method used for removal of kidney stones?

Method for removal of kidney stones:

Various methods for the removal of kidney stones are given below:

- i. Medicines
- ii. Lithotripsy
- iii. Surgery

Q.14: How plant survive in saltish water?

- Plants develop salt glands where plant store salts by taking it through active transport.
- Plants oppose salt to move outside from vacuole.
- Some salt accumulated at surface of leaf which attracts water from air

Q.15: When dialysis is required?

A person with kidney failure needs dialysis or a kidney transplant to survive. dialysis machine performs the function of a kidney. It helps to clean the patient's blood from metabolic waste products and toxics.

Q.16: Why filtration at Para tabular capillaries called ultra-filtration?

The process of glomerular filtration is known as ultrafiltration because blood is filtered very finely through all the membranes such that all the components of the blood plasma are passed on except proteins.

Q.17: Write functions of nephron in kidney.**Functioning of Nephron**

- i. **Filtration:** Filtration of blood takes place in Bowman's capsule from the capillaries of glomerulus. This filtrate contains glucose, amino acids, urea, uric acid, salts and a major amount of water.
- ii. **Re-absorption:** As the filtrate flows along the tubule useful substances such as glucose, amino acids, salts and water are selectively re-absorbed into the blood by capillaries surrounding the nephron tubule.
- iii. **Urine formation:** The filtrate which remains after re-absorption is called urine. Urine contains dissolved nitrogenous waste, i.e., urea and uric acid, excess salts and water. Urine is collected from nephrons by the collecting duct to carry it to the ureter.

Extended Response Questions with Answers**Q.18: How many types of plants are there on the basis of water and salt requirement? Write their characteristic features?**

The plants grow in different conditions of water and salts, on the basis of water and salt quantity there are four types of plants

- a) Hydrophytes
- b) Halophytes
- c) Mesophytes
- d) Xerophytes

(a) Hydrophytes (hydro = water; phyta = plants)

- Those plants which grow in or near water are called hydrophytes.
- Plant body is either completely found in water or partially submerged.
- Roots are either absent or poorly developed. Water is absorbed throughout their body surface.
- Leaves have large surface area and numerous stomata on the upper surface.
- They remove extra water by excessive transpiration
- Examples are Hydrilla, Lotus and lily.

(b) Halophytes (Halos= salt)

- Those plants which grow in salty soil are called halophytes.
- Halophytes are salt tolerator plants. Their leaves contain water storage cells.
- Plants develop salt glands where plant store salts by taking it through active transport.
- Leaves have thick cuticle which prevent transpiration.
- They mostly grow on seashores forming special type of vegetation called mangrove.
- Example: Salsola, Rhizophora etc.

Mesophytes:

- Those plants which grow in places which are neither very wet nor very dry are called Mesophytes.
- They have well developed roots.
- Leaves are dark green and contain abundance chloroplast.
- Stomata are present on the lower surface of leaves.
- Their body is covered by cuticle to prevent loss of water
- Examples: Rose, Brassica, Citrus, etc.

Xerophytes:

- Those plants which grow in dry hot and sandy place are called xerophyte.
- They are also called desert plants. Such habitat contains very less amount of water.
- These plants have long and deep roots to absorb underground water.
- Stem and leaves are covered by cuticle which reduce transpiration.
- Stem also contain water storage tissues.
- In some plants leaves are modified into spines to reduce transpiration.
- Example Optunia, Ziziphus, cacti etc.

Q.19: How organism maintain osmoregulation in aquatic environment?

Osmoregulation in aquatic environment

The aquatic conditions are classified on the basis of the concentration of salt present in it. The water which contains very low amount of salt called fresh water and the water contains high salt called marine water.

Osmoregulation in fresh water

- Freshwater fishes are hypertonic to their surrounding environment, which means that the concentration of salt is higher in their blood than their surrounding water.
- They absorb a controlled amount of water through the mouth and the gill.
- Due to this intake of water, they produce large quantities of urine through which a lot of salt is lost.
- The salt is replaced with the help of mitochondria-rich cells in the gills.
- These cells absorb salt into the blood from the surrounding water.

Osmoregulation in marine animals

- Marine fish face the opposite problem. They have a higher concentration of water in their blood than their surrounding environment.
- Consequently, it results in the tendency to lose water and absorb the salt.
- To get around this problem, marine fish drink large quantities of water and restrict urination. These organisms actively need to expel salt from the body (through the gills)

Q.20: Explain structure of skin with their function.

Structure Of Skin

It provides a protective covering throughout our body and acts as the body's initial barrier against external harmful substances or foreign particles.

The hair is made up of a protein called keratin, and the same protein is found in hooves, horns, claws and nails of other animals too.

The structure of the skin is made up of three layers of, namely:

- Epidermis
- Dermis
- Hypodermis

Epidermis

- It is the outermost layer of the skin. The cells in this layer are called keratinocytes.
- The keratinocytes are composed of a protein called keratin.
- Keratin strengthens the skin and makes it waterproof.
- This layer does not contain blood vessels.
- Types of Epidermal Cells

There are three main cell types in the epidermis:

- Melanocytes
- Keratinocytes
- Langerhans

Dermis

- Beneath the epidermis is the dermis layer.
- Dermis synthesizes Vitamin D to absorb calcium on exposure to sunlight.
- It consists of blood vessels which supply blood for the formation of new cells.
- Nerves ending receptors to detect temperature change, pain, pressure etc.
- The dermis also contains sweat glands which secrete sweat on the surface to maintain temperature and also secrete urea, water and salt.

Hypodermis

- This subcutaneous layer is made up of fat and forms the innermost layer.
- Its thickness is depended on the region where they appear and vary. For example, the area around the eye is comparatively thinner for the easy movement of the eye.
- It cushions the internal organs, muscles and bones, and protects them from any injuries.

Function of Skin

Following are a few important functions of the skin in the human body:

- Protection from the Environment
This is foremost and the most important function of the skin. It keeps the pathogens away so that they do not enter into the skin and cause any harm.
- Prevents Water Loss
Humans possess thick skin that loses less water. In deserts, the human skin gets thicker to prevent water loss to dry air.

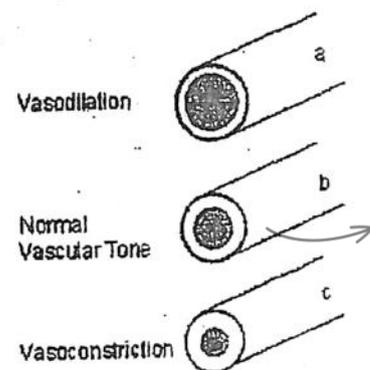
Q.21: How skin works as thermoregulatory organ?

Regulating Body Temperature

The skin is the organ which help in regulating body temperature when the receptor in skin detects change in body temperature (human body temperature 37C)

If Body Temperature Start Rise

- Production of sweat:
The sweat gland starts to produce and secrete sweat. The sweat accumulates at the surface of skin which evaporates with heat energy so the body feels cooling.



- ii. **Laying down of hairs:**
In hot condition, muscles which are attached with hair relax. It allows the hair to lie flat against surface of the skin
- iii. **Vasodilation:**
Arterioles found in the form of network in dermis, become wide which increase the flow of blood, as well as it brings the blood vessels near the surface of skin which allows more heat loss.

In cold condition when body temperature starts decreasing

- i. **Erection of hairs:**
The muscles contract pulling the hairs upright and trapping a layer of insulating air next to skin.
- ii. **Vasoconstriction:**
Narrowing of blood arterioles of dermis occurs which reduces the blood flow in capillaries of skin so less heat is lost.
- iii. **Decrease in sweat production:**
The sweat gland stops to produce and secrete sweat, so it prevents from energy loss.

Q.22. Describe the urinary system of man with the help of diagram

Urinary System in Man

The urinary system of human is consisted of

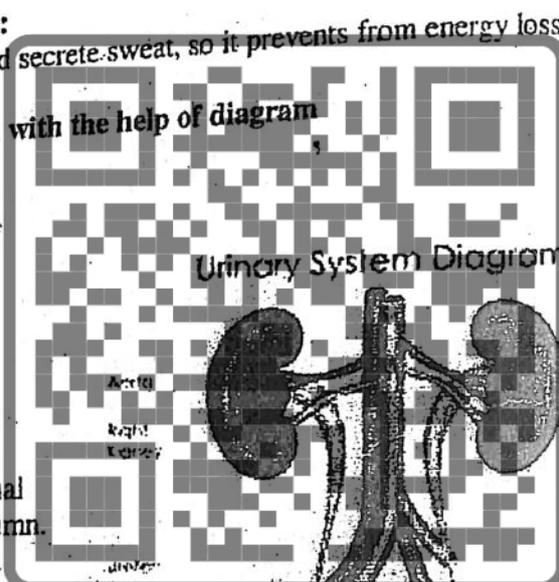
- A pair of kidneys
- A pair of ureters
- A urinary bladder
- A urethra

- i. Kidneys are reddish-brown bean organs, situated at the dorsal side of the abdominal cavity on either side of the vertebral column. Each kidney has Hilus: Hilus is the point where renal artery enters and renal vein leaves.

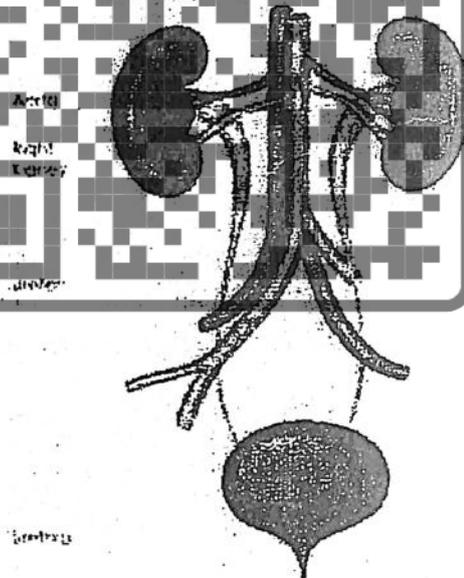
Pelvis: Pelvis is the upper expanded portion of urethra.

Units of kidney:

- i. Kidney consists of millions of urinary tubules called nephron. A nephron is the structural and functional unit of kidney.
- ii. The ureter is a narrow tube which connects the kidney to the urinary bladder.
- iii. Urine passes through ureter to the urinary bladder.
- iv. The urinary bladder is a thin-walled muscular bag situated towards the bottom of abdominal cavity in front of the rectum which stores urine.
- v. The urethra is a tube which comes out from the urinary bladder, runs down and opens outside the body through urinary opening. It passes urine from bladder to outside the body.



Urinary System Diagram



Q.23: Describe the structure of kidneys in human beings?

Human kidney:

The human beings possess a pair of kidneys which are attached to the dorsal body wall in the abdominal cavity.

Peritoneum: Kidney is enclosed in a membrane called peritoneum.

Color:

Kidneys are dark brown in color.

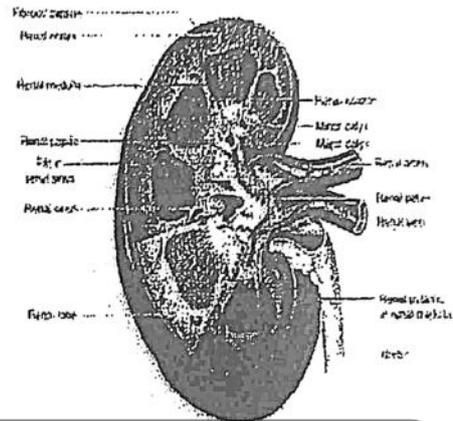
Shape: Kidneys are bean shaped in structure and are enclosed in a thin membrane called peritoneum.

Size:

Each kidney is 12 cm long, 6cm wide and 3cm thick.

Parts of kidney: A longitudinal section of kidney shows that it consists of two regions.

Renal cortex: It is the outer darker region of the kidney.



Renal medulla:

The inner lighter region of the kidney is called renal medulla.

Renal medulla: The conical projection called renal pyramids. The human Kidneys contain 12-16 pyramids

Hilus:

The concave side of the kidney is called hilus. Hilus is the point where renal artery enters and renal vein leaves.

Pelvis:

In the center of medulla there is a cavity which is funnel shaped, this is called pelvis.

Pelvis is the upper expanded portion of urethra.

Nephrons:

Units of kidney:

Kidney consists of millions of urinary tubules called nephron. A nephron is the structural and functional unit of kidney.

Q.24: Describe the structure of nephron within the L.S of kidney. Describe the network of blood vessels in nephron and their functions.

What is Nephron?

A nephron is the basic structural and functional unit of the kidney. They are the microscopic structure composed of a renal corpuscle and a renal tubule.

Structure Of Nephron

Each nephron consists of four main parts:

- The Bowman's capsule,
- Proximal convoluted tubule,
- Loop of Henle's
- Distal convoluted tubule.

Number of nephrons open into a tube called collecting duct.

Renal corpuscle:

It consists of bowmen's capsule and glomerulus.

Bowman's capsule
Each nephron begins in the cortex as a cup like structure called Bowman's capsule. Which encloses a cluster of microscopic blood vessels called the glomerulus. This capsule and glomerulus together constitute the renal corpuscle.

Renal Tubule:

Bowman capsule continuous as extensively tubular system.

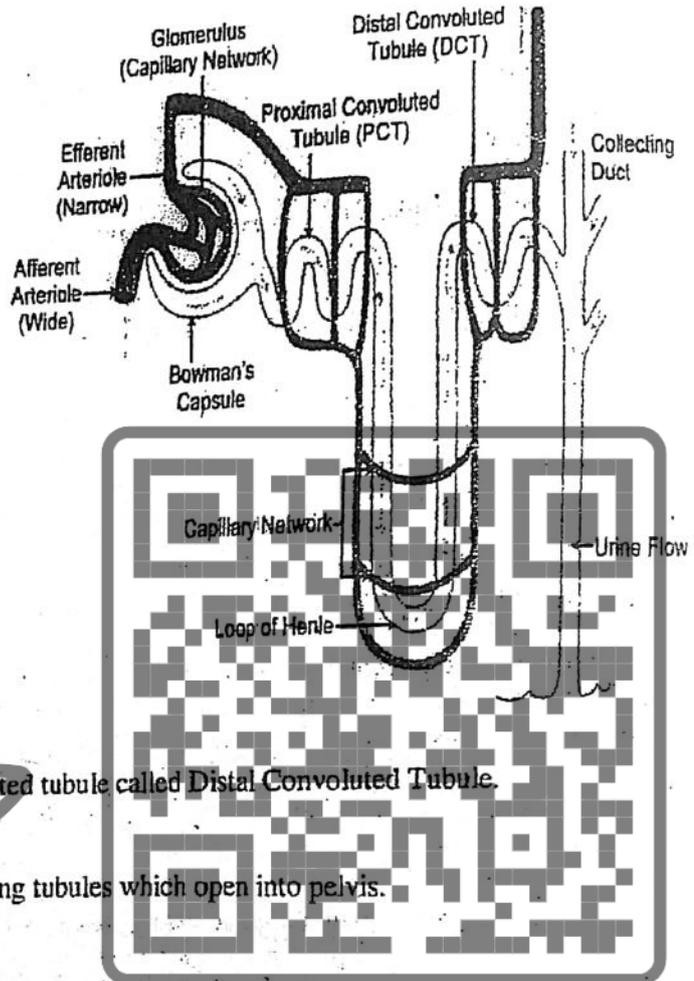
- Proximal Convolved tubule
- Loop of Henle
- Distal convoluted tubule
- Common collecting duct

i. Proximal Convolved Tubule
Bowman capsule gives out a coiled tubule called Proximal Convolved Tubule.

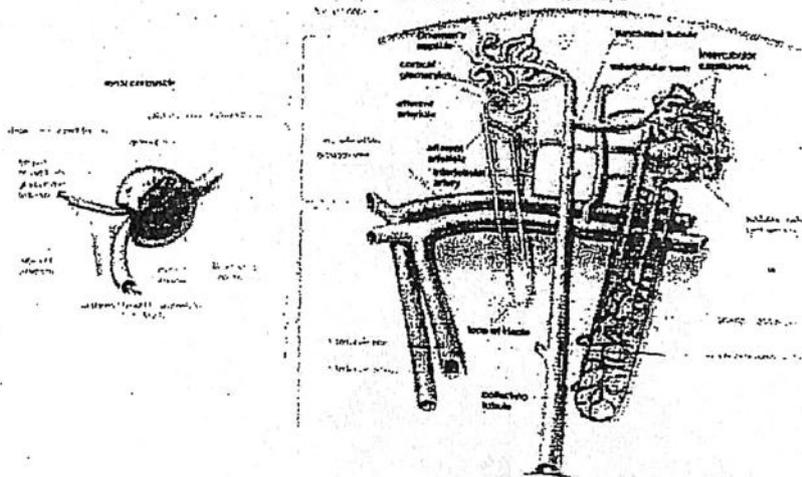
ii. Loop of Henle
The proximal convoluted opens into a U-Shaped structure called loop of Henle. Loop of Henle consist of descending and ascending limbs.

iii. Distal Convolved Tubule
The ascending limb of loop of Henle opens into another convoluted tubule called Distal Convolved Tubule.

iv. Collecting Tubules
Distal tubule empties into collecting tubules which open into pelvis.



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Structure of nephron within L.S of Kidney

Q.25: What is role of kidney in urine formation?

Role of kidney in urine formation

Deamination and Urea Formation

- The urea is formed within the liver cells. The liver stores surplus glucose of food by converting it into glycogen
- Excess of protein cannot be store in body. Protein is change into amino acid.
- Amine group is removed from the amino acid then this process is called deamination form NH₃.
- Ammonia is very poisonous; it may kill the cell when stored in high concentration. So, the liver cells quickly convert NH₃ into less toxic substance urea.

Urine formation

Excess mineral salt and nitrogenous waste products i.e. urea, creatinine and uric acid, which are poisonous if accumulated. These are removed from body with water and this mixture is called urine.

Urine formation takes place in Kidneys. Two main processes are involved in the formation of urine within nephron.

- i. Filtration
- ii. Reabsorption
- iii. Filtration

Filtration is the process of taking out material from blood. It is of two types:

- a. Ultrafiltration
- b. Selective filtration

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Ultrafiltration/Non selective filtration	Selective filtration
<ul style="list-style-type: none"> • Ultrafiltration is the process of filtering small molecules such as water, glucose, amino acids, sodium chloride and urea from blood to the glomerulus. • It occurs at glomerulus. • It does not require some energy 	<ul style="list-style-type: none"> • Selective filtration is the process when blood flows into peritubular capillaries, the remaining amount of urea filter out from blood by active transport. • It occurs at proximal and distal convoluted tubules • It requires some energy

Reabsorption

Reabsorption is the movement of water and solutes from the tubule back into the plasma.

Reabsorption of water and specific solutes occurs to varying degrees over the entire length of the renal tubule. In a normal adult about 120 Cm³ of filtrate is formed in the kidney every minute.

when the filtrate passes through the nephron useful substances and excessive water reabsorbed into the blood stream by:

- (a) Non-selective and (b) Selective reabsorption

(a) Non-selective reabsorption:

Non-selective reabsorption occurs at distal and proximal convoluted tubules without any selection.

(b) Selective reabsorption:

Selective reabsorption occurs at Loop of Henle's and collecting duct with the help of hormones. i.e. Antidiuretic hormone (ADH), Parathyroid hormones (PTH) and calcitonin.



Q.26: What are kidney stone and how are they formed? Suggest ways in which these stones can be removed from the body?

Kidney stones:

A kidney stone is a solid mass that forms from the crystals of calcium oxalate or Calcium Carbonate. Sometimes uric acid and cysteine are also present in it.

Types of kidney stones:

There are four types of stones which have specific chemical nature. These types are:

- i. Calcium stones (80%) Calcium oxalate (70%) Calcium phosphate (10-15%)
- ii. Uric acid stones
- iii. Cysteine stones
- iv. Stravide stones

Harmful effects:

- i. These stones cause obstruction in the urinary tract.
- ii. They cause several pains.
- iii. They may stop the release of urine from kidney.
- iv. The disorder may become more complicated if infection occurs.

Treatment of kidney stones:

Take plenty of water:

If kidney stones are small in size, the patient is advised to drink plenty of water so that stones can pass through the urine.

Through surgery:

If stones are large and cannot pass easily, the patient has to undergo surgery. Patient's kidney, ureter or urinary bladder is opened and stones are removed.

Non-surgical method:

The most recent method of removing kidney stones is called lithotripsy. It is the non-surgical removal of kidney stones. This technique is used to break up stones present in the kidney, ureter or urinary bladder.

Q.27: Describe different disorders of kidneys and their treatment

Kidney Failure

Sometimes the nephrons of kidney stop working, it is called kidney failure. It is mainly due to solute disbalance in blood and kidneys. This disbalance of solutes causes death unless the patient is given treatment to filter out waste by machine.

Treatment: Kidney dialysis

A dialysis machine performs the function of a kidney. It helps to clean the patient's blood from metabolic waste products and toxics.

For effective treatment the patient needs to undergo dialysis 2-3 times a week. Each session lasts about 3-5 hours depending on the patient's body size and medical condition.

i. **Kidney stones:**

A kidney stone is a solid mass that forms from the crystals of calcium oxalate or Calcium Carbonate. Sometimes uric acid and cysteine are also present in it.



Treatment: Lithotripsy

If the size of stone is comparatively small we can use the technique of lithotripsy to break stone by ultrasonic waves (sound waves). The broken rudiments drain out from kidney with urine.

Treatment: Renal surgery

The large size stone cannot be broken by lithotripsy, so it is removed only by the process of renal surgery.

Prevention:

The large intake of water is the only measure to minimize the chances of

Formation of stone in kidney.

Difference:

Transpiration	Guttation
Transpiration occurs through the stomata and lenticels.	Guttation takes place through hydathodes.
Loss of Water as water vapor.	Loss of water as liquid water.
It occurs during the day.	It occurs at night.
Takes place at high temperature	Takes place at low temperatures.
Can be checked by the opening and closing of stomata.	Cannot be regulated as hydathodes do not open or close.
Only pure water is evaporated.	Eliminates sugars, salts and amino acids.
Occurs in terrestrial and herbaceous plants.	Occurs only in herbaceous plants.

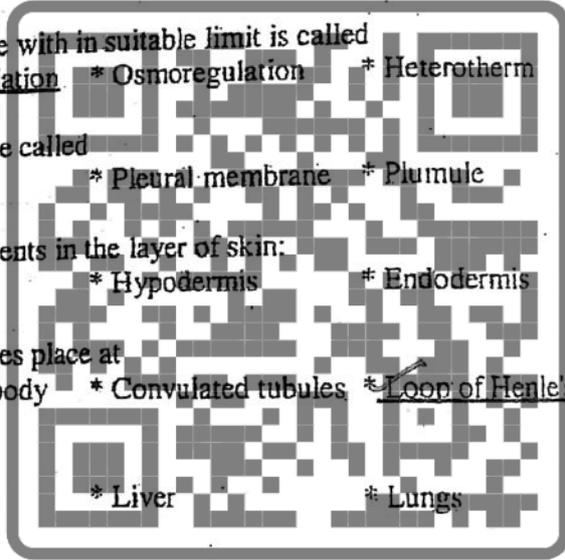
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Solved Exercise from Book:**Multiple Choice Questions**

Choose the correct answer:

- i. The internal condition of an organism is referred as:
 * Homeostasis * Internal environment
 * Internal metabolism * Feedback mechanism
- ii. A set of metabolism reaction which maintain internal environment is:
 * Positive feedback * Negative feedback
 * Osmoregulation * (d) Homeostasis
- iii. Removal of extra liquid water is:
 * Exudation * Guttation * Respiration * Transpiration
- iv. Plant grows near coastal area called:
 * Xerophyte * Halophyte * Epiphyte * Hygrophyte
- v. Organ of human body which is considered on the largest organ is:
 * Skin * Digestive tract * Liver * Brain
- vi. The maintenance of body temperature with in suitable limit is called
 * Homeotherm * Thermoregulation * Osmoregulation * Heterotherm
- vii. The kidney is enclosed in a membrane called
 * Pericardium * Peritoneum * Pleural membrane * Plumule
- viii. The network of blood capillaries presents in the layer of skin:
 * Epidermis * Dermis * Hypodermis * Endodermis
- ix. Selective reabsorption in nephron takes place at
 * Glomerulus * Malpighian body * Convulated tubules * Loop of Henles
- x. The hormone ADH release from
 * Pituitary gland * Kidneys * Liver * Lungs



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X-BIOLOGY

- xiii. This is not a part of hindbrain:
 * Pons
 * Cerebellum
 * Medulla oblongata
 * Cerebrum
- xiv. Ali Ibn-e-Isa book on study of disease and surgery of eye is:
 * Zoology
 * Botany
 * Ophthalmology
 * Biology
- xv. Insulin is secreted by gland:
 * Pancreas
 * Pituitary
 * Adrenal
 * Thyroid
- xvi. The portion of the nervous system that is involuntary in action.
 * Sensory nervous system
 * Dendrites
 * Autonomic nervous system
 * Somatic nervous system
- xvii. Special organs, tissues or cells of the body which detect stimulate:
 * Receptors
 * Coordination
 * Dendrites
 * Effectors
- xviii. Central nervous system include brain and:
 * Spinal cord
 * Noto cord
 * Vertebra
 * Heart
- xix. The largest part of the fore brain is:
 * Cerebellum
 * Cerebrum
 * Thalamus
 * Hypothalamus
- xx. Which type of coordination is present in plants?
 * Nervous Coordination
 * Mechanical Coordination
 * Chemical Coordination
 * Electrical Coordination
- xxi. The sensitive layer of eye is:
 * sclera
 * retina
 * choroid
 * iris
- xxii. Ibn- al- Haytham is famous for his book.
 * Biology
 * Optics
 * Coordination
 * Chemistry
- xxiii. A part from hearing, what other major body function is performed by the ear?
 * Reduction in nerve pressure
 * All of these
 * Hormone's secretion
 * Body balance
- xxiv. The parts of forebrain are;
 * Thalamus, medulla and pons
 * Thalamus, hypothalamus and cerebellum
 * Thalamus, cerebellum and pons
 * Thalamus, hypothalamus and cerebrum
- xxv. The parts of body which receive message from coordinates and produce response are:
 * Neuron
 * Receptors
 * Stimulus
 * Effectors



- xxvi. Pairs of spinal nerve are:
 * 21
~~* 31~~ * 12
 * 13
- xxvii. _____ is unable to see during day time.
 * Rabbit * Human
 * Cat ~~* Owl~~
- xxviii. The unit of nervous system is:
~~* Neuron~~ * Axon
 * Nephron * Hormone
- xxix. How many diseases of eyes were described by Ali Ibn Isa in his books?
 * 120 * 110
~~* 130~~ * 150
- xxx. Spinal cord is the continuation of:
 * Thalamus ~~* Hypothalamus~~
 * Medulla Oblongata * Frontal lobe
- xxxi. Insulin and glucagon are produced in the
 * Anterior pituitary * Hypothalamus
~~* Pancreas~~ * Liver
- xxxii. _____ Gland is pea-shaped:
 * Adrenal * Hypothalamus
~~* Pituitary~~ * Pancreas
- xxxiii. _____ are sensitive to dim light.
 * Rods * Cornea
 * Cones ~~* Retina~~
- xxxiv. Diabetes mellitus is a disorder in which _____ produces insufficient or no insulin.
 * Liver * Kidney
~~* Pancreas~~ * Stomach
- xxxv. It is partial or complete loss of controlled movement caused by the inability to contract one or more muscles.
 * Epilepsy * Paralysis
 * Myopia * Heteromyopia

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Coordination

Short Questions with Answers

Q: What is coordination?

Coordination:

Living organisms respond and react to various stimuli like heat, light, cold, touch, pressure etc.

For example -

Take off the hand on touching a hot object.

Catching a ball by a fielder.

Coordination is defined as the process where different units of a system work together to perform a meaningful function.

Q: Define these terms.

Stimulus:

It refers to any factor which cause change either in internal or external environment of the organism.

Receptors:

The changes are detected by special cells or organs termed as receptors. For example, eyes are photoreceptors (sensitive to light), ears are sound receptors, nose is chemoreceptor for gases and tongue is chemoreceptor for solids or liquids.

Response:

It is the activity performed by some living organism after analyzing stimulus or stimuli. It is exhibited by organs like muscles, glands which are termed as effectors.

Q: What are the different types of coordination?

Types of Coordination:

There are two types of coordination:

- 1) Chemical Coordination,
- 2) Nervous Coordination

1) Chemical Coordination:

It takes place by releasing specific, signaling molecules such as hormones by special cells or glands.

This kind of coordination is helpful in lower animals as well as plants because of their simple body plans and small size.

2) Nervous Coordination:

It is an advance type of coordination exhibited by most of the animals, which is a consequence of specially designed cell, Neurons. The neurons upon stimulation generate electrochemical signals.



Q: What are the main difference between chemical and nervous coordination?

Chemical Coordination	Nervous Coordination
It takes place by releasing specific, substances such as hormones by special cells or glands.	It is an advance type of coordination exhibited by most of the animal by specially designed cell, Neurons..
purely chemical signals are released to stimulate or inhibit other cells or tissues of the body.	The neurons generate electrochemical signals..
It produces long lasting response	It produces short-lasting response
It transmitted through blood stream.	It transmitted through nerve impulse
It is controlled by endocrine system	It is controlled by nervous system
Slower in action	Rapid in action
Related to all organisms	Exclusively related to animals

Q: Why the nervous coordination is faster than chemical coordination?

Nervous coordination is faster because it transmitted through nerve impulse while chemical coordination is slower because it transmitted through blood stream

Q: Which of the two coordination types is better and why?

Chemical coordination is better because chemical coordination involves communication through hormones. It does not require any specialized tissue like nervous tissue for the signaling to take place. While nervous coordination by itself is insufficient to communicate information within the body. Due to certain limitations of the use of electrical impulses.

Q: How reflex action works by a reflex-arc?

The pathway of a reflex action is termed as reflex arc. In complicated reflexes, the reflex arc may involve one or numerous inter-neurons in between sensory and motor neuron.

Q: Why driving license is not issued to a color-blind person?

Because a colour blind person can't differentiate between red and green colour so during driving because of their inability to distinguish red and green traffic lights can cause any incident that's why driving license is not issued to colour blind person.

Q: Why thyroid gland swells up and give the name of the disease?

If the intake of iodine in diet is low in adult, the thyroid gradually enlarges in size. This abnormal condition is termed as "goiter".

Q: What is the role of Islet's of Langerhans cells?

The endocrine part consists of patches of cells called "Islets of Langerhan's". It is involved in regulating glucose metabolism. In response to high level of glucose, it secretes Insulin which helps in decreasing the blood glucose levels. On the other hand, low level of blood glucose, it secretes glucagon which increases the glucose level up to normal.

Q: What is "emergency hormone" and why it is named so?

X-BIOLOGY

Adrenal medulla responds to emergency conditions to produce so called "fight or flight response". It secretes adrenaline or emergency hormone resulting in an increase in blood glucose level by breaking down of glycogen. As a result, the body responds to the emergency situation quickly.

Q: Write a short note on reflex action.

Reflex Action:

A reflex action is that which is performed at Once without response to stimulus. This action is performed very quickly without any decision or will-power. It is an automatic, involuntary response which is due to external or internal stimuli.
Example A simple example of a reflex action is the withdrawal of a hand when it Suddenly touches a hot object.

Extended Response Questions with Answers

Q: Define human nervous system with its types.

Human Nervous System

Human nervous system like other vertebrates is "centralized-type nervous system" (CNS). It is the most complicated type. Centralized nervous system consists of two major divisions: Central Nervous System (CNS) and Peripheral Nervous System (PNS).

Central Nervous System:

- It is the major command and control center
- It consists of two main components, brain and spinal cord.

Brain - Upper and broader part lying in the head; and

Spinal cord - Lower, long and narrow part running from beginning of neck to trunk.

Peripheral Nervous System

The peripheral nervous system consists of the nerves that branch out from the brain and spinal cord. These nerves form the communication network between the CNS and the body parts. The peripheral nervous system is further subdivided into the somatic nervous system and the autonomic nervous system

Q: Describe central nervous system in detail.

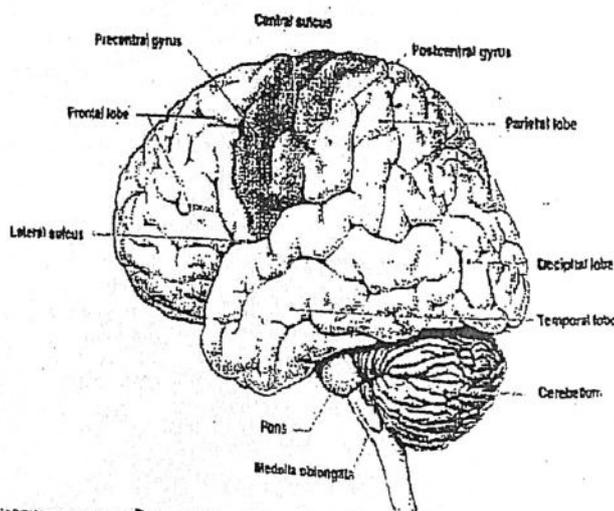
Central Nervous System:

It is the major command and control center

It consists of two main components, brain and spinal cord.

Brain - Upper and broader part lying in the head; and

Spinal cord - Lower, long and narrow part running from beginning of neck to trunk.



Brain:

- i. It is the major command and control center of our body.
- ii. It is wrapped in three protective membranes called meninges.
- iii. Inside the brain, there are empty cavities filled with a cerebro spinal fluid (CSF). It also provides a cushion-like protection to the brain.
- iv. Bones of the skull provide another protection to brain.
- v. Human brain consists of following important parts:
 - Cerebrum,
 - Hippocampus,
 - Amygdala,
 - Thalamus and Hypothalamus,
 - Mid-Brain,
 - Cerebellum,
 - Medulla Oblongata.

Cerebrum:

- i. It is the largest part of the brain.
- ii. It is considered to be the seat of intelligence, all conscious activities and memory.
- iii. Its outer part, cortex or gray matter and consists of cell bodies of neurons while inner part white matter is whitish and consists of cell which are hair-like outgrowths.
- iv. Cerebrum consists of two hemispheres i.e. Right and left cerebral hemispheres.
- v. The right cerebral hemisphere regulates the left side of the body while the left cerebral hemisphere to the right side of the body.
- vi. The cortex is associated with thoughts, plans, actions and determination.
- vii. It can be divided into four sections or lobes.

- Frontal lobe: it is associated with thoughts, emotions, etc.
- Parietal lobe: it is associated with different sensations like pressure, temperature, language processing, etc.
- Temporal lobe: it is involved in hearing and speech.
- Occipital lobe: it is associated with vision.

Frontal lobe
(thinking, memory,
behaviour and
movement):

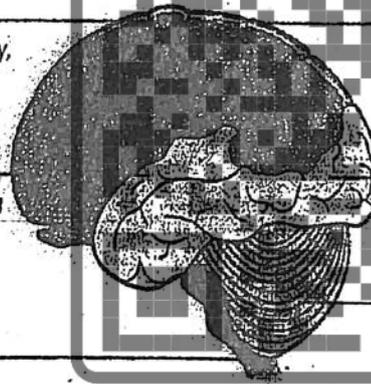
Temporal lobe
(hearing, learning
and feelings)

Brain stem
(breathing,
heart rate and
temperature)

Parietal lobe
(language
and touch)

Occipital
lobe (sight)

Cerebellum
(balance and
coordination)

**Thalamus:**

Thalamus lies inside in the brain just above the hypothalamus. It guides the stimuli towards appropriate part of the cortex.

Hypothalamus:

Hypothalamus regulates life maintaining functions like blood pressure, body temperature, hunger, thirst, etc. It plays vital role in maintaining homeostasis of the body.

Hippocampus: It is related with long-term memory.

Amygdala: It's a deep seated small area involved in emotions (pain, pleasure, etc.)

Mid brain:

In human it is relatively smaller and involved in integration of visual and olfactory (smell) stimuli. It is also collaborator of spinal cord with fore-brain.

Function of Midbrain

It is associated with Vision, Hearing, Sleep, Arousal, Temperature etc.

Cerebellum

- The cerebellum is the second largest part of the brain, located in the posterior portion of the medulla and pons.
- It is involved in controlling attention, language, equilibrium, posture, etc.
- The cerebellum consists of two, the outer grey cortex and the inner white medulla.

Functions:

- Coordinates eye movement.
- It enables precision control of the voluntary body movements.
- Activities like writing, drawing, painting, dancing, crafting have become possible due to its elaborate structure in human.
- Coordinates and maintains body balance and posture during walking, running, riding, and swimming.

Medulla Oblongata

The medulla oblongata is a small structure present in the lowest region of the brain.

Functions:

- It helps in controlling Blood Pressure, Heart Rate, Respiratory Movement, Vomiting etc.
- It is the control center for visceral function.
- It helps us in maintaining our posture and controlling our reflexes.

Pons:

Pons controls digestive and respiratory movements.

Functions:

- Regulating the activities like muscular coordination, facial expression, breathing and sleeping.
- Pons is also involved in sensations, such as the sense

Spinal Cord

The Spinal Cord is made up of White Matter and Gray Matter. White matter contains nerves that are covered with Myelin Sheath whereas gray matter contains nerves without myelin sheath. It is a thin, tube-like structure which extends from the medulla of the brain.

Function:

- It controls the reflex actions and acts as means of communication between spinal nerves and brain.
- It also controls center of many reflex actions.

Q: What do you know about peripheral nervous system?

Peripheral nervous system:

From brain and spinal cord many nerves are produced which are spreaded in various parts of the body. These nerves form peripheral nervous system.



Each nerve consists of bundles of axons of both sensory and motor neurons. The PNS consists of somatic nervous system and autonomic nervous systems.

The somatic nervous system is associated with skeletal muscles and glands.

The autonomic nervous system is associated with involuntary functions like digestion, breathing, etc.

These functions are vital for maintaining life processes.

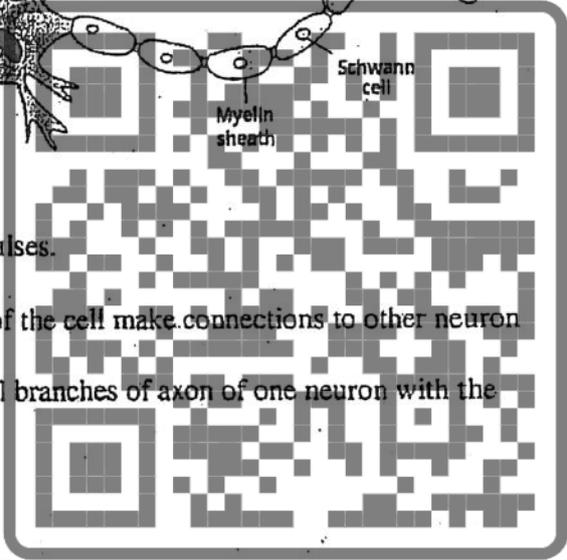
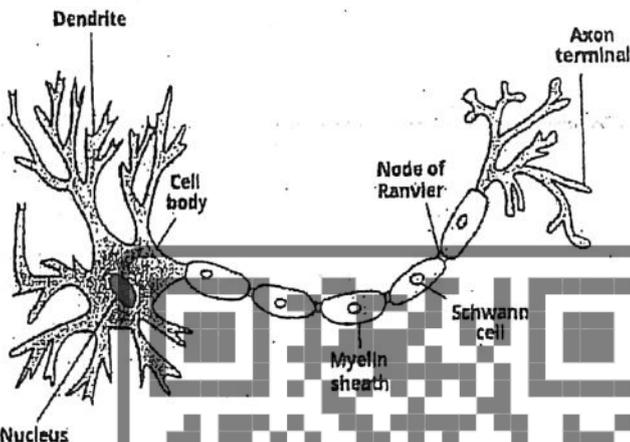
Q: Define structure of neuron.

Neuron

Neurons are specialized cells which are combined to form nerves of the nervous system. As nerves are emerged from brain and spinal cord and branch out to almost all parts of the body, so neuron is also called unit of nervous system.

The neuron consists of the following parts:

- **Cell Body:** This main part has all of the necessary components of the cell, such as the nucleus, endoplasmic reticulum, ribosome and mitochondria. If the cell body dies, the neuron dies.
- **Axon:** This is a long cable like projection of the cell along the length of the cell. It ends in several hair-like structures; called axon terminals/ axon endings. The axon terminals relay nerve impulses.
- **Dendrites:** These small branch-like projections of the cell make connections to other neuron and receive the nerve impulses.
- **Synapse:** The point of contact between the terminal branches of axon of one neuron with the dendrite of another neuron is called synapse.



Q: Define human eye as photoreceptor.

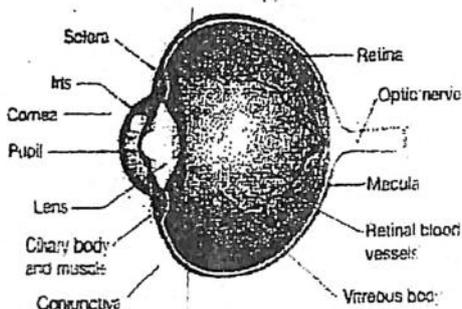
Eye:

It is the organ of sight.

It works on the principle of a simple camera

The various parts of eye and their functions:

- **Retina:** It is a light sensitive screen inside the eye on which image is formed. It contains rods and cones.
- **Cornea:** It is a thin membrane which covers the eye trail. It acts like a lens which refracts the light entering the eye.
 - **Aqueous humour:** It is fluid which fills the space between cornea and eye lens.
 - **Eye lens:** It is a convex lens made of transparent and flexible jelly like material. Its curvature can be adjusted with the help of ciliary muscles.



- **Pupil:** It is a hole in the middle of iris through which light enters the eye. It appears black because light falling on it goes into the eye and does not come back.
- **Ciliary muscles:** These are the muscles which are attached to eye lens and can modify the shape of eye lens which leads to the variation in focal lengths.
- **Iris:** It controls the amount of light entering the eye by changing the size of the pupil.
- **Optical nerve:** These are the nerves which take the image to the brain in the form of electrical signals.

Q: What do you know about defects of vision?

Defects of Vision and their Correction

Colour Blindness:

A person having defective cone cells is not able to distinguish between the different colours, such as blue and yellow or red and green. It is due to the defect in cones of retina. This defect is known as Colour Blindness.

Myopia (Short-sightedness):

It is a kind of defect in the human eye due to which a person can see near objects clearly but he cannot see the distant objects clearly. Myopia is due to

- Excessive curvature of the cornea.
- Elongation of eyeball.

Hypermetropia (Long-sightedness):

It is a kind of defect in the human eye due to which, a person can see distant objects properly but cannot see the nearby objects clearly. It happens due to

- decrease in the power of eye lens i.e., increase in focal length of eye lens.
- shortening of eyeball.

Q: Define structure of human ear.

Ear:

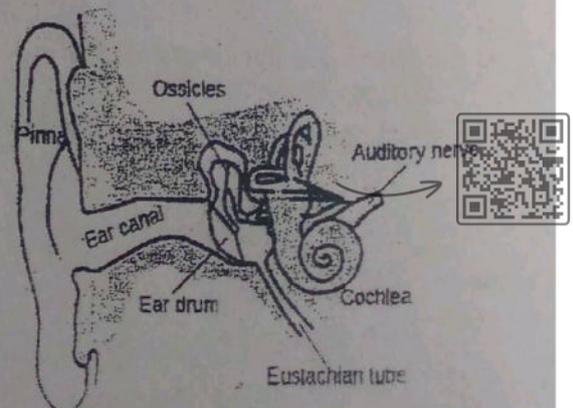
Ear is an organ of hearing and balance. It consists of three parts:

- 1) Outer ear:** The outer ear consists of pinna, ear canal and tympanic membrane or ear drum.
 - The pinna: The pinna composed of folds of skin and cartilage.
 - Tympanic membrane: The pinna leads into the ear canal which is closed at the inner end by tympanic membrane. This membrane separates the middle ear and the external ear
 - Ear canal: Ear canal has hair and produces wax to trap dust and small foreign bodies.

Function of outer ear: The outer ear collects and transmits sound waves.

- 2) Middle ear:** The middle ear consists of a small cavity containing three small moveable bones (malleus, incus and stapes).

- **Malleus:** A hammer-shaped part that is attached to the tympanic membrane. It is the largest ear ossicle.
- **Incus:** An anvil-shaped ear ossicle connected with the stapes.
- **Stapes:** It is the smallest ossicle and also the smallest bone in the human body.



The Eustachian tube. : The middle ear is connected to inner nasal cavity through a small tube, the Eustachian tube.

Function of outer ear: The middle ear receives sound waves from air outside and transmits it into the fluid in the inner ear.

3) Inner ear:

The inner ear consists of a front membranous cochlea and a rear, three semicircular canals deep inside the skull bones.

The cochlea: The cochlea is associated with hearing

Semicircular canals: Semicircular canals are associated with balance. Both cochlea and semicircular canals are fluid filled and contain sensory hair cells.

These cells transform sound waves into nerve impulse.

Q: What is endocrine system? Discuss in detail.

Endocrine System:

It is an important means of chemical coordination. In animals, it is a system of ductless glands. These ductless glands are known as endocrine glands and their secretion is called hormones.

Hormone

A hormone is defined as a special chemical substance which is secreted by a particular organ directly into the blood and it is carried to the place where it is necessary.

The hormones do not cause the formation of organs but help to regulate their functions.

Hormones are required in a specific amount. if their amount is increased or decreased, the normal development and function of the body is disturbed.

In the body of man and other mammals following endocrine glands are present

1. Pituitary gland.
2. Thyroid gland
3. Pancreas
4. Adrenal gland
5. Gonads (Testes and Ovaries)

1) Pituitary gland:

It is located in brain and considered to be very important. It secretes number of hormones which influence upon other endocrine glands also besides other organs. Pituitary gland consists of two lobes in human, an anterior lobe or anterior pituitary gland and a posterior lobe or posterior pituitary gland.

Anterior pituitary gland:

It has number of hormone secreting cells.

Its important hormones and their effect with target organs are summarized in the table:

Hormone	Target organ	Function
Follicle Stimulating Hormone (FSH)	Gonads (Testes and ovaries)	Stimulate gonads to develop gametes
Luteinizing Hormone (LH)	Gonads	Development and release of gametes.
Thyroid Stimulating Hormone (TSH)	Thyroid gland	Control the function of thyroid gland
Somatotropin (Growth Hormone GH)	Bones cartilaginous, muscles etc.	Growth in children and normal body structure and metabolism in adults
Adenocorticotropin Hormone (ACTH)	Adrenal cortex	Influences the adrenal gland to release of Cortisol or the "stress hormone"
Melanocyte Stimulating hormones	Skin	Control pigmentation (melanin) in skin

Posterior Pituitary Hormones

The posterior pituitary is responsible for the storage and secretion of two very important hormones:

- Antidiuretic Hormone (ADH): maintains the blood pressure, blood volume Controls the water balance of the body by affecting reabsorption of water by the kidneys.
- Oxytocin: Controls certain aspects of pregnancy and childbirth Oxytocin stimulates greater contraction of smooth muscles as well as social behavior.

2. Thyroid Gland

The thyroid gland is a ductless endocrine gland located on trachea in the base of neck. It resembles the shape of a butterfly. It is also one of the largest endocrine glands.

Hormones:

There are two thyroid hormones:

- Thyroxine (Tetraiodothyronine): Thyroxine has iodine as its important constituent. It regulates the rate of the metabolic activities of cells. It regulates the physical growth and mental development in children. Its deficiency causes Goiter, Cretinism and Myxedema.
- Calcitonin: Deficiency of this hormone in early age disturb the growth of a body. Such person is called cretin. Calcitonin released in response to high level of calcium in blood lowers the blood calcium.

3. Pancreas:

Pancreas is about 6 inches long, leaf-like in structure located in the abdominal cavity in between stomach and small intestine. It contains a group of cells known as islets of Langerhans.

They are as follows:

Alpha cells secrete a hormone known as glucagon that raises blood glucose level
Beta cells secretes insulin that works opposite to glucagon. It decreases the blood glucose level

- **GLUCAGON**

It is secreted in response to decrease sugar level in blood.

It increases the blood glucose level mainly by promoting breakdown of glycogen to glucose in
It also increases the rate of breakdown of fats.

- **INSULIN**

- It is secreted in response to increase sugar level in blood.

- It decreases the blood glucose level mainly by following mechanism

- It increases glycogen synthesis in liver and also increasing cell utilization of glucose.

4. Adrenal gland

The Adrenal Glands are found on top of each kidney A pair of adrenal glands is present, one on the top of each kidney. Each adrenal gland has two distinct parts

1 Adrenal Cortex

2- Adrenal medulla

Adrenal Cortex

It produces hormones which are collectively called as Corticosteroids are important for regulating metabolism.

They are also essential maintaining mineral balance in the body corticosteroid are as follows.
Aldosterone Cortisol

Adrenal medulla

- It works under the influence of sympathetic nervous system
- It secretes two hormones which considered as emergency hormones.
- Adrenaline/epinephrine
- Non-adrenaline/ non-epinephrine.

5. Gonads:

Gonads are the reproductive organs, viz., testes in male while ovaries in female. They are involved in gametes formation and hormones secretion.

Testis:

It secretes hormone known as testosterone. Testosterone is responsible for the development of secondary characteristics in boys like appearance of moustache and beard, deepening of voice, etc.

Ovaries:

Each ovary is about the size of a grape located in the lower abdominal cavity. Ovary secretes estrogen and progesterone hormones. Estrogen is responsible for the development of secondary characteristics in girls like development of breasts, sharpening of voice, etc. Progesterone maintains and prepares uterus for pregnancy.

Q: Discuss the gland involved in regulation of blood glucose and how?

3. Pancreas:

Pancreas is the gland involved in regulation of blood glucose level. Pancreas is located in the abdominal cavity in between stomach and small intestine. It contains a group of cells known as islets of Langerhans.

They are as follows:

Alpha cells secrete a hormone known as glucagon that raises blood glucose level

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It is secreted in response to increase sugar level in blood.

It decreases the blood glucose level mainly by following mechanism

It increases glycogen synthesis in liver and also increasing cell utilization of glucose

Q: What is diabetes mellitus? Explain some ways of its management

Disorders Of Insulin Deficiency

Due to deficiency of insulin, a disease appeared called Diabetes mellitus.

Diabetes Mellitus

When there is deficiency of insulin, the amount of sugar is increased in blood, it is called Diabetes Mellitus.



X-BIOLOGY

Symptoms

- High level of blood sugar
- Sugar in the urine
- Disturbance of the body's osmotic equilibrium
- Dehydration
- Derangement of the nervous system

Ways To Manage Diabetes Mellitus

1. Balanced Diet
2. Exercise
3. Medication
4. Blood Glucose Monitoring
5. Dietary Management of Diabetes

- Dietary Management and appropriate amount of physical activity play important roles in diabetic control.
- Balanced diet with a variety of foods.
- "3 Low, 1 High" principle, i.e. low fat, low sodium (or salt), low sugars and high fiber.
- Reduce intake of saturated fat, trans fat and sodium can lower the risk of developing heart diseases and hypertension.
- Controlling intake of energy for the purpose of weight reduction or maintenance.

Q: What is the cause, symptoms and control of Paralysis?

Paralysis

Paralysis is a condition where the individual loses their ability to move some or all parts of their body.

Paralysis Causes

The major causes of paralysis include:

- Bleeding (hemorrhage) or blood clot in the specific part of brain.
- Stroke
- Head injury
- Spinal cord injury
- Multiple sclerosis
- Toxins
- Peripheral neuropathy

Symptoms of Paralysis

Paralysis symptoms usually vary based on the causal factor.

Sudden or gradual onset of numbness to:

- Face
- One of the arms or legs
- Both the legs
- Both the arms and legs
- One side of the body
- Loss of balance
- Disorientation
- Dizziness



Paralysis Treatment

Heat massage, exercises, physiotherapy stimulates the nerves and muscles. Electrical stimulations are also used to treat patients.

Q: What is the cause, symptoms and control of epilepsy?

Epilepsy:

It is a brain disorder in which there is temporary alteration in one or more function or recurrent seizures.

Epilepsy Cause:

- It is due to the abnormal electrical activity in brain.
- Stimulus like sudden flash light on eyes is also associated cause of the epilepsy.

There are several reasons also

- High fever
- Head trauma
- Very low blood sugar
- Alcohol withdrawal

Epilepsy Symptoms:

- Temporary confusion.
- A staring spell.
- Uncontrollable jerking movements of the arms and legs.
- Loss of consciousness or awareness.

Epilepsy Control:

The frequency of seizures can be reduced by using proper medication.

Q: What is the difference between Autonomic nervous system and Somatic nervous system?

Autonomic nervous system	Somatic nervous system
the autonomic nervous system only has motor pathways.	The somatic nervous system has sensory and motor pathways
the autonomic nervous system is associated with involuntary functions like digestion, breathing etc.	The somatic nervous system is associated with skeletal muscles and glands



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Solved Exercise from Book:Multiple Choice Questions

Choose the correct answer:

i) The activity in relation to changes in environment is:

- * Stimulus
- * Response
- * Both a & b
- * None of these

ii) Stimulus is detected by:

- * Receptor
- * Effector
- * Nerve
- * All of these

iii) The type of coordination through electrochemical signals is:

- * Nervous
- * Chemical
- * Mechanical
- * All of these

iv) The chemicals released from one cell and carried to signal some distant cell through blood is:

- * Neurotransmitters
- * Enzymes
- * Hormones
- * all of these

v) The type of coordination exhibited by Plants:

- * Nervous coordination
- * Chemical coordination
- * Mechanical coordination
- * Both a & b

vi) The part of brain involved in reasoning is:

- * Fore brain
- * Cerebrum
- * Cortex
- * Frontal lobe

vii) The part of brain involved in balance and precision in movements is:

- * Cerebrum
- * Cerebellum
- * Thalamus
- * Medulla oblongata

viii) Vital functions for survival of animals are regulated by:

- * CNS
- * PNS
- * somatic sub-division
- * Autonomic sub-division

ix) The shortest path of reflex action consists of:

- * 1 neuron
- * 2 neurons
- * 3 neurons
- * many neurons

x) The type of lens in our eye is:

- * Convex
- * concave
- * Both a & b
- * None of these

xi) The automatic process of altering focus to get sharper image of near object is:

- * Vision
- * Accommodation
- * Focus
- * All of these

xii) The vitamin necessary for proper vision is:

- * Vitamin A
- * Vitamin B
- * Vitamin C
- * Vitamin D



- xiii) A colour blind person cannot see:
 - * Anything
 - * White
 - * Red
 - * Black

- xiv) The book "Kitab-ul-Manazir" was written by:
 - * Jabir bin Hayan
 - * Ali Ibn-Isa
 - * Ibn-al-Haitham
 - * Bu-Ali Sina

- xv) Sensory hair-cells are present in:
 - * Retina
 - * Skin
 - * Cochlea
 - * Nose

- xvi) The gonads are the target organ for:
 - * FSH
 - * Both a & b
 - * LH
 - * None of these

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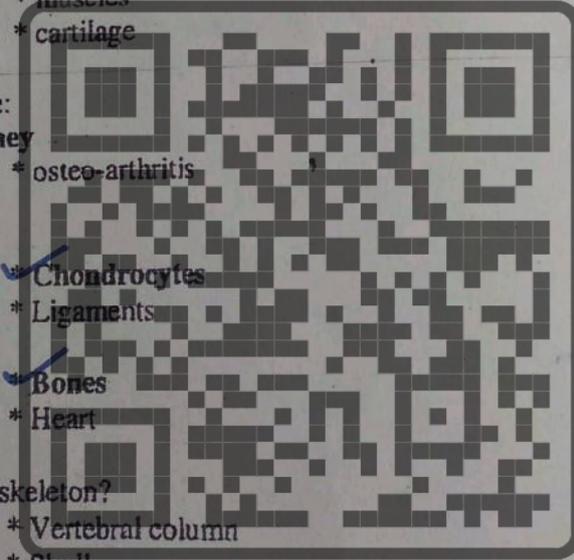


Chapter:04

Support and Movement

Multiple Choice Questions

1. Induce movement is due to _____ stimuli
 - * Internal
 - * Both
 - * External
 - * None of these
2. Nastic movement is found in.
 - * Plants
 - * Unicellular organism
 - * Animal
 - * None of these
3. Allows movement in all directions:
 - * Joints among skull bones
 - * Hinge joints
 - * Slightly moveable joints
 - * Ball and socket joints
4. Inflammation of membrane at joints is called.
 - * Rheumatoid arthritis
 - * Osteoarthritis
 - * Arthritis
 - * Gout
5. The bands of connective tissue which prevent dislocation of bones at joints are:
 - * ligaments
 - * tendons
 - * muscles
 - * cartilage
6. It is not a disorder of skeletal muscle:
 - * osteoporosis
 - * arthritis
 - * Tetany
 - * osteo-arthritis
7. Cartilage is made up of:
 - * Matrix
 - * Collagen
 - * Chondrocytes
 - * Ligaments
8. Osteoporosis is a disease of:
 - * Stomach
 - * Liver
 - * Bones
 - * Heart
9. Which bones is part of appendicular skeleton?
 - * Pectoral girdle
 - * Sternum
 - * Vertebral column
 - * Skull
10. The tissues which attach muscles to bones are called:
 - * muscles
 - * ligaments
 - * cartilage
 - * tendons
11. Bones can store:
 - * Urea
 - * Calcium
 - * Salts
 - * Uric Acid
12. All these are the parts of axial skeleton of humans except:
 - * Shoulder girdle
 - * Vertebral column
 - * Ribs
 - * Sternum
13. Find the INCORRECT statement:
 - * Bone protects and supports the body and its organs
 - * Bones serves as a storehouse for various minerals.



- * Bone is where most blood cells are made.
- * Bones is a dry and non-living supporting structure.

14. What do some bones produce?

- * **Blood cells**
- * Mucous
- * Oxygen
- * Hormones

15. Number of bones in Vertebral column is:

- * 55
- * **26**
- * 33
- * 44

16. Pair of skeletal muscles are called.

- * **Antagonistic**
- * None of these
- * Extensor
- * Flexor

17. Interior of bone is soft and porous which is called:

- * Compact bone
- * Bone marrow
- * **Cartilage**
- * Spongy bone

18. Human skeleton contain number of bones:

- * 106
- * 306
- * 406
- * **206**

19. How many bones make our skull?

- * 26
- * 14
- * **22**
- * 24

20. The examples of hinge joints are:

- * neck joints
- * shoulder joints
- * **knee and elbow joints**
- * arm and shoulder joints

21. Pelvic girdle consist of _____ bones

- * **3**
- * 5
- * 4
- * 6

22. The skeleton found outside the body is called:

- * Endoskeleton
- * **Exoskeleton**
- * Fibro skeleton
- * Hydro skeleton

23. _____ is joint move in only one plane.

- * Slightly moveable joints
- * Ball & Socket
- * Moveable joint
- * **Hinge joint**

24. It is the softening and weakening of bones in children, usually because of an extreme and prolonged vitamin D deficiency.

- * Arthritis
- * **Rickets**
- * Osteoarthritis
- * Osteoporosis

25. An example of immoveable joint is :

- * Hip joint
- * **Joints of skull bone**
- * Elbow joint
- * Shoulder joint



X-BIOLOGY

26. Tendons and Ligaments are bands of:
* Nerve tissue
* Epidermic tissue
* **Connective tissue**
* Muscular tissue
27. _____ is the longest bone in our body.
* **Thigh**
* Arm
* Foot
* Leg
28. Skeletal muscles are attached to bones on either side of the joint by bands of tough, fibrous connective tissues called
* **Tendon**
* Tissues
* Ligaments
* None of these
29. Vocal cords are present in:
* Larynx
* Nasal cavity
* **Trachea**
* Pharynx
30. Bicep and tricep are example of
* Tendons
* **Antagonistic muscles**
* Ligaments
* None of these

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Support and Movement

Short Questions with Answers

Q. Why organisms need support?

The organisms with greater sizes need support to keep their body mass as one unit. This is particularly true for organisms that live on land.

Q. What is movement?

The act of changing place or position by entire body or its parts of an organism is called movement.

Types of movement:

There are two types of movement:

- Movements of body parts
- Locomotion

Q: Define irritability and when it happens in an organism?

The cells of an organism have a living material, protoplasm, which is sensitive, due to its sensitive nature it possesses special property called irritability. It means it irritates when there is a change in its environment.

Q: Define locomotion.

The movement of an animal as a whole from one place to another is called locomotion.

Q: What are the main differences between locomotion and movement?

Locomotion	Movement
Moving away from the original position of an organism is locomotion.	Movement can happen with or without moving away from an organism's original position.
It is always voluntary.	It can either be voluntary or involuntary.
Locomotion takes place at the organism level.	A movement takes place at the biological level.
Locomotion doesn't necessarily require energy	Movement requires energy.

Q: What are stimuli and how types of movement in organisms are classified on the basis of it?

The change in environment takes place due to some factors these factors are called stimulus. anything that produces a response in an organism or in a cell or tissue of an organism. Such stimuli can be internal or external.

Internal stimuli come from inside an organism—pain and hunger are internal stimuli

Types of movement on the basis of stimuli:

On the basis of stimuli there are two types of movement

Autonomic or spontaneous movement	Paratonic or induced movement
It is due to internal stimuli	It is due to external stimuli
Genes are involved	Genes are not involved
It shows in both plant and animals	It shows in both plant and animals
Example <ul style="list-style-type: none"> • Cramps due to involuntarily ++ release of calcium ions • Beating of cilia and flagella. • protoplasmic streaming 	Example <ul style="list-style-type: none"> • Reflex action. • Taxes, <u>tropic movements</u> and <u>nastic movements</u> in plants.

Q: Define skeleton.

Skeleton are the frame work which gives shape to any structure.

(OR)

The framework of hard articulated structures that provides physical support, attachment for skeletal muscles and protection for the bodies of animals is called skeleton.

Q: What are the three main functions of skeletal system?

The skeleton performs three main functions

- Provide shape to organs
- Provide support to organs during movement
- Provide protection to soft, vital organs

Q: What is the role of skeletal system?

The big functions of the skeletal system are Protection:

- Skeleton provides protection to many internal organs. For example: Skull protects brain
 - Vertebral column protects spinal cord
 - Ribs protect most of the internal organs
- Support:
- Vertebral column provides the main support to the body mass
- Movements:
- In our body, skeleton works very closely with the muscular system to help us move.

Hydrostatic skeleton	Exoskeleton	Endoskeleton
Skeleton made up of fluid	Skeleton develops outside the body or organ.	Skeleton develops inside the body.
Found in soft bodied animals	Found in Arthropod, Mollusca and higher animals	Found in high animals.
Simplest type of skeleton	It provides support and protection.	Provide shape, support and protection
Help in extension or withdrawal of body or its organs.	Nonliving in nature	Living in nature made up of cells.
In jelly fish help in propulsion. In earthworm coelomic fluid act as hydrostatic skeleton	In arthropods made up of chitin, in Mollusca made up of CaCo ₃ In high animals made up of proteins	Two types of endo skeleton cartilage made up of chondrocyte bones made up of osteocytes.

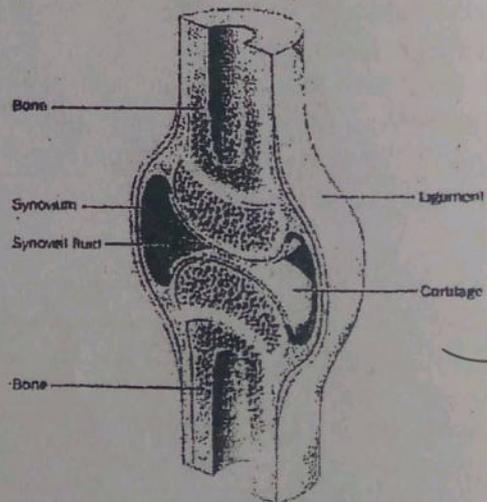
Q: What do you know about human skeleton?

Write differences between bones and cartilage.

Human Skeleton

The skeletal system of human is basically made up of two types of skeletons

- (i) Cartilage
- (ii) Bones



Bones	Cartilage
Bones are the hard, inelastic and a tough organ that forms part of the vertebral skeleton.	Cartilage is a soft, elastic and flexible connective tissue that protects the bone from rubbing against each other.
Bone cells are known as osteocytes.	Cartilage cells are known as chondrocytes.
Presence of blood vessels.	Absence of blood vessels (nutrients are obtained through diffusion)
Has deposits of calcium salts.	May or may not have deposition of calcium salts.
The bones have a rich blood supply.	Lacks blood supply (hence repair is slower)
The growth pattern of the bone is bidirectional.	The growth pattern of the cartilage is unidirectional.
Presence of calcium phosphate in the matrix.	Has no calcium phosphate in the matrix.
Functions: <ul style="list-style-type: none"> Protect the body from mechanical damage Provide a framework and shape for the body & helps in the movement. Store minerals, and produce both RBC – red blood cells and WBC – white blood cells. 	Functions: <ul style="list-style-type: none"> Supports the respiratory tract Acts as shock absorbers between weight-bearing bones Maintains the shape and flexibility of fleshy appendages and reduces friction at joints.

Q: What are tendons and ligaments?

Tendons and ligaments are a type of connective tissues that contain tightly packed collagen fibers

Tendons

Tendons joint bones to skeletal muscles. They are made up of connective tissues.

Ligaments

Ligaments join two bones together. They are also a type of connective tissue.

Q: Enlist the name and number of bones in hind limbs.

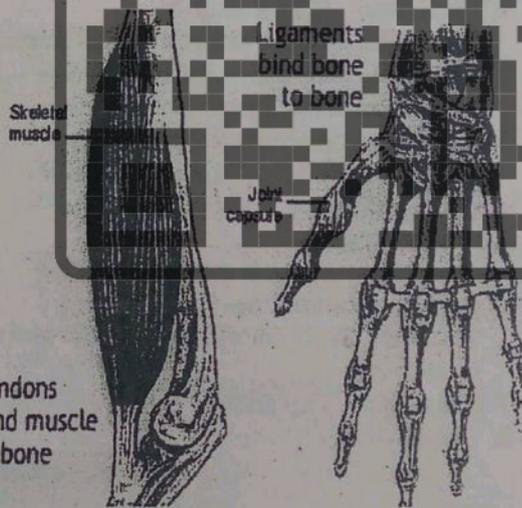
The bones of the hind limb are femur (thigh bone – the longest bone), tibia and fibula, tarsals (ankle bones – 7 in number), metatarsals (5 in number) and phalanges (digits – 14 in number). Hence number of bones in the hind limb of human is 30

Q: locate the immovable joint in human body.

Immovable joints (called synarthroses) include skull sutures, the articulations between the teeth and the mandible, and the joint found between the first pair of ribs and the sternum.

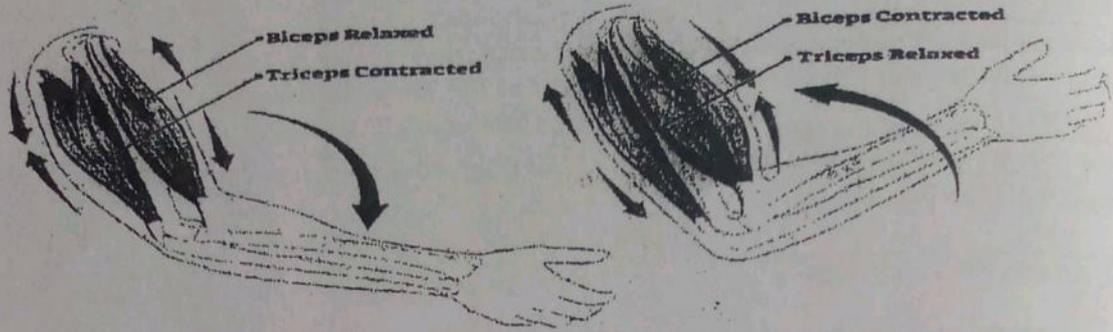
Q: What do you mean by bicep and triceps muscles?

Biceps	Triceps
Made up of two muscle bundles: the long head and the short head.	Made up of three muscle bundles: the lateral head, the long head, and the medial head
Responsible for forearm rotation and moving the elbow and shoulder	Extends the elbow and moves the elbow and the shoulder but in the opposite direction as the biceps
Functions as a flexor, responsible for the pulling action and decreasing the angle between the forearm and the upper arm	Functions as an extensor, responsible for the pushing action and increasing the angle between the forearm and the upper arm



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Q: What do you know about antagonism and antagonistic pairs of muscles

This type of working of two muscles against each other called antagonism. This pair of skeletal muscles which work against each other called an antagonistic pair.

Extended Response Questions with Answers

Q: Define in detail about human skeletal system with its types.

This skeletal system can be divided into the axial and appendicular systems. In an adult body, it is mainly composed of 206 individual bones which are organized into two main divisions:

- Axial skeleton
- Appendicular skeleton.

Axial skeleton

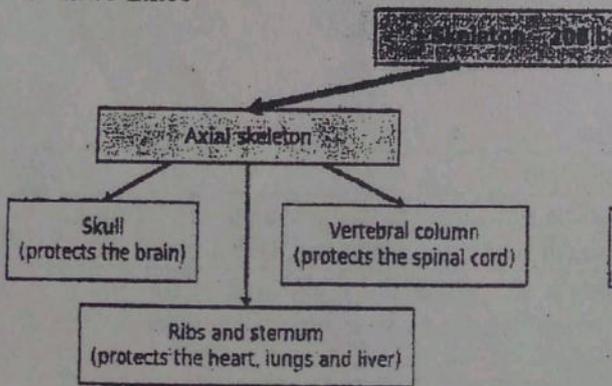
The axial skeleton runs along the body's central axis, therefore it is called the central core of the human body. The axial skeleton is composed of 80 bones and it consists of:

1. Skull Bone – 22 bones
It includes 8 cranial bones, 14 facial bones, 6 auditory ossicles, and the Hyoid Bone
2. The bone of the Thoracic Cage/Rib cage – 25 bones
Ribs 12 pairs and sternum 1 bone
3. The bone of the Vertebral column- It includes 26 vertebrae bones, the sacrum bone, and the coccyx bone.

Appendicular skeleton

The appendicular skeleton is composed of 126 bones and it comprises of the-

1. Pectoral r Girdle (shoulder gridle)
2. Forelimbs
3. Pelvic girdle (hip gridle)
4. Hind limbs



- **Pectoral girdle** is consisted of two bones i.e., scapula and clavicle.
- **The forelimb** consists of humerus, radius and ulna, carpal (8), metacarpal (5), and phalanges (14).
- **Pelvic girdle** consists of three bones ileum, ischium and pubis.
- **Hind limb** consists of femur, patella, tibia, fabula, tarsals (7), metatarsals (5) and phalanges (14).

Q: What are joints? Define it with its types

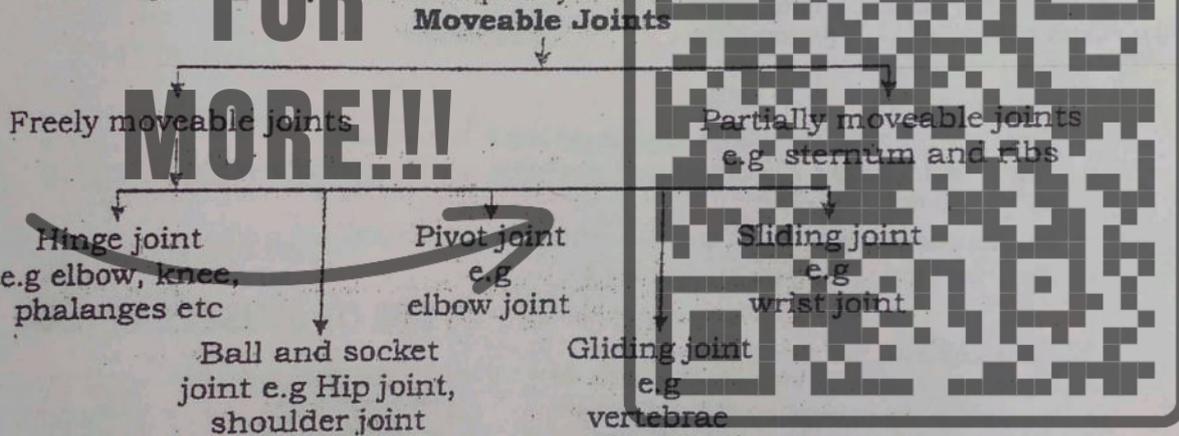
Joints

A joint is a connection that occurs between bones in the skeletal system.

- Joints provide the means for movement.
- Joints can be classified based on structure and function.
- The joints help us to rotate our shoulder, bend our knees and elbows, swivel our neck and more.

There are two types of joints

- **Immovable joint**
- **Movable joint**
- **Immovable or fixed joint.** Joint where bones are fixed like puzzle pieces and do not allow to move, like 8 bones of skull or 3 bones of pelvic girdles.
- **Movable joints** where bones are allowed to move freely or partially. So there are two types of movable joints i.e freely moveable and partially moveable.



Q: Discuss different types of freely movable joints and their role.

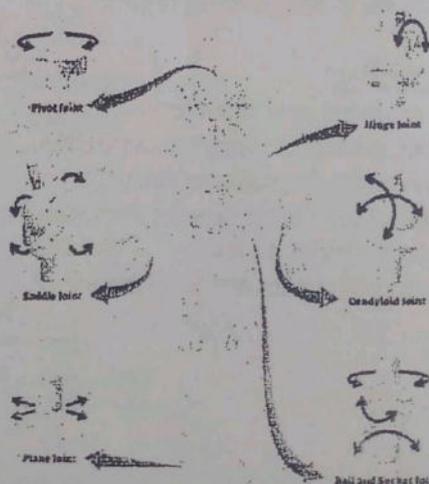
Freely movable joints:

These joints allow free movements. There are two types of freely moveable joints i.e. hinge joint and ball-and-socket joints.

(i). **Hinge joints:** Hinge joints allow movements only in two directions. These are present at the elbow and the knee.

(ii). **Ball-and-socket joint:** Ball-and-socket joints allow movement in all directions (up, down, forward, and backward). Hip joint and shoulder joint are examples of ball-and-socket joints.

TYPES OF JOINTS



Pivotal Joints

In this type of joint, one bone has tapered into the other in such a way that full rotation is not possible. This joint aid in sideways and back-forth movement. An example of a pivotal joint in the neck.

Hinge Joints

Hinge joints are like door hinges, where only back and forth movement is possible. Example of hinge joints is the ankle, elbows, and knee joints.

Gliding Joints

This joint is mainly found in those regions where the two bones meet and glide on one another in any of the directions. Example vertebrae

Q: Describe in detail about muscles and its types.

Muscles

Movements of arms and legs are brought about by the contraction of muscles attached to bones. Muscles are connective tissues consist of fibrous cells. These tissues have a tendency to contract and relax.

Types of Muscles

The muscular tissue is of three types:

Skeletal Muscle Smooth Muscle Cardiac Muscle

Skeletal Muscle

- These muscles are attached to the skeleton and help in its movement.
- These muscles are also known as striated muscles because of the presence of alternate patterns of light and dark bands.
- Skeletal muscles are voluntary muscles composed of muscle fibers.
- The cells of these tissues are multinucleated.

Smooth Muscle

- These are non-striated, involuntary muscles.
- It stimulates the contractility of the digestive, urinary, reproductive systems, blood vessels, and airways.
- The cells are spindle-shaped with a single nucleus.
- These muscles are found in blood vessels, digestive tract and many other internal organs.

Cardiac Muscle

- These are found only in the heart.
- These are involuntary muscles and the heart pumps the blood through cardiac contractions.
- The cells of the cardiac muscles known as the cardiomyocytes are striated.
- They are single-celled and ununucleated.



Cardiac muscle



Skeletal muscle



Smooth muscle



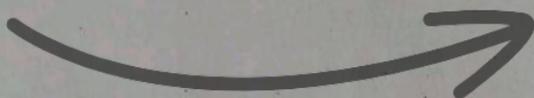
13. The simple and most common way of asexual reproduction in bacteria:
 * Multiple fission
 * **Budding**
 * Regeneration
 * Binary fission
14. Inside testes, sperms are produced in:
 * Vas deferens
 * **Seminiferous tubules**
 * Collecting duct
 * Sperm duct
15. The plant in which vegetation propagation occurs by leave is called:
 * Water lily
 * Ginger
 * Ferns
 * **Bryophylum**
16. Which part of flower is changed into fruit?
 * Ovule
 * Petals
 * **Ovary**
 * Anther
17. Calyx is the outer most whorl of the flower and bears the colour:
 * Red
 * white
 * Blue
 * **Green**
18. In animal process of reproduction without fertilization is called:
 * **Parthenocarpy**
 * Tissue culture
 * Parthenogenesis
 * Fission
19. The whorl of carpels in a flower is called:
 * Androecium
 * Corolla
 * **Gynoecium**
 * Calyx
20. Ovule after ripening make:
 * Seed
 * Egg
 * Root
 * Fruit
21. Growing an entire new plant from part of the original plant is called.
 * Fragmentation
 * Budding
 * Regeneration
 * **Vegetative propagation**
22. Diploid (2n) is:
 * Egg cell
 * **Zygote**
 * Endosperm
 * Sperm cell
23. Reproducing a new plant form any part of a plant is:
 * **Tissue culture**
 * Grafting
 * Parthenogenesis
 * Cutting
24. Female reproductive part of flower is called:
 * Calyx
 * Corolla
 * Androecium
 * **Gynoecium**
25. The seed coat consists of an outer thick layer called
 * Plumule
 * **Testa**
 * Tegmen
 * None of these

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26. The water enters into the seed through a very small hole in the seed coat this pore is called
- * Micropyle
 - * Cotyledon
 - * Pericarp
 - * Plumule
27. Ovary works as gland as well in
- * Male rabbit
 - * Both of these
 - * Female rabbit
 - * None of these
28. AIDS is caused by
- * Bacteria
 - * Pathogen
 - * Fungai
 - * Virus
29. Multiple fission is found in
- * Plasmodium
 - * Fishes
 - * Corals
 - * Bacteria
30. Pollination is the transfer of pollens from:
- * Sepal to petal
 - * Petal to sepal
 - * Stigma to anther
 - * Anther to sigma

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Chapter:05 Reproduction

Short Questions with Answers

Q: What is Reproduction?

It is the process in which living organism produce offspring of their own kind is called reproduction.

- Reproduction is the most fundamental function of living things.
- It is essential for continuing and survival of the species.
- the reproduction also depends on the favorable environmental conditions also.

Types Of Reproduction

Living organism can produce by two ways

Asexually

Sexually

Q: What are the main differences between asexual and sexual reproduction?

Asexual reproduction	Sexual reproduction
Occurs in prokaryotic microorganisms and in some eukaryotic unicellular and multicellular organisms. lower invertebrates and plants	Occurs almost in all types of multicellular organisms including humans, animals, and higher plants.
Gametes are not formed.	Gametes are formed.
No fertilization occurs.	Fertilization takes place.
No involvement of reproductive organs.	Presence of fully developed reproductive organs.
Only mitosis type of cell division occurs.	Both meiosis and mitosis type of cell division occurs.
Characteristics of only one parent are inherited.	Characteristics of both parents are inherited.
The number of offspring produced may vary from two to many.	The number of offspring produced is comparatively lower.
Bacterial fission, fragmentation, spore formation, budding of hydra are different types of asexual reproduction.	Syngamy, external fertilization, and conjugation are different types of sexual reproduction.

Q: How many types of asexual reproduction are there?

There are different types of asexual reproduction:

- Binary Fission
- Budding
- Fragmentation
- Vegetative Propagation
- Sporogenesis.

Q: Describe structure of maize grain in short.

Structure of maize grain:

Internally maize grain is divided into two unequal parts by a thin layer of cells called epithelium. The larger portion is the endosperm and the smaller is embryo. In the embryonic part, a shield shaped cotyledon is present called scutellum. Moreover the plumule and radicle are enclosed in protective sheath called coleoptile and coleorhiza, respectively.



Q: Define germination in seed.

Germination of seed

Breaking of seed dormancy is called seed germination. As a result of germination seed develops into seedling.

Q: How leaves develop into new plants?

Some leaves have bud on their margin e.g., Bryophyllum. These buds give rise adventitious root when fall on ground or come in contact with soil. After sometime these parts of leaves develop into an independent plant.

Q: List out the male reproductive organs of rabbit with glands.

Male reproductive Organs in Rabbit

1. Gonads (Gametes producing organs)
2. Duct (Gametes collecting tubes)
3. Genitals
4. (Gametes depositing or receiving organs)
5. Glands
 - Prostate gland
 - Cowper's gland
 - Seminal vesicle

Q: List out the male reproductive organs of rabbit with glands.

1. Gonads (Gametes producing organs)
2. Duct (Gametes collecting tubes)
3. Genitals
4. (Gametes depositing or receiving organs)
5. Glands
 - Ovary works as gland as well

Q: What is STD's?

The diseases or infections which are passed from one person to another person through genital organs and genital fluids during sexual contacts called **sexually transmitted diseases**. Some of the sexually transmitted diseases are Gonorrhoea, AIDS, Syphilis, Genital herpes etc.

Q: Why population control is considered important for prosperous society?

Population means the total number of beings living in a particular area. The human population helps in estimating the birth and death rates, the number of resources that will be required i.e., food, houses, health, electricity, transport, drinking water, garbage disposal etc.

To establish and maintain the quality of human life and environmental conditions the birth rate should be planned according to available resources of the area.

Q: What do you know about term apomixes?

Apomixis, derived from two Greek words "APO" (away from) and "mixed" (the act of mixing or mingling). It refers to the formation of the plant from a seed without fertilization or normal sexual reproduction. Apomixis can be best described as the reference to the asexual process.

Q: What are unisexual and bisexual flowers? Give two examples of each.

Unisexual flowers

The flowers which contain only the male or female reproductive organs are called unisexual flowers. They are called incomplete flowers. To reproduce they undergo cross-pollination.

- They do not have both stamen and carpels.
- Examples: Papaya, White mulberry and Watermelon.

Bisexual flowers

The flowers which contain both male and female reproductive organs are known as full or bisexual flowers.

- They will self-pollinate themselves.
- Examples: Tulip, Sunflower and Lily

Extended Response Questions with Answers

Q: Define different types of Asexual reproduction in plants.

Types of Asexual Reproduction

There are different types of asexual reproduction:

1. By Fission (Splitting):

The splitting of cell into two or more cells is called Fission. It is the simplest and the fastest mode of asexual reproduction. Each daughter cell receives equal amount of genetic material. Fission is of two types, i.e., binary fission or multiple fission.

(a) Binary Fission: Type of fission where a mother cell divides into two daughter cells. It occurs during favorable conditions. It takes place in bacteria under favorable conditions of temperature, nutrition and moisture.

(b) Multiple Fission: Type of fission where a mother cell divides into more than two daughter cells.

2. Budding:

In this type of asexual reproduction, the parent cell forms a small out growth which is called bud. This bud detaches from parent cell or body and grows into new organism.

It takes place in yeast and plants.

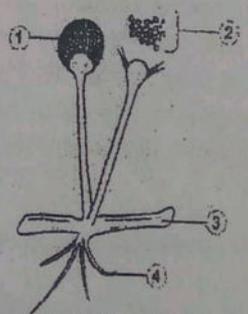
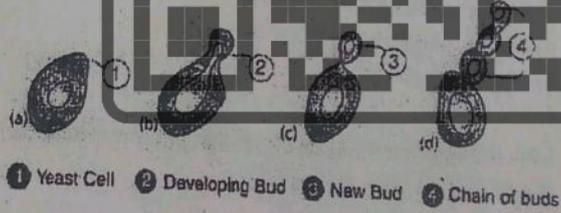
3. By Spores

During unfavorable conditions, the organism develops sac-like structures called sporangium that contain spores. When the conditions are favourable, the sporangium burst opens and spores are released that germinate to give rise to new organisms.

It occurs in fungi, algae and plant

4. Vegetative Propagation

Asexual reproduction in plants occurs through their vegetative parts such as leaves, roots, stem, and buds. This is called vegetative propagation. For example, potato tubers, runners/stolon, onion bulbs, etc., all reproduce through propagation.



Stem

Runners grow horizontally above the ground. The buds are formed at the nodes of the runners.
 Runner (Grass and strawberry) stolon (mint), rhizomes (ginger)

Roots/Suckers

New plants emerge out of swollen, modified roots known as tubers. Buds are formed at the base of the stem. Bulb (onion and garlic), stem tuber (potato), Bulbil (Bryophyllus)

Leaves

Leaves of a few plants get detached from the parent plant and develop into a new plant.

Bulbs

Bulbs have an underground stem to which the leaves are attached. These leaves are capable of storing food. The center of the bulb produces leaves and flowers while shoots are developed from the lateral buds.

Bulb (onion and garlic), stem tuber (potato)

Q: What do you know about artificial vegetative propagation?

Artificial Vegetative Propagation

This is a type of vegetative reproduction carried out by humans on the fields and laboratories. The most common types include:

1. Cutting

- In this, a part of a plant, specifically a stem or leaf is cut and planted in the soil.
- These cuttings are sometimes treated with hormones to induce root development.
- E.g. sugar cane, sweet potato and rose

2. Grafting

- This is a technique where a branch of desired variety of plant is joined to another plant with well-established root system.
- The plant from which the branch is taken is called scion and the plant to which it is joined is called stock.
- The two plants involved are normally belongs to different varieties of same species.
- E.g. oranges, lime and mango.

3. Cloning (Tissue Culture Technology)

- It is one of the recent techniques. In this, the plant cells from different parts of a plant are cultured in the laboratory to develop a new plant.
- This technique is helpful in increasing the number of rare and endangered plant.
- To speed up the growth, hormones are added in the growth medium.
- After some time, the baby plant is transferred to field for large commercial scale production of desired yield.

Q: Define in detail about sexual reproduction in flowering plant (Angiosperms).

Sexual Reproduction in flowering Plants

The angiosperm sexual reproduction takes place through flower. Flower is highly modified shoot which is responsible for the reproduction by producing seeds within fruits.

The complete flower typically consists of four parts:

Calyx: its each member is termed as Sepals

Corolla: its each member is termed as Petals

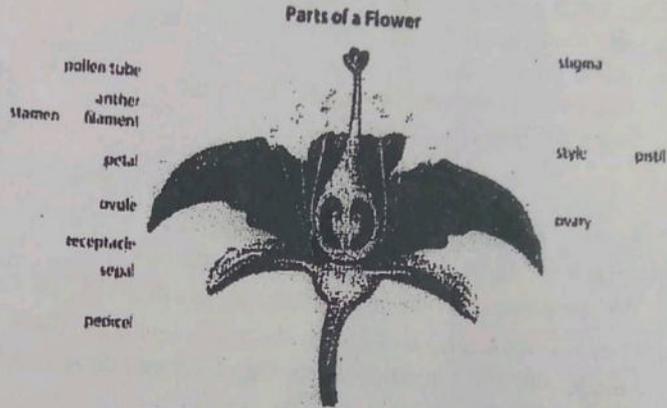
Androecium: its each member is termed as Stamen (male reproductive part)
Stamen consists of anther and filament.

- The anther is a sac-like structure that produces and stores pollen.
- The filament supports the anther.

Gynoecium: its each member is termed as Pistil/Carpel (female reproductive part)

The pistil comprises three parts- stigma, style, and ovary.

- Stigma is the topmost part of a flower.
- The style is the long tube which connects the stigma to the ovary.
- The ovary contains a lot of ovules. It is the part of the plant where the seed formation takes place.



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Q: Describe structure of ovule.

Structure of Ovule:

Nucellus: Each ovule has main cellular body called nucellus. It is surrounded by two coats, outer and inner integuments.

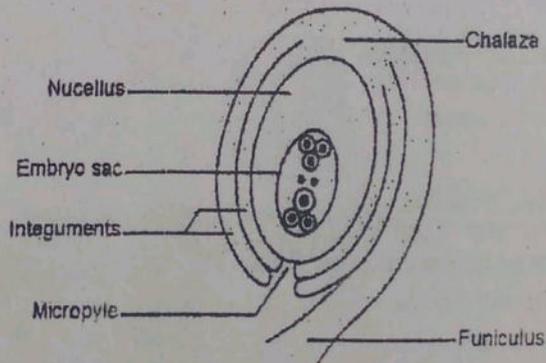
Micropyle: A small opening present at the apex of the integument is called micropyle.

Funicle: The ovule has stalk, the funicle with which it is attached to ovary wall.

Chalaza: Chalaza are tissues between nucellus and funicle.

Embryo sac: There is a large oval cell embedded in the nucellus which form embryo sac (female gametophyte).

Embryo: The mature embryo sac consists of 7 cells i.e. one Ovum, two synergids, three antipodals cells and one secondary nucleus in numbers while a diploid cell is a fusion nucleus in the center.

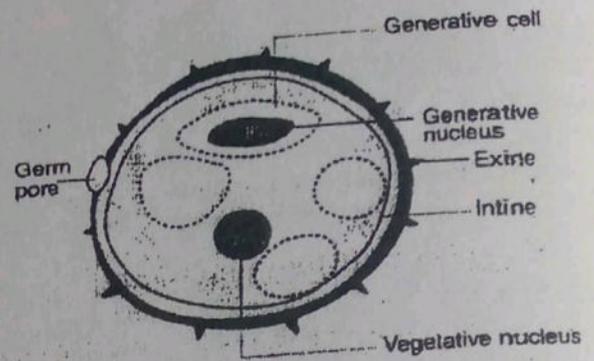


Q: What do you know about structure of pollen grain? Also define formation of microspores and megaspores.

Structure of pollen grain:

Pollen grain develops in pollen sac of anther from microspore in the form of loose, dusty powder. Each pollen grain is 4 celled structures. bounded by wall which consists of 2 layers. outer, the exine and inner, the intine.:

- The inside of the cell, which is filled with living cytoplasm
- **Intine**, the inner layer of the cell wall comprises the cellulose and pectin. Similar to the cytoplasm.
- **Exine**, the outer layer of the cell wall, mainly consists of sporopollenin. It is one of the most resistant substances.



Formation of pollen grains/microspores

- In flower androecium (Male part) is consist of stamen (microsporophyll) has 2 to 4 pollen sacs (microsporangia) in its anther.
- These pollen sacs are filled with microspore mother cell which produces microspore by meiotic cell division.
- Each unicellular microspore divides its cells by mitosis and produce 2 to 4 cells each of its cell is haploid.
- When anther burst these pollen grains disperse in nature.

Formation of megaspores

- Each carpel (megasporophyll) has one or more ovules (megasporangium) in its ovary.
- Each ovule has single megaspore mother cell.
- This megaspore mother cell divided by meiosis to produce 4 haploid megaspores.
- Only one will survive and develops into embryo sac (female gametophyte) inside ovule.
- The pollen grain disperses if dropped at the stigma of carpel the life cycle remain continues.

Q: What is pollination? Define its types also.

Pollination

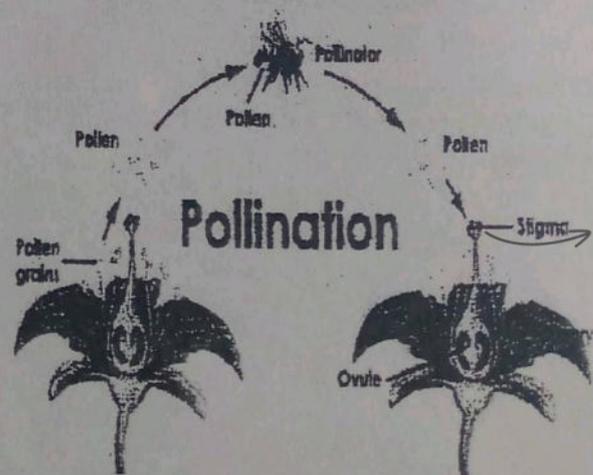
Pollination is the process in which pollen grains are transferred from anther to stigma of carpel.

Types of Pollination

- (i) Self pollination
- (ii) Cross pollination

Self-Pollination

It is the transfer of pollen grains from anther of stamen to the stigma of same flower or flowers on same plant.



Cross-Pollination

It is the transfer of pollen grains from anther of one flower to stigma of other flower belongs to another plant of same species. Cross pollination is more common than self-pollination, the pollen grains are carried from one flower to another through following agents.

- (i) Wind
- (ii) Water
- (iii) Insects
- (iv) Animals

Q: What do you know about process of fertilization in plants?

Fertilization/Double fertilization

When pollen grain drops at stigma, it starts its development into pollen tube (male gametophyte), which consists of 6 haploid cells, among them

- Two are prothallium cells
- Two are male gametes
- One stalk nucleus
- One tube nucleus.

The pollen tube grows from stigma to ovule through style and transfers two male gametes in ovule through micropyle to reach to embryo sac.

One sperm nucleus fuse with ovum to produce diploid (2N)

zygote while other gamete fuses with secondary nucleus to form 3N (Triploid) cell which later develop into endosperm of seed.

This type of fertilization is called **double fertilization** which is the characteristic feature of angiospermic plant.

During this development the ovule develops into seed the integument develop into seed coat whereas zygote form small embryo and cotyledon during this the ovary outside ovule become swollen due to mitotic cell division and become fruit.

Q: Define structure of seed.

Structure of seed

A seed is an important part of a flowering plant.

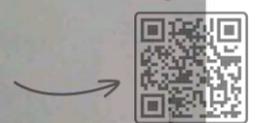
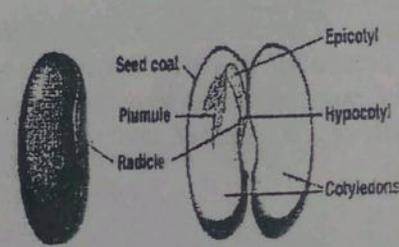
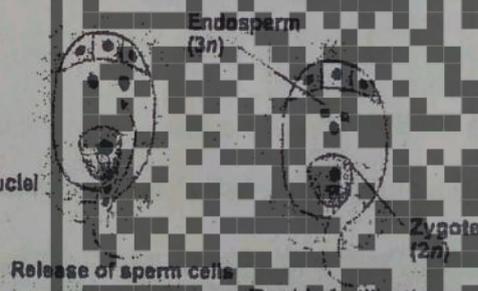
They give rise to a new plant.

They may be round, wrinkled, winged or hairy.

The growth of the plant from a seed is known as germination.

A seed has three parts:

- Seed Coat
- Endosperm
- Embryo



1. Seed Coat

A seed coat protects the internal parts of a seed. The seed coat has two layers.

Testa: The outer layer is thick and known as the Testa.

Tegmen: The inner layer is thin and known as tegmen.

Micropyle: An opening in the integument of the ovule is known as the micropyle and is visible on some seed coats.

2. Endosperm

The endosperm contains the nutrients stored in it.

It provides nutrients to the seed in the form of starch, carbohydrates and proteins to support the embryo during germination.

It is located below the seed coat.

3. Embryo

The embryo is the most important part of a seed. It is diploid, developed from the fertilized egg. An embryo comprises the following parts:

- Epicotyl
- Hypocotyl
- Radicle
- Cotyledons

Epicotyl is a small shoot which gives rise to the entire plant shoot system.

Hypocotyl: The primary root emerges first during germination. It is also known as hypocotyl. It anchors the plant firmly in the soil.

Radicle is a small embryonic root.

The **cotyledons** provide nourishment to different parts of the embryo. It emerges as a tiny or fleshy leaf from the soil with the seedling during growth. It stores food in the form of starch and protein. The embryonic leaves are the first to appear above the ground. An embryo develops from a fertilized egg.

Q: What are the conditions necessary for seed germination?

Conditions necessary for seed germination

Only living seeds can germinate, require optimum condition of moisture, oxygen and temperature.

(i) Role of water (Moisture)

Water is essential for life because metabolic activities depend on water.

Seed coat become soft by water. Cotyledons and endosperm absorb water by imbibition become swollen and exert pressure on seed coat to break. So the embryo comes out to grow, enzymes become activated by water and solid reserve food change into solution.



(ii) Role of oxygen:

The metabolic activities require energy. Energy is produced during respiration which requires oxygen.

(iii) Temperature:

Enzyme's activity requires certain range of temperature. Most of the seeds require the temperature range between 25 to 37 C. Seeds do not germinate at temperature below 0 C or above 45 C.

Q: Define asexual reproduction in animals.

Asexual Reproduction in Animals

There are also two types of reproduction in animal. i.e. Asexual and sexual reproduction.

Asexual reproduction

Animals reproduce asexually by different methods, some of them are as follows.

1. Fission (Splitting)

Splitting of cell into two or many cells or organisms called fission.

(a) Binary Fission:

The type of fission where an organism divides into two organisms is called binary fission. It is commonly observed in unicellular organisms like protozoa. During this process the nucleus of the parent organism divides into two nuclei, both of them move in opposite directions in the cytoplasm. finally, organism divides into two organisms.

(b) Multiple Fission

Multiple fission involves the division of an organism into many small sized daughter organisms as found in *Plasmodium*.

2. Budding

In this method one or more out growth develop on the body surface of organism which are called buds. When buds separate from the parent body starts living independently and develop into new organism e.g., *Hydra*.

3. Fragmentation

It is found in lower, multicellular animals like liver fluke and nematodes. When a living organism divides into fragments, each fragment recovers its lost part by regeneration and develops into new organism.



Q: Define sexual reproduction in animals.

Sexual Reproduction

The process of sexual reproduction involves fusion of specialized haploid sex-cells or gametes to form a single diploid cell, zygote. The fusion of these gametes is called fertilization. Sexual reproduction

involves:

- (i) Gametogenesis - Formation of gametes
- (ii) Mating - Union of male and female organisms to collect their gametes at same place.
- (iii) Fertilization - Fusion of male and female gametes to form zygote.



Q: What are the adaptive characters of wind and water pollinated flowers?

Adaptive characters of wind and water pollinated plants.

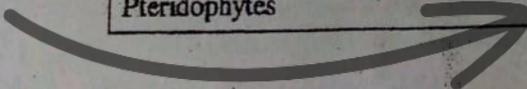
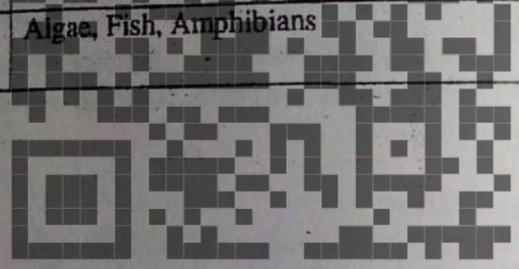
1. The flowers of these plants are non-attractive, small in size and do not bear any odour.
2. They produce pollen grains in high quantity.
3. The pollen grains are very light in weight, some of them bear wings and some have parachute like structure.
4. They do not produce high quantity of nectar.

Adaptive character in insect pollinated plants.

1. The flowers are large in size.
2. They have bright coloured petals or sepals or bracts.
3. The pollen grains have sticky substance or hooks.
4. They produce special odour
5. They produce high quantity of nectar.

Differences

Internal Fertilization	External Fertilization
Fusion of gametes within the body of the female	Union of the gametes in an external environment (Water bodies)
Lesser is released and deposited inside the body of the female	Multiple gametes (both male and female) released into the external environment
It occurs inside the female body	It occurs outside the body
Gametes may mature after each other.	Both gametes mature at same time.
Gametes are produced in limited numbers.	Gametes are produced in large numbers.
Reptiles, Birds, Mammals, Tracheophytes, Pteridophytes	Algae, Fish, Amphibians



Epigeal Germination	Hypogeal Germination
The cotyledons are brought on the surface of the soil along with the shoot	Cotyledons remain below the soil surface
The hypocotyl has a curved terminal part to protect the plumule as it comes out of the soil	The epicotyl has a curved terminal part to protect the plumule from friction in soil particles
The hypocotyl grows excessively to bring the cotyledons out of the soil	The hypocotyl does not show much elongation
The plumule comes out of the seed by the elongation of the hypocotyl	The plumule comes out of the seed by the elongation of the epicotyl
The energy for the growth comes from the cotyledons	The energy primarily comes from the endosperm
Epicotyl is short	Epicotyl is long
The cotyledons turn green and perform photosynthesis	The cotyledons have no role in photosynthesis
It is generally shown by the dicot seeds	It is shown by the monocot seeds
It occurs in beans, onion, papaya, castor	It occurs in coconut, gram, maize, etc.

Epigeal

Hypogeal

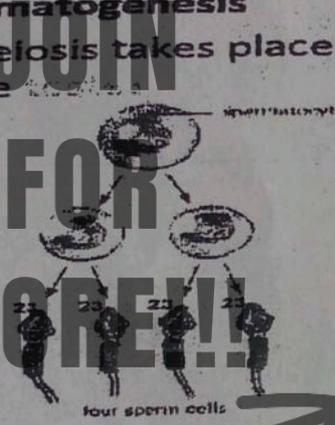
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Spermatogenesis	Oogenesis
The production of sperms from spermatogonia is known as spermatogenesis	The production of eggs from oogonia is known as oogenesis
Occurs in testes	Occurs inside the ovary
All stages are completed in testes	The major part of oogenesis occurs inside the ovary. The last few stages occur in the oviduct.
It is a continuous process	It is a discontinuous process.
Produces motile gametes	Produces non-motile gametes
Equal cytokinesis occurs during the spermatogenesis producing four sperms.	Unequal cytokinesis occurs during oogenesis ultimately producing one large ovum and tiny polar bodies

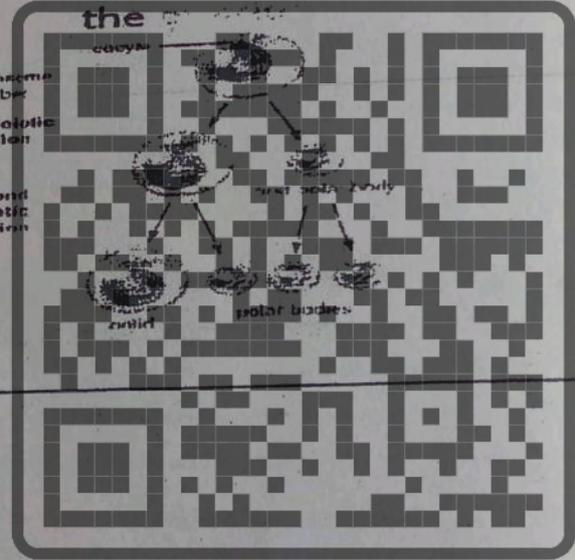
• **Spermatogenesis**

— Meiosis takes place in the



• **Oogenesis**

— Meiosis takes place in the



Solved exercise from book**Multiple Choice Questions**

Choose the correct answer:

- i) The process which is essential for continuing and survival of species is
 * Digestion
 * **Reproduction**
 * Respiration
 * Excretion
- ii) The type of reproduction which is necessary for evolution is
 * Vegetative propagation
 * **Sexual reproduction**
 * Fragmentation
 * cloning
- iii) The unicellular structure, responsible for asexual reproduction without fusion is
 * Pores
 * Gametes
 * **Spores**
 * Pollen grains
- iv) The example of stem which run horizontally on surface of soil to produce vegetatively
 * **Mint**
 * Onion
 * Ginger
 * Bryophyllum
- v) Plant stem that arise from buds on the base of parent plants are
 * Bulb
 * **Sucker**
 * Rhizome
 * Runner
- vi) The type of seed production without fusion of male and female gametes is
 * Parthenocarpy
 * Grafting
 * **Apomixes**
 * Scion
- vii) The female gametophyte of angiospermic plant is
 * **Embryo sac**
 * Ovary
 * Ovule
 * Carpel
- viii) The 3N zygote is angiosperm develop into
 * Seed coat
 * Embryo
 * Cotyledon
 * **Endosperm**
- ix) The male gonads in rabbit are
 * **Testis**
 * Scrotal sac
 * Ovaries
 * Vasdeferens
- x) The female gametes are fertilized in the rear end of
 * Oviduct
 * **Ovaries**
 * Fallopian tube
 * Both a and b.

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Chapter # 6 Inheritance

Multiple Choice Questions

1. The allele which is not expressed in F1 generation is called:
 - * Recessive
 - * Mutant
 - * Dominant
 - * Selected
2. ABO blood system is controlled by a gene
 - * many
 - * three
 - * five
 - * two
3. In human body cells the number of chromosomes present are:
 - * 48
 - * 52
 - * 23
 - * 46
4. In a nucleosome, DNA is wrapped around protein named.
 - * Interferon
 - * Haemoglobin/Insulin
 - * Histone

* How many pairs of homologous chromosomes are present in human body cells?

 - * 23
 - * 24
 - * 25
 - * 22
5. Ribosome reads the sequence of mRNA nucleotides and joins specific amino acids to form protein. This step is known as:
 - * Replication
 - * Translation
 - * Combination
 - * Transcription
6. How many contrasting pairs of characters of pea plant were studied by Mendel?
 - * five
 - * seven
 - * one
 - * three
7. In dihybrid cross the genotypic ratio of F2 generation is:
 - * 1 : 2 : 2 : 1
 - * 1 : 3 : 1 : 1
 - * 1 : 1 : 1 : 1
 - * 9 : 3 : 3 : 1
8. Which of the following statement regarding genes is FALSE?
 - * Each cell contains a single copy of every gene.
 - * A gene contains information for the production of a protein
 - * Genes consist of a long sequence of DNA
 - * Genes are located on chromosomes
9. Branch of biology that deals with the study of inheritance is called as:
 - * Genetics
 - * Artificial selection
 - * Natural selection
 - * Histology
10. The location of position of genes on chromosomes is called.
 - * Phenotypes
 - * Alleles
 - * Loci
 - * Genotype
11. Chromatin material is made of:
 - * RNA
 - * Protein
 - * DNA and Protein
 - * DNA
12. Transmission of character (traits) from parent offspring is called:
 - * Mutation
 - * Reproduction
 - * Regeneration
 - * Inheritance
13. The specific combination of genes in an individual is called.
 - * Phenotype
 - * Phenocopy
 - * Karyotype
 - * Genotype →
14. Alternatives forms of a gene are called:
 - * DNA
 - * Gamete
 - * Chromosome
 - * Allele

15. Adenine always pairs with:
 * Uracil * thymine * Guanine * Cytosine
16. It is a genetic material:
 * RNA * tRNA * DNA * rRNA
17. These are unit of inheritance.
 * Alleles * Genotype * Genes * Phenotype
18. Formation of messenger RNA from DNA is called.
 * Transcription * Translation * Transduction * Translocation
19. *Pisum sativum* is scientific name of:
 * Frog * Mustard plant * Onion * Pea plant
20. It is change in characteristics of a population or species of organisms over the course of generations:
 * Evolution * Transcription * Replication * Translation
21. An organism has two different alleles for a single trait. Its genotype is said to be:
 * Homozygous * Homozygous * Heterozygous * Homozygous
22. There are how many hydrogen bonds between cytosine and guanine?
 * two * four * one * three
23. Example of discontinuous variation is:
 * Intelligence * None of these * Blood group * Height in Man
24. Who developed fundamental principles of genetics?
 * Charles Darwin * Charles Lyall * Gregor Mendel * Lamarck

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Inheritance

Short Questions with Answers

Basic definition

❖ Heredity:

The sum of all biological processes by which particular characteristics are transmitted from parents to their offspring.

❖ Inheritance

Inheritance is the process by which genetic information is passed on from parent to child. This is why members of the same family tend to have similar characteristics.

❖ Genetics:

It is the branch of biology which deals with the hereditary characteristics of an individual and their transmission from parent to offspring.

❖ Variation:

Any difference between cells, individual organisms, or groups of organisms of any species caused either by genetic differences (genotypic variation) or by the effect of environmental factors on the expression of the genetic potentials (phenotypic variation).

❖ Trait or Character:

A character that is controlled by a pair of genes is called a trait or a character. Factor: Gene which is responsible for a particular trait is also called a factor.

❖ Chromosome:

Chromosomes are thread-like structures present in the nucleus, which carries genetic information from one generation to another. They play a vital role in cell division, heredity, variation, mutation, repair and regeneration.

❖ Homologous chromosome:

The pair of chromosomes which are similar in their shape, size and position of centromeres present in a cell.

(OR)

A homologous chromosome pertains to one of a pair of chromosomes with the same gene sequence, loci, chromosomal length, and centromere location.

❖ Locus:

The position on a chromosome where a gene is located is often referred to as locus.

❖ Homozygous:

An organism in which both copies of a given gene have the same allele

❖ Heterozygous:

An organism which has two different alleles of a given gene.

❖ Dominant:

The trait that appears in the offspring of two parents is called dominant trait. The gene controlling this trait is also said to be dominant.

❖ **Recessive:**

The trait or gene that is suppressed or masked in F₁ generation of two pure breeding organisms is called recessive e.g., the gene of dwarfness (t) is recessive.

❖ **Phenotype:**

Phenotype is the form of appearance of a trait e.g., color, form, size behavior etc.

❖ **Genotype:**

Genotype is the genetic complement i.e. genes in an individual for a particular trait such as TT, Tt, tt etc. (It refers the genetic makeup of a trait of the individual)

❖ **Mutation**

A mutation is a change that occurs in our DNA sequence, either due to mistakes when the DNA is copied or as the result of environmental factors

❖ **Alleles:**

A single gene may have alternative form which is called allele, or partners of gene pair are called allele.

Explanation: Each allele of a gene pair occupies the same gene locus on its respective homologue. Both alleles on one locus may be identical or different from each other.

❖ **Gene Pool:**

The group of individuals of same species that interbreed sexually and live in same place are called population. The genes distributed among all individuals of a population are collectively called a gene pool. It is the total genetic information encoded in the total genes in a breeding population existing at a given time.

Q: What is genetic variation?

Genetic variation is the presence of differences in sequences of genes between individual organisms of a species.

Q: What is gene and how it works?

Genes:

The smallest part of DNA is called genes which is a basic unit of biological information.

Explanation: The biological information in DNA is stored and coded in the sequence of its bases.

Every gene comprises of the particular set of instructions for a particular function or protein-coding.

Speaking in usual terms, genes are responsible for heredity.

Q: Define replication in DNA.

DNA Replication

When formation of new DNA molecule take place in the cells without any change. It is known as replication of DNA

In the process of DNA replication, the DNA makes multiple copies of itself. It is a biological polymerization which proceeds in the sequence of

Initiation,

Elongation,

Termination



X-BIOLOGY

Q: Why is Mendel's Law of segregation defined as the purity law of gametes?

In genetics, the Law of Segregation shows that because a gamete carries either a recessive or a dominant allele but not both the alleles at the same time. This is the reason how this law is also known as the law of purity of gametes.

Q: Define structure of chromosome.

Each chromosome contains hundreds and thousands of genes that can precisely code for several proteins in the cell. Structure of a chromosome can be best seen during cell division.

Structure of chromosomes:

Chromosomes are made up of chromatin, which contains a single molecule of DNA and associated proteins.

Chromatin: Chromosome is made up of chromatin. Chromatin is made up of DNA, RNA and proteins.

DNA is packaged in a highly organized manner in chromosomes

Chromosome is made up of deoxyribose-nucleo-protein which consist DNA and histone protein

Deoxyribonucleic acid:

DNA is the chemical name for the molecule that carries genetic instructions in all living things.

The DNA molecule is composed of units called nucleotides, and each nucleotide is composed of three different components, such as sugar, phosphate groups and nitrogen bases

Nucleo-protein / Histone Protein:

Histones are protein molecules and are rich in lysine and arginine residues, they are positively charged.

Extended Response Questions with Answers

Q: What do you know about DNA structure? OR define Watson and crick model of DNA.

DNA Structure

- The DNA structure can be thought of like a twisted ladder.
- This structure is described as a double-helix. It is a nucleic acid, and all nucleic acids are made up of nucleotides.
- The basic building blocks of DNA are nucleotides, which are composed of a sugar group, a phosphate group, and a nitrogen base.
- The sugar and phosphate groups link the nucleotides together to form each strand of DNA. Adenine (A), Thymine (T), Guanine (G) and Cytosine (C) are four types of nitrogen bases.
- These 4 Nitrogenous bases pair together in the following way: A with T, and C with G. These base pairs are essential for the DNA's double helix structure, which resembles a twisted ladder.
- The order of the nitrogenous bases determines the genetic code or the DNA's instructions.



Q: Define process of protein synthesis.

Protein Synthesis

Protein synthesis is the process in which cells make proteins. It occurs in two stages: transcription and translation.

Transcription

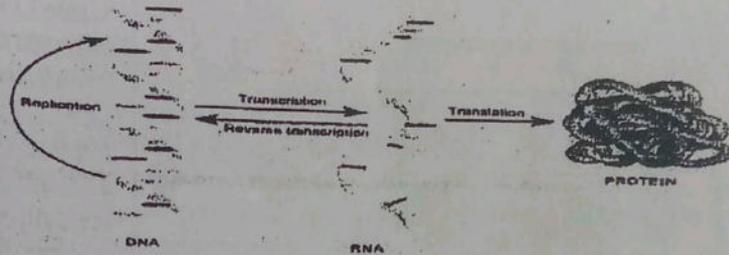
Transcription is the transfer of genetic instructions in DNA to mRNA in the nucleus. It includes three steps: initiation, elongation, and termination. After the mRNA is processed, it carries the instructions to a ribosome in the cytoplasm.

Translation

Translation occurs at the ribosome, which consists of rRNA and proteins. In translation, the instructions in mRNA are read, and tRNA brings the correct sequence of amino acids to the ribosome. Then, rRNA helps bonds form between the amino acids, producing a polypeptide chain.

After a polypeptide chain is synthesized, it may undergo additional processing to form the finished protein.

Transcription and Translation



Q: Why Mendel choose Pea Plant:

Mendel's work was on pea plant *Pisum sativum* and grow it in his monastery garden for eleven years. He chose this plant for many reasons:

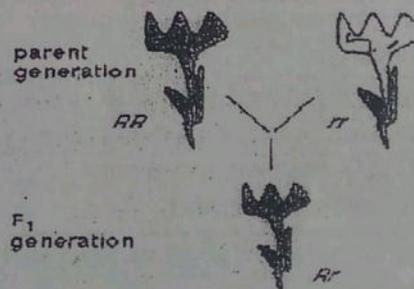
1. It was easy to grow.
2. Flowers of pea plant were hermaphrodite.
3. It was self-fertilizing plant but it can be cross fertilized.
4. The time gap between the generations was short, Mendel could produce many generations of pea within a short time.
5. Pea plants had many sharply distinct traits.
6. Each trait had two clear alternative forms or varieties, that differed from each other in very pronounced (sharp) ways e.g., seed colour could be yellow or green. Mendel called them contrasting character of trait.

Q: State Mendel's laws.

Law of Dominance

Mendel's law of dominance states that:

"When parents with pure, contrasting traits are crossed together, only one form of trait appears in the next generation. The hybrid offspring will exhibit only the dominant trait in the phenotype."



Law of segregation

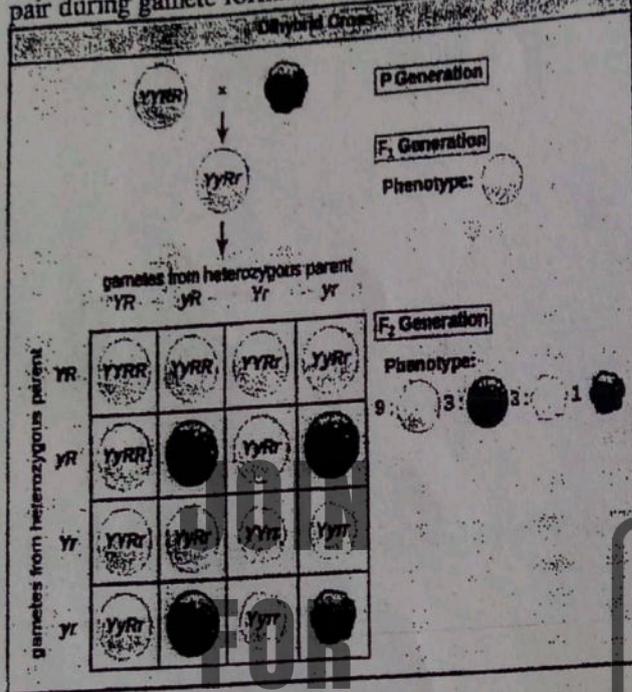
Statement:

This law state that co-existing alleles for each trait in an individual segregate from each other so that each gamete receives only one of the two alleles. Alleles unite at random fertilization of gametes.

Q: Define law of independent assortment.

Law of Independent Assortment

The law of independent assortment states that a pair of trait segregates independently of another pair during gamete formation. As the individual heredity factors assort independently, different traits get equal opportunity to occur together.



Explanation:
When two contrasting pairs of traits are followed together in the same cross, their alleles assort independently into gametes. E.g. seed shape and seed colour. He wanted to see if there was any relationship between the inheritance of one gene and inheritance of other gene.

Q: What do you know about incomplete dominance and codominance? Write differences also.

Incomplete Dominance
It is the discovery that was done after Mendel's work. Incomplete dominance is the situation in which both the alleles do not display a dominant trait resulting in a fine combination or a midway amid the characteristics of the alleles.

Co-dominance

When two alleles lack the dominant-recessive association and thus the duo affects the creature together.

Difference Between Codominance and Incomplete dominance	
Codominance	Incomplete Dominance
2 parent phenotypes are expressed together in their offspring	2 parents blend together to create a new phenotype for their offspring
The two alleles neither act as dominant or recessive over the other	One allele is not completely dominant over the other
Both the alleles blend equally and show the traits in their offspring	Both alleles blend, however only one of the two is noticeable in the offspring
A hybrid will not result in the formation of a new phenotype	A hybrid will always result in a new phenotype
Individuals with blood group ABO exhibit Codominance. A and B are dominant in relation to O, however, they are not dominant against each other.	Snapdragon. <i>Antirrhinum majus</i> (pink flowers are resultant when crossed between a homozygous red flower and a homozygous white flower)

Q: What do you know about multiple allele?

Multiple Allele:

More than two alternative alleles of a gene are known as multiple alleles in a population occupying the same locus on a chromosome or its homologue.

Features of multiple alleles

- The same genes have more than two alleles.
- All multiple alleles in homologous chromosomes occupy the respective loci.



- A chromosome or gamete only has one group allele.
- Each human contains only two separate gene alleles, one for each homologous pair of chromosomes carrying the gene.
- Multiple alleles express various alternatives of one trait.
- Different alleles can exhibit codominance, dominance-recessive behaviour or incomplete dominance.

Examples of multiple allelism: A well-known example of a trait determined by multiple alleles is the blood groups in man and skin colour.

Q: What do you know about different types of blood groups OR Define ABO blood group system.

Types of blood groups

ABO blood group:

Landsteiner divided human population into four groups based on the presence of antigens found in their red blood corpuscles. Each group represented a blood group. Thus, there are four types of blood groups viz. A, B, AB and O.

He observed that there was a reciprocal relationship between antigen and antibody according to which a person has antibodies for those antigens which he does not possess.

Blood groups of man with antigen and antibodies

Type of blood group	Antigen	Antibody
A	A	Anti-B or 'b'
B	B	Anti-A or 'a'
AB	A, B	Absent
O	None	'a' and 'b'

Type of blood group	Genotype	Nature of gene
A	I ^a I ^a	Homozygous (Dominant)
A	I ^a i	Heterozygous
B	I ^b I ^b	Homozygous (Dominant)
B	I ^b i	Heterozygous
AB	I ^a I ^b	Codominant
O	ii	Homozygous (Recessive)

Q: Write a short note on Rh factor. Also write its importance.

Rhesus or Rh factor

Landsteiner and Weiner (1940) discovered a different type of protein in the blood of Rhesus monkey. They called it Rh antigen or Rh factor after Rhesus monkey.

Formation of Rh antigen is controlled by dominant gene (R) and its absence by recipient gene (r). People having this antigen with genotype (RR or Rr) are called Rh positive (Rh⁺) and those whose blood is devoid of it with genotype (rr) are Rh negative (Rh⁻). About 85% human beings in Europe and 97% in India are Rh⁺.

Importance of Rh factor:

Generally human blood is devoid of Rh antibodies. But it has been noticed that on transfusion of blood of a Rh⁺ person to Rh⁻ person, the recipient develops Rh antibodies in its blood plasma. If Rh⁺ blood is transfused for the second times it causes agglutination and leads to the death of Rh⁻ person.

Q: Define the term variations. Also write about its different types.

Variation

The differences in characters such as height, colour, etc. among individuals of same species are called variations. Variations may be caused either by the effect of environment or by the changes in the genetic material.

a) Environmental variation: Variation caused by environmental factors among the members of same species, it is not inherited to the offspring e.g. development of muscles in athletes, loss of some body parts due to accident or diseases etc.

b) Heritable variation: The variation caused due to changes in genetic material called genetic or heritable variation.

c) Continuous variation: These variations refer to small differences in characters of the members of a species i.e. Height, Skin colour, Intelligence, Eye colour etc. such variations are neither purely genetical nor purely

d) Discontinuous variation: These are sudden and sharp differences among the members of same species. They are heritable as they are purely caused by genetic material. Blood groups, six fingers in hand or foot, tongue rolling etc. are common examples in man.

Q: What are the causes of variation? Discuss in detail.

- 1) **Mutation:** It can be defined as the sudden changes in the genetic material (genome) of an organism. It is the major source of heritable variation among the organisms which is considered as the starting point of new species. e.g., some person has six fingers in hands or feet. This phenomenon of producing sudden changes is called mutation.
- 2) **Crossing over:** It is the process of mutual exchange of segments of chromatids between non-sister chromatids of homologous pair of chromosomes. Due to crossing over maternal and paternal alleles are mixed and segregated. Due to this crossing over and segregation, offspring of same parents become variable.
- 3) **Environment:** Number of environmental factors affect the body cells to cause variations e.g., the changes in the pigmentation of skin due to extent of exposure to sun light or the development of muscles due to exercise etc.
- 4) **Fertilization:** The set of alleles carried by chromosomes of each gamete is unique and always differ from each other. There are number of male gametes available to fertilize a single female gamete. Thus, different combination of characters in an individual are possible as a result of fertilization.

Q: Describe Darwin theory of natural selection.

Theory of Natural Selection or Darwinism: Charles Darwin (1809-1882) was an Englishman. In the year 1859, he published a book "Origin Of Species" where he proposed the theory of Natural Selection, in which he presented simple evidences in favor of evolution. The main points of the Darwin's theory are as follows:

1. **Over Production:** living organisms reproduce rapidly so that the number of their offspring could increase rapidly.
2. **Struggle for Existence:** Due to the limited available resources of food, shelter, etc. the offspring of species compete not only with each other but also with the members of different species to share these resources. In this struggle a large number of individuals of each species are eliminated. As a result, the population remains stable.

3. Heritable Variation: Individuals of a species differ from each other in their ability to obtain resources, withstand environmental extremes, etc. These differences in characters are called minor variations. Those individuals whose inherited characters fit them best to their environment would survive and produce more offspring than less fit individuals who will vanish.
4. Natural selection: Nature selects the fittest individuals to survive and reproduce. As a consequence, the favourable variations are preserved through their inheritance to new young ones.

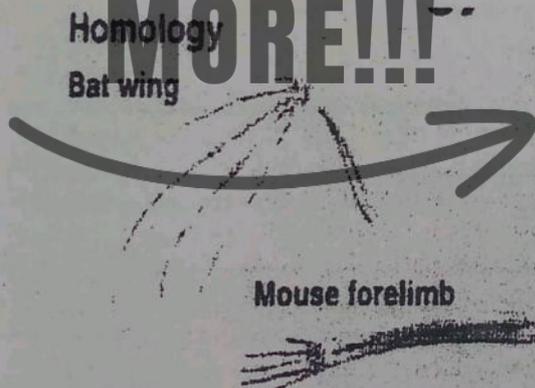
Q: What are Vestigial Organs? Also define homologous and analogous organs.

Vestigial organs:

Vestigial organs are organs, tissues or cells in a body which are no more functional the way they were in their ancestral form of the trait. In humans, the appendix is a good example of a vestigial organ. This non-functioning organ eventually degenerates, shrinking in size and disappearing ultimately.

Homologous organs: These organs have the similar structure in different organisms but perform different functions. Thus, it clearly shows a common ancestry. For example, the limbs of human, cheetah, whale, and wings of a bat. They all have different functions but have a similar structure indicating a common ancestor.

Analogous organs: These organs have different anatomy but perform similar functions. For example, the wings of different birds and bats. The wings of birds have feathers for flight whereas, bats have wings made up of stretched skin and lack feathers. But both serve the function of flight.



Analogy

Bat wing



Butterfly wing

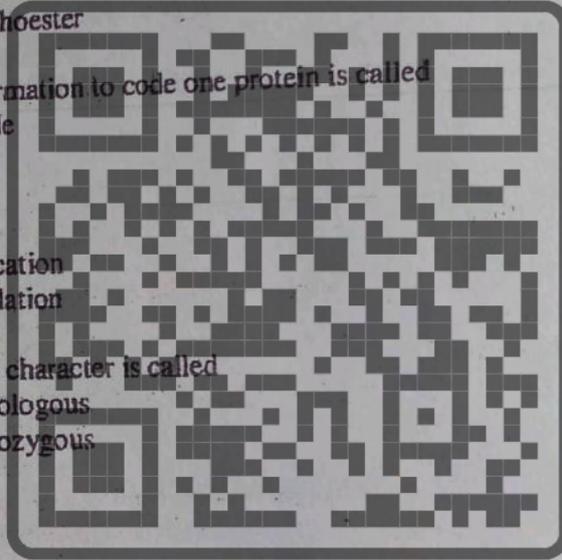


Bird wing



Solved exercise from book

1. Branch of biology deals with the study of heredity and variation is called:
 - (a) Inheritance
 - (b) Heredity
 - (c) Genetics
 - (d) Evolution
2. The way by which gene transmits characters from parents to offspring is
 - (a) Genetics
 - (b) Inheritance
 - (c) Heredity
 - (d) Allele
3. Two similar chromosomes in a cell which are similar in shape, size and position of centromere called
 - (a) Chromatids
 - (b) Arms
 - (c) Homologous
 - (d) Homology
4. The chemical material of a chromosome is called
 - (a) Chromatin
 - (b) Chromeres
 - (c) Chromonema
 - (d) Chromatid
5. The outer part of DNA helix made up of sugar and phosphate is called
 - (a) Nucleoprotein
 - (b) upright
 - (c) Rungs
 - (d) Phosphoester
6. The small segment of DNA which has information to code one protein is called
 - (a) Nucleotide
 - (b) Polynucleotide
 - (c) Gene
 - (d) Exon
7. The exact duplication of DNA is called
 - (a) Duplication
 - (b) Replication
 - (c) Transcription
 - (d) Translation
8. If both the parents donate same factors of a character is called
 - (a) Homologous
 - (b) Heterologous
 - (c) Homozygous
 - (d) Heterozygous
9. The Genetic constitution of a trait is called
 - (a) Genotype
 - (b) Phenotype
 - (c) Genome
 - (d) Phenyl



Chapter # 7 Man, and His Environment

Multiple Choice Questions

1. Endangered species are
 - * Dangerous for the life of humans
 - * Already extinct
 - * **Reduced in number**
 - * All of these
2. The Scientific study of environment, ecology, evolution and global change with in a combined form called is
 - * Biology
 - * Ecosystem
 - * **Environmental biology**
 - * None of these
3. The scientific study of the various relationships exists between organism and their environment is called
 - * Genetics
 - * Biotechnology
 - * **Ecology**
 - * Cytology
4. The symbiotic association in which both the partners get benefit and neither can survive without the other is called
 - * Predation
 - * **Mutualism**
 - * Parasitism
 - * None of above
5. An area where community interacts with non-living environment and flow of energy occur is called
 - * Biosphere
 - * Biomass
 - * **Biome**
 - * Ecosystem
6. Life sustaining envelope of earth is called
 - * Biome
 - * **Ecosystem**
 - * None of these
7. The group of organisms belongs to the same species live in a particular area is called
 - * **Population**
 - * Species
 - * Community
 - * Ecosystem
8. Any bio-geographical region recognized by specific vegetation or climate is called
 - * Biosphere
 - * Species
 - * **Biome**
 - * Community
9. It is Abiotic components of an ecosystem
 - * Light
 - * **Both of these**
 - * Temperature
 - * None of these
10. In ecosystem, the flow of food material progresses through
 - * Food web
 - * **food chain**
 - * carbon cycle
11. The number of animals at low trophic level are
 - * **Abundant**
 - * Fewer
 - * More than other levels
12. Graphical presentation of members of population in an area at different trophic levels is called
 - * Pyramid of mass
 - * Pyramid of energy
 - * **Pyramid of number**
 - * None of these
13. The first trophic level is composed of algae and plants. Organisms on this level are called
 - * Decomposers
 - * **Producers**
 - * Consumers
 - * Carnivores
14. Process of converting nitrogenous compound into free nitrogen is called
 - * Biological cycle
 - * **Denitrification**
 - * Acid rain
15. Which one is not the greenhouse gas?
 - * Carbon dioxide (CO_2)
 - * Nitrous oxide (N_2O)
 - * **Methane (CH_4)**
 - * **Ozone**



Man, and His Environment

Short Questions with Answers

Basic Definitions:

Environmental Biology

"The effect of the environment on the organism is called Environmental biology or Ecology." OR
"Ecology is the study of relationship between the organisms and their environment."

Biosphere:

Part of earth where life exist is termed as biosphere.

Population:

"Population is a group of individuals of the same species that live in the same area and share the same resources."

Community:

A group of different species (population) of plants and animals living together in the same place is called Community. A forest with various trees, shrubs, herbs, animals, insects, birds, and microorganisms is considered as a community.

Ecosystem:

A System in which living organisms and non-living live together and exchange materials between them is called Ecosystem". Ecosystem is the basic structural and functional unit of ecology.

Biomes:

Ecosystem occupying broad geographical region is called Biome. some major biomes of the world are forest, grassland, desert, tundra etc.

Environment:

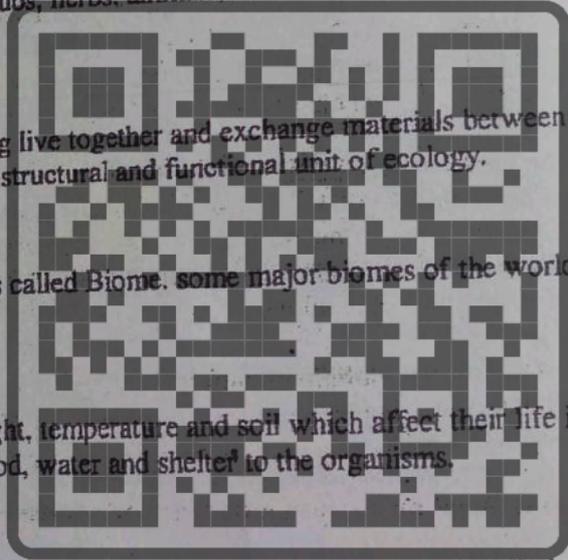
Everything around the living organisms such as light, temperature and soil which affect their life is called Environment. The environment provides food, water and shelter to the organisms.

Habitat:

Specific locality with a particular set of environmental conditions where organisms live is called habitat.

Q: What is the effect of light on ecosystem?

- Light It is the most vital factor, without it life cannot exist.
- It is a source of energy for every ecosystem.
- Plants convert this light energy into chemical energy by the process of photosynthesis.
- This chemical energy is stored in the form of food which is needed by every living thing.
- Distribution of plants and animals is affected by the type, intensity and exposure time of light.
- Light is also necessary for vision and for the start of , certain biological processes e.g. flowering of certain plant, making vitamin D in human beings and migration of many animals.



Q: Which one is the first trophic level of ecosystem and how?

The first trophic level is composed of algae and plants. Organisms on this level are called producers, as they make their own food by using photosynthesis to convert light energy into chemical energy. These organisms are known as autotrophs.

Q: What do we mean by nitrogen fixation and how it occurs in an ecosystem?

The conversion of atmospheric nitrogen into simpler compounds, nitrite and nitrate with the help of some living organisms is called Nitrogen Fixation. The organisms which help in nitrogen fixation are rhizobium bacteria and blue green algae. There are two types of nitrogen fixation.

Q: What is interaction?

In ecology, a biological interaction is the effect that a pair of organisms living together in a community have on each other. They can be either of the same species (intraspecific interactions), or of different species (interspecific interactions).

Q: What is pyramid of number?

A pyramid of numbers is a graphical representation that shows the number of organisms at each trophic level.

Q: What is greenhouse effect?

"Greenhouse effect is the process by which radiations from the sun are absorbed by the greenhouse gases and not reflected back into space. This insulates the surface of the earth and prevents it from freezing."

Q: What is algal bloom and how it destroys the life of an aquatic ecosystem?

An algal bloom is a kind of algae who increases their population rapidly. They mainly live in freshwater or marine water systems and they are mainly recognized by the discoloration in the water with the help of their pigments.

Death of Aquatic Animals:

As each and every living organism needs proper supply of oxygen whether they live in water or on land. In the same way algal bacteria need oxygen for their survival for which they utilize the amount of oxygen present in the aquatic system, this leads to depletion in oxygen level and causes death of aquatic animals.

Q: What is global warming?

"Global warming is a gradual increase in the earth's temperature generally due to the greenhouse effect caused by increased levels of carbon dioxide, CFCs, and other pollutants."

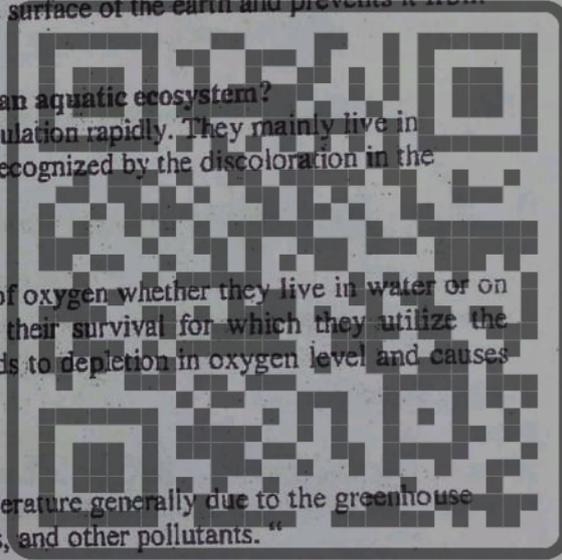
Q: What measure can be taken to control water pollution?

Control of water pollution

- Public awareness at all levels is important.
- It should be through social media, political leaders, institution from pre-primary level.
- Strict legislation and implementation are required on sewage treatment and industrial recycling processes.
- No industrial and agricultural waste should be added to water bodies before complete treatment.

Q: Write down the name of some endangered mammals of Pakistan.

- Indus river dolphin
- Markhor
- Snow leopard
- Wild goat
- Asian black bear
- Punjab urial



Q: What are biochemical cycles?

Biogeochemical cycles

The growth and life processes of living organisms require about 40 elements, among them six are needed in large quantities i.e., carbon, oxygen, hydrogen, nitrogen, phosphorous and Sulphur. These elements are taken up from environment by producers, made a part of protoplasm and finally returned back to environment. So, the elements cycle continuously through organism and environment. These cycles are called Biogeochemical Cycles.

Q: Write characteristics of biochemical cycles in ecosystem.

A biogeochemical cycle has the following characteristics.

- Movement of the nutrient elements from environment to organism and back to environment.
- Involvement of biological processes.
- A geochemical reservoir.
- Chemical changes.

Q: What do you know about cycling of nutrients in ecosystem?

Cycling of Nutrients in Ecosystem.

The cyclic movements of chemical elements of the biosphere between the organism and the environment are called Biogeochemical cycles." The chemical elements essential for life in living organisms are called biogenic elements or nutrients elements. These are of two types.

Macronutrients: These nutrients are needed in large amount like, water, oxygen, nitrogen, hydrogen.

Micronutrients: these nutrients are needed in very small amount like, zinc, iron, molybdenum etc.

Q: Define denitrification.

Denitrification:

Process of converting nitrogenous compound into free nitrogen is called denitrification. Some soil bacterial (pseudomonas) in the absence of oxygen break down nitrates releasing nitrogen back into the atmosphere, this is called denitrification.

Extended Response Questions with Answers

Q: Describe Abiotic components of ecosystem.

Abiotic Component

Abiotic components are the non-living materials of ecosystem. These are the , light, water, Temperature, Atmosphere, Fire, Soil, Inorganic material, Topographic factor, Gravity.

1. Light

- Light It is the most vital factor, without it life cannot exist.
- It is a source of energy for every ecosystem.
- Plants convert this light energy into chemical energy by the process of photosynthesis.
- This chemical energy is stored in the form of food which is needed by every living thing.
- Distribution of plants and animals is affected by the type, intensity and exposure time of light.
- Light is also necessary for vision and for the start of. certain biological processes e.g., flowering of certain plant, making vitamin D in human beings and migration of many animals.

2. Temperature

- Temperature controls the growth, and distribution of animals and plants.
- life functions generally within a temperature range of 10 – 45 degrees Celsius.
- Temperature changes during day and night, also varies from season to season.
- Many birds and few mammals migrate or hibernate in winter.
- Enzyme activities of metabolic reactions are also altered with the changes in temperature.
- Most forms of life cannot survive this extreme temperature.

3. Water

- All the living things need water.
- It is the major part of protoplasm.
- It acts as the solvent for most of the compounds, raw material of photosynthesis.
- The amount of water on land is controlled by rainfall and snowfall.
- it also controls the distribution of plants and animals on land.
- For example, forest grows in the area which receives abundant rainfall whereas low rainfall in the area with extreme temperature develops desert conditions.

4. Soil

- The upper layer of earth crust consists of particles of varying size and decomposed organic material by microorganism called soil.
- The decomposed dead animals and plants called humus.
- Humus enriches the soil and increases its water and air holding capacity.
- Soil which is good for agriculture is called loam.
- Soil is important to plants because it provides water, nutrients & air to roots for respiration.

5. Air

- It plays an important role in smooth running of the ecosystem.
- Air is the mixture of N_2 , O_2 , CO_2 and 1120 vapours mainly.
- Nitrogen is an essential constituent of protein.
- Oxygen is vital for respiration of all living organisms whereas CO_2 is the main requirement of photosynthesis to produce primary product i.e. carbohydrates.

Q: Write in detail about biotic components of ecosystem.

Biotic Components

Biotic components are the living organisms of ecosystem. These components are of three types:

Producers Consumers Decomposer

1. Producers:

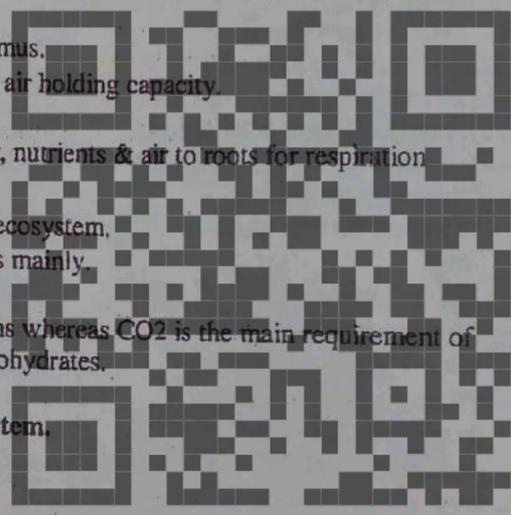
- Green plants are the producers. They prepare their own food and are called Autotrophs
- Phytoplankton are the producers of aquatic ecosystem.
- A part of this prepared food is utilized by plant themselves. Remaining part is utilized by consumers.

2. Consumers:

- Consumers are mostly animals which get their food from producer.
- Consumers are all heterotrophs. Consumers are of the following three types:

Primary Consumers: Primary consumers feed directly on green plants. They are also called herbivores. The primary consumers of land ecosystem are insects, cow, rabbits, sheep, and goats.

Secondary Consumers: They feed on herbivores and green plants. Secondary consumer which feed on herbivores is called carnivores e.g. lion, tiger, hawk etc. some consumers eat both herbivores, carnivores and green plants and are called Omnivores.



Tertiary Consumers: These are the top carnivores. They get their food from primary and secondary consumers. e.g. lion, tiger, fox, hawks etc.

3. Decomposers:

- They are also called saprophytes or scavengers.
- They get their energy from the decomposition of dead bodies of plants and animals.
- Decomposers act as cleaners of ecosystem.
- Decomposers help in the recycling of nutrients in the ecosystem. Bacteria and fungi are chief decomposers of ecosystem.

Q: What do you know about energy flow in ecosystem and their levels?

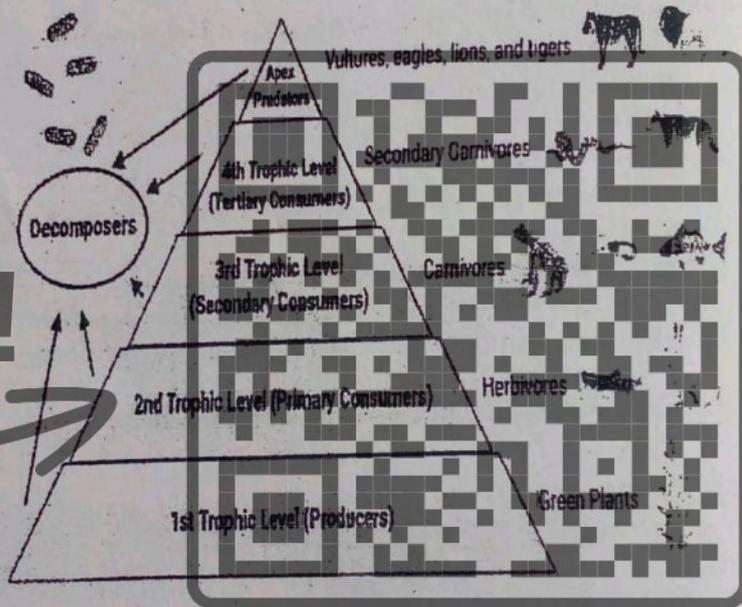
Energy Flow in Ecosystem

Energy flow is the flow of energy through living things within an ecosystem. All living organisms can be organized into producers and consumers, and those producers and consumers can further be organized into a food chain. Each of the levels within the food chain is a trophic level.

Trophic level

The producers and consumers in the ecosystem can be arranged into different feeding groups and are known as trophic level or the feeding level.

- The producers (plants) represent the first trophic level.
- Herbivores (primary consumers) represent the second trophic level.
- Primary carnivores (secondary consumers) represent the third trophic level.
- Top carnivores (tertiary consumers) represent the last level.



Q: What is Ecological Pyramid? Explain with the help of their types.

An ecological pyramid is a graphical representation of the relationship between the different living organisms at different trophic levels.

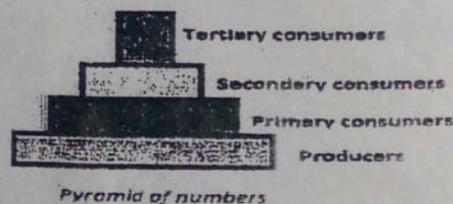
Types of Ecological Pyramid

Three types of ecological pyramid exist. They are as follows:

Pyramid of Numbers

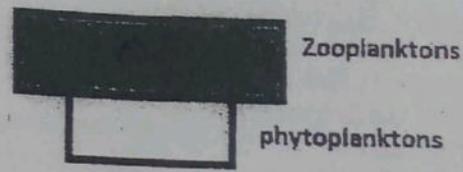
In this type of ecological pyramid, the number of organisms in each trophic level is considered as a level in the pyramid. The pyramid of numbers is usually upright except for some situations like that of the detritus food chain, where many organisms feed on one dead plant or animal.

Example there are more mice than snake which feed on mice.



Pyramid of Biomass

In this particular type of ecological pyramid, each level takes into account the amount of biomass produced by each trophic level. The pyramid of biomass is also upright except for that observed in oceans where large numbers of zooplanktons depend on a relatively smaller amount of phytoplankton.

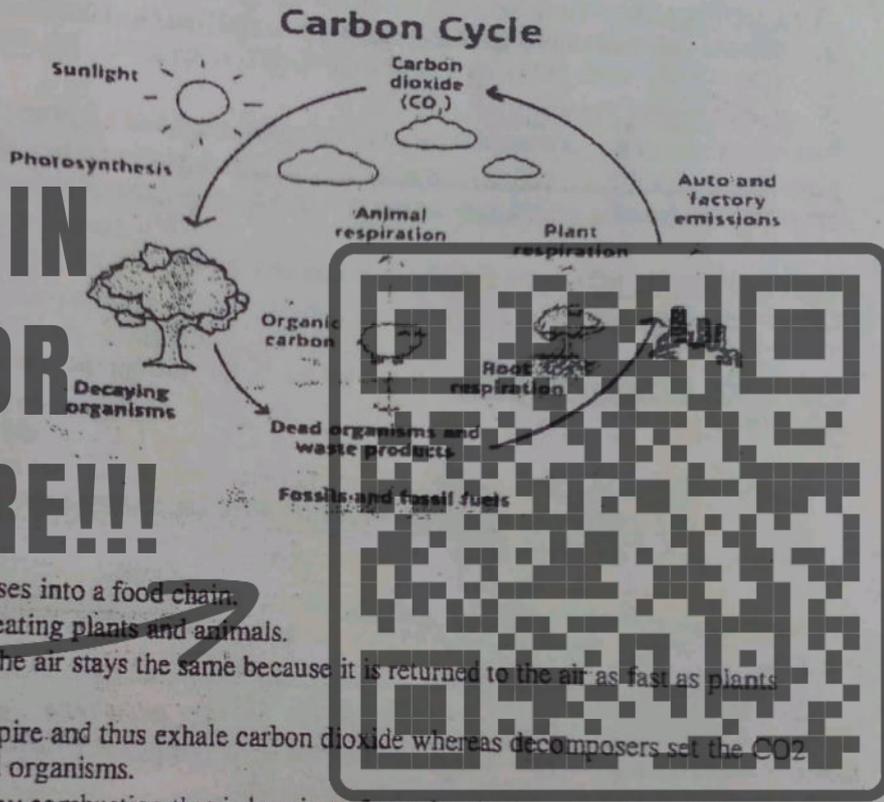


Pyramid of biomass in oceans

Q: Define carbon cycle in detail.

Carbon cycle

- All the life in the earth is based on carbon. It is needed for the formation of proteins, carbohydrates, fats and many other substances that make up living things.
- The carbon comes from carbon dioxide which is found in atmosphere.
- Plant takes this CO₂ from air and convert it into carbohydrates by photosynthesis.
- Carbon in this form passes into a food chain.
- Animals get carbon by eating plants and animals.
- The amount of CO₂ in the air stays the same because it is returned to the air as fast as plants take it in.
- All living organisms respire and thus exhale carbon dioxide whereas decomposers set the CO₂ free from bodies of dead organisms.
- It is also returned to air by combustion that is burning of wood and other organic fuel like coal, petrol and gas etc.



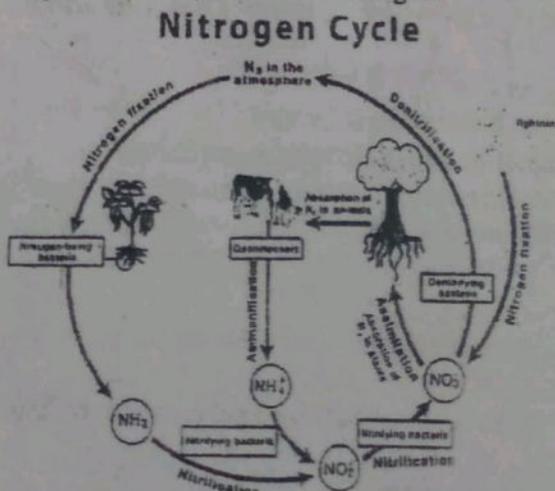
This circulation of carbon in the atmosphere of an ecosystem is termed as carbon cycle.

Q: What do you know about nitrogen cycle? Define it with all its stages.

Nitrogen Cycle

The cyclic movement of atmospheric nitrogen from air into the soil and back from the soil into the atmosphere is called nitrogen cycle. In the atmosphere nitrogen occurs in three different states:

- Dinitrogen molecule: e.g., (N₂)
- Nitrogen oxides: e.g., nitrite (NO₂) and nitrates (NO₃)
- Reduced nitrogen: e.g., ammonia (NH₃) and ammonium.



Stages of Nitrogen Cycle:

Nitrogen cycle complete in the following way:

- Decomposition of dead bodies.
- Nitrogen fixation
- Nitrification
- Denitrification

1. Decomposition of dead bodies:

Dead bodies are decomposed by fungi and bacterial into simpler compounds. There are two steps in this process.

Ammonification: The process in which the nitrogenous compounds are decomposed by fungi and bacteria into ammonia (NH_3) or ammonium ion (NH_4^+) is called Ammonification.

2. Nitrogen Fixation:

The conversion of atmospheric nitrogen into simpler compounds, nitrite and nitrate with the help of some living organisms is called Nitrogen Fixation. The organisms which help in nitrogen fixation are rhizobium bacteria and blue green algae. There are two types of nitrogen fixation.

Non-Symbiotic nitrogen fixation: it's carried out by some bacteria like Azotobacter and Clostridium, and Nostoc.

Symbiotic nitrogen fixation: it's carried out by the microorganisms like Rhizobium that live symbiotically.

- 3. Nitrification:** The conversion of ammonia and ammonium ion into nitrites and nitrate by the actively nitrifying bacteria is called Nitrification. Two groups of nitrifying bacteria are responsible for nitrification.

Nitrosomonas: converts ammonia to nitrites.
nitrites.

Nitrobacteria: converts nitrites into

4. Denitrification:

Process of converting nitrogenous compound into free nitrogen is called denitrification. Some soil bacterial (pseudomonas) in the absence of oxygen break down nitrates releasing nitrogen back into the atmosphere, this is called denitrification.

Q: Write in detail about different types of interactions among living organisms.

Interaction and Interdependence of Organism

Living world needs a regular flow of energy. Organisms interact and inter-dependence between organisms may be:

Useful to both partners

One partner get benefit and other is harmed.

Beneficial for one partner and other remain unaffected.

Interaction and interdependence between organisms may be of following type:

Predation Parasitism Symbiosis Grazing

1. Predation:

Predation is a biological interaction where one organism, the predator, kills and eats another organism, its prey.

An animal that preys on other animals for food is called predator. The animal that is caught and eaten is called prey.

A predator animal is often larger than its prey. Predators select food on the basis of size and strength of prey.

3. Symbiosis:

Symbiosis is an association between two dissimilar organisms which live together for mutual benefit.

There are two types of symbiosis.

Mutualism Commensalism

I. Mutualism: The symbiotic association in which both the partners get benefit and neither can survive without the other is called Mutualism.

Root Nodules: in root nodules of legume plants nitrogen fixing bacteria (*Rhizobium*) live. The bacteria fix atmospheric nitrogen for the roots. The root provides food and shelter to the bacteria.

Lichens: The symbiotic association between algae and fungi is called lichen.

ii. Commensalism: In this type of relationship only one partner gets benefit while the other member neither benefits nor is harmed.

Epiphytes: Epiphytes are the plants growing on other plants. They use other plants only as support. Tree is neither harmed nor benefited.

Q: Differentiate between food chain and food web.

Difference Between Food Chain and Food Web	
Food Chain	Food Web
A linear pathway showing the flow of energy	A multitude of networks showing the flow of energy
An organism of higher-level trophic feeds on a specific organism of lower trophic level	An organism of higher trophic level has access to more members of a lower trophic level.
Has no effect on the adaptability and competitiveness of organisms.	Has a role in improving the adaptability and competitiveness of an organism.

Q: What is Pollution? Write about its types and their effects.

"Pollution is the introduction of substances (or energy) that cause adverse changes in the environment and living entities."

Types of Pollution

As stated before, there are different types of pollution, which are either caused by natural events (like forest fires) or by man-made activities (like cars, factories, nuclear wastes, etc.) These are further classified into the following types of pollution:

1. Air Pollution

Air pollution refers to the release of harmful contaminants (chemicals, toxic gases, particulates, biological molecules, etc.) into the earth's atmosphere. Some causes that contribute to air pollution are:

- Burning fossil fuels
- Mining operations
- Exhaust gases from industries and factories

X-BIOLOGY

Generally, the impact of air pollution ranges from:

- Increased risk of respiratory illness and cardiovascular problems
- Increased risk of skin diseases
- May increase the risk of cancer
- Global warming
- Acid rain
- Ozone depletion
- Hazards to wildlife

2. Water Pollution

Water pollution is said to occur when toxic pollutants and particulate matter are introduced into water bodies such as lakes, rivers and seas. These contaminants are generally introduced by human activities like improper sewage treatment and oil spills.

Other significant causes of water pollution include:

- Dumping solid wastes in water bodies
- Disposing untreated industrial sewage into water bodies
- Human and animal wastes
- Agricultural runoff containing pesticides and fertilizers

3. Soil Pollution

Soil pollution, also called soil contamination, refers to the degradation of land due to the presence of chemicals or other man-made substances in the soil. These can drastically impact life directly or indirectly. For instance, any toxic chemicals present in the soil will get absorbed by the plants. Since plants are producers in an environment, it gets passed up through the food chain. Compared to the other types of pollution, the effects of soil pollution are a little more obscured, but their implications are very noticeable.

Some of the common causes of soil pollution are:

- Improper industrial waste disposal
- Oil Spills
- Acid rain which is caused by air pollution
- Mining activities
- Intensive farming and agrochemicals (like fertilizers and pesticides)
- Industrial accidents

Other effects of soil pollution include:

- Loss of soil nutrients, which renders the soil unfit for agriculture
- Impacts the natural flora and fauna residing in the soil
- Degrades vegetation due to the increase of salinity of the soil
- Toxic dust (such as silica dust) can cause respiratory problems or even lung cancer.

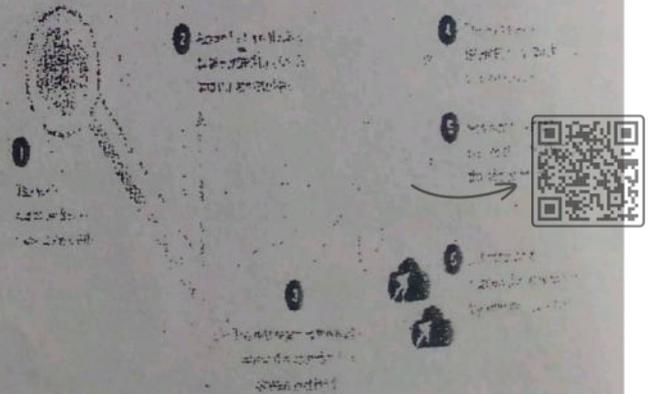
Q: Describe greenhouse effect in detail.

Greenhouse Effect:

Greenhouse Effect is the process of heating of the surface of Earth till the troposphere. It happens because of higher concentration of carbon dioxide, water vapor, methane and other gases.

Sunlight heats up Earth's surface, and subsequently, the energy is reflected back to space in the form of infrared radiation. In the greenhouse effect, the concentrated gases absorb the energy, thereby increasing the global temperature. Hence, greenhouse effect and global warming are correlated.

The Greenhouse Effect



Greenhouse Gases

The concentration of gases that lead to trapping of heat in the atmosphere is known as greenhouse gases. Greenhouse gases include –

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)

Fluorinated gases like halons, hydrochlorofluorocarbons, chlorofluorocarbons, nitrogen trifluoride, Sulphur hexafluoride etc.

What Causes the Greenhouse Effect?

- Fossil fuel burning
- Fertilizers used during farming
- Deforestation
- Population increase
- Landfill and industrial waste

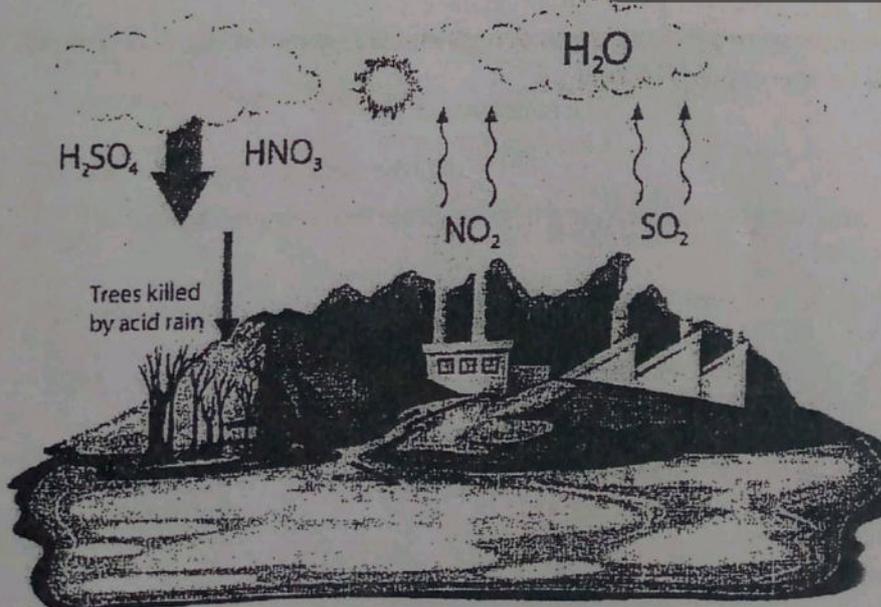
Q: Write a note on acid rain.

Acid rain

Acid rain is caused by a chemical reaction that begins when compounds such as Sulphur dioxide and oxides of nitrogen are released into the air. These substances can rise very high up into the atmosphere, where they mix and react with water, oxygen, and other chemicals to form more acidic pollutants called acid rain.

When rain falls through these polluted air H_2O react with these gases in air and produce carbonic acid, Sulphuric acid and nitric acid, respectively. These acids remain as vapours and condense into liquid when temperature falls. The acid destroy soil, micro-organisms of soil, skin of animals, building material.

ACID RAIN

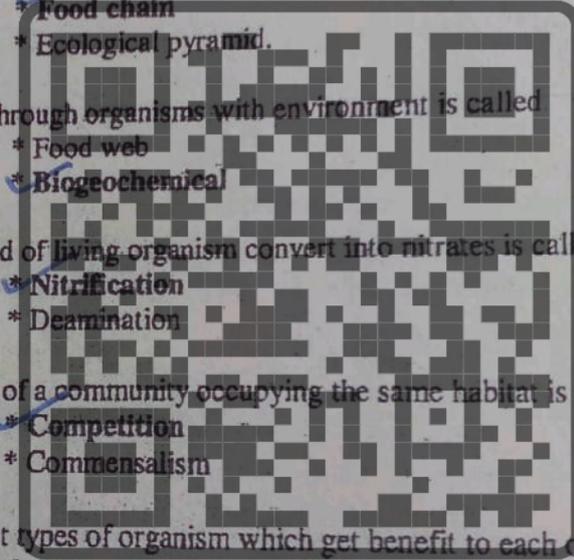


Solved exercise from book

Choose the correct answer:

1. The life sustaining envelop of earth is
 - * Biomass
 - * Atmosphere
 - Biosphere
2. The group of organisms belong to the same species live in a particular area called
 - * Community
 - * Species
 - Population
 - * Genes
3. An area where community interacts with non-living environment is called
 - * Ecology
 - * Biome
 - Ecosystem
 - * Community
4. Any biological region recognized by its climate or vegetation is called
 - * Ecosystem
 - * Biomes
 - * Biosphere
 - * Biomass
5. The transfer of food material from producers through some organisms with repeated eating and being eaten is called
 - * Food pyramid
 - * Food web
 - Food chain
 - * Ecological pyramid.
6. The elements in ecosystem recycle through organisms with environment is called
 - * Food chain
 - * Food web
 - Biogeochemical
 - * Chemical cycle
7. Process where nitrogenous compound of living organism convert into nitrates is called
 - * Ammonification
 - * Nitrification
 - * Denitrification
 - * Deamination
8. The cold war between the organisms of a community occupying the same habitat is called
 - * Predation
 - * Competition
 - * Mutualism
 - * Commensalism
9. The association between two different types of organism which get benefit to each other, cannot live without each other is called
 - * Parasitism
 - * Commensalism
 - Mutualism
 - * Predation
10. The amount of solid waste or concentration of gases other than oxygen increase in atmosphere is called
 - * Air pollution
 - * Ozone depletion
 - Acid rain
 - * Greenhouse effect

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13. The treatment through genes is called:
 * Chemo Therapy
 * Gene Therapy
 * Radio Therapy
 * Physio Therapy
14. The animal whose DNA has been changed is called:
 * Transformed
 * Transgenic
 * Dihybrid
 * Monohybrid
15. In alcoholic fermentation _____ change into CO₂ and alcohol.
 * Fomic acid
 * Lactic acid
 * Pyruvic acid
 * None of these
16. The small wholes in the bread is formed by bubbles of
 * Oxygen
 * Carbon dioxide
 * Carbon mono oxide
 * Pyruvic acid
17. Sleeping sickness is caused by parasite called
 * Trypanosoma
 * Bacteriophage
 * Plasmodium
 * Saccharomyces
18. Scientists have found a gene which suppress the cancer ceels named as
 * p-53
 * p-55
 * p-54
 * p-60
19. Insulin is used by patient of which disease?
 * Cancer
 * Hepatitis
 * AIDS
 * Diabetes
20. Indo Aryan civilization first practice biotechnology in
 * 1200 BC
 * 1400 BC
 * 1300 BC
 * 1500 BC
21. These bacteria are used in converting milk into yougurt and also produce various type of cheese
 * Lactobacillus
 * Both of these
 * Streptococcus
 * None of these
22. This enzyme uses in nature to repair broken DNA
 * DNA Ligase
 * Restriction enzyme
 * Fermenter
 * DNA Polymerase
23. What was the world's first ever mammal to be successfully cloned?
 * Sheep
 * Cow
 * Monkey
 * Calf
24. Which of the following organelles is associated with genetic, engineering?
 * Plasmids
 * Chloroplast
 * Plastids
 * Mitochondria
25. Important objective of biotechnology in agriculture section is
 * To increase the nitrogen content
 * To decrease the seed number
 * To increase the plant weight
 * To produce disease and herbicides resistance



Biotechnology

Short Questions with Answers

Q: Define biotechnology and genetic engineering.

Biotechnology

Biotechnology is the use of technology for modifying or manipulating a biological system. Biotechnology utilizes a living system for making different products.

OR

Biotechnology is the "controlled use of biological agents like cells or cellular components for beneficial use".

Genetic engineering has been defined as the artificial manipulation, modification, and recombination of DNA or other nucleic acid molecules in order to modify an organism or population of organisms.

Q: What kind of enzymes allows scientists to cut and paste pieces of DNA together to form recombinant DNA?

Restriction enzymes: These naturally occurring enzymes are used as a defense by bacteria to cut up DNA from viruses. There are hundreds of specific restriction enzymes that researchers use like scissors to snip specific genes from DNA.

Q: How do organisms obtain energy? How does fermentation work?
 most living things use oxygen to make ATP from glucose. However, many living things can also make ATP without oxygen. These organisms use aerobic respiration when oxygen is present, but when oxygen is in short supply, they use anaerobic respiration instead. Certain bacteria can only use anaerobic respiration.

Fermentation:

Fermentation is the process by which living organisms such as yeast or bacteria are employed to produce useful compounds or products.

Q: What types of microorganisms cause fermentation to occur?

Fermentation occurs in the absence of oxygen (anaerobic conditions), and in the presence of beneficial microorganisms (yeasts, molds, and bacteria) that obtain their energy through fermentation.

Q: What food and non-food products are created by fermentation?

Food products:

- Foods that undergo fermentation include dairy products: yogurt, cheese, cereal products, bread, cakes fruit and vegetable products: flavorings, candy, fruit juice etc.
- Foods that are frequently pickled include beans, onions, cauliflower, cucumbers, tomatoes, and cabbage.

Nonfood product:

- Non-food items that undergo fermentation include antibiotics, laundry detergent, insulin, growth hormones, cellulose, monoclonal antibodies, compost, chemicals and medicine to dissolve tumors and to clot blood.



Q: What are some advantages and disadvantages of fermentation in food processing?

Advantages:

- Fermenting things makes them taste great: like miso, kimchi, wine, and sourdough bread.
- Fermenting breaks down things that can be difficult to digest and makes some foods more nutritious: like sauerkraut (fermented cabbage) and miso (fermented soybeans).
- Fermented food keeps a lot longer than fresh. That cabbage will go bad after a week, but the sauerkraut will keep for months.

Disadvantages:

- Fermentation produces no ATP.

Q: What is the classical biotechnology?

The classical biotechnology that emerged during the early twentieth century was basically a microbial-based fermentation process in which the principles of biochemical engineering have been applied to change it into an industrial process. In short, it is a hybrid of fermentation and biochemical engineering.

Q: What is lacto-fermentation?

Fermentation, also known as lacto-fermentation, is a chemical process in which bacteria and other micro-organisms break down starch and sugars within the foods, possibly making them easier to digest, and resulting in a product that is filled with helpful organisms and enzymes. This process of fermentation is a natural preservative, which means that fermented foods can last a long time.

Extended Response Questions with Answers

Q. Define gene therapy and cloning of a gene.

Gene therapy:

Gene therapy is a technique that modifies a person's genes to treat or cure disease.

Uses

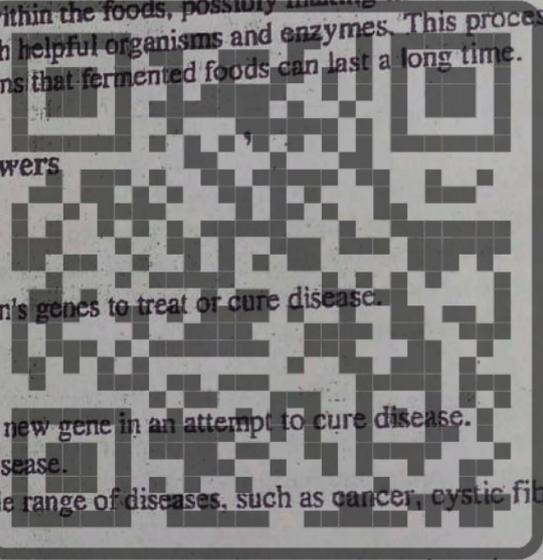
- Gene therapy replaces a faulty gene or adds a new gene in an attempt to cure disease.
- It also improves your body's ability to fight disease.
- Gene therapy holds promise for treating a wide range of diseases, such as cancer, cystic fibrosis, heart disease, diabetes, hemophilia and AIDS.
- Indeed, gene therapy in humans (attempting to repair a faulty gene) is already undergoing clinical trials.

Cloning of a gene:

Gene cloning, also known as molecular cloning, refers to the process of isolating a DNA sequence of interest for the purpose of making multiple copies of it.

Classic gene cloning involves the following steps:

- Restriction enzyme digestion and ligation
- Isolation of DNA
- Ligation
- Transfection and Selection
- Gel electrophoresis



Q: What do you know about human genome project?

The Human Genome Project

In 1990, The Human Genome Project was launched to map all the genes of the human cell. The complete draft of the human genome sequence was published in 2002 with the following objectives:

- Determining the human DNA sequence
- Understanding the function of the human genetic code
- Identifying all of the genes
- Determining their functions
- Understanding how and when genes are turned on and off throughout the lifetime of an individual

Q. Describe the methodology of recombinant DNA technology.

Genetic Engineering

The principle of genetic engineering is to manipulate and modify the genetic material of an organism or plants to insert desirable traits. Recombinant DNA technology is the main pillar of genetic engineering.

Recombinant DNA Technology

- When segments of DNA are cut and pasted together to form new sequence, the result is known as recombinant DNA

Recombinant DNA Technology is a technique to alter genes of an organism or plant. The recombinant DNA technology involves following main steps:

- Selection of the desired gene or preparation of recombinant DNA
- Selection of vector for the transfer of the gene known as a cloning vector, e.g., plasmid
- Insertion of recombinant DNA into the host
- Maintaining the introduced DNA in the host so that it is passed on to the next generation
- Selection of bacteria with required gene.
- Recombinant DNA Technology requires various tools like vector, host and enzymes such as restriction enzymes, ligases, polymerases, etc.
- Process
- Restriction enzymes are known as molecular scissors, that cut the desired sequence of DNA.
- This DNA is then ligated into the vector with the help of ligases before inserting it into the host organism.



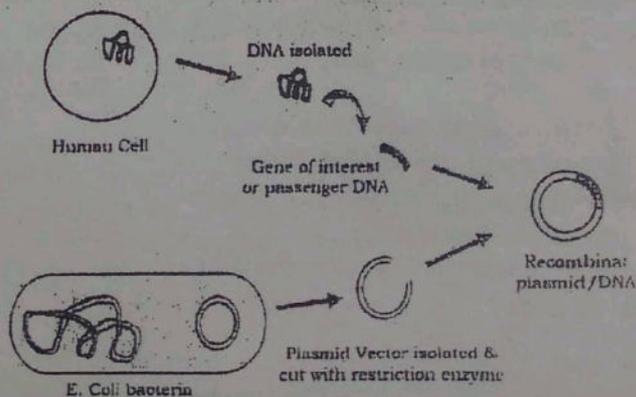
Q. What do you know about human genome project and how it is useful?

The Human Genome Project

The Human Genome Project was an international scientific research project with the goal of determining the base pairs that make up human DNA, and of identifying and mapping all of the genes of the human genome from both a physical and a functional standpoint.

- The project has two primary goals.
- (1) To construct a genetic map of the human genome.
 - (2) To construct a base sequence map.

Recombinant DNA Technology



How Human genome project is useful?

- The sequence can be compared to the sequence found by the Human Genome Project.
- The number, location, size and sequence of human genes is now established.
- This has allowed for the production of specific gene probes to detect sufferers and carriers of genetic diseases

Q: Define in detail about scope of biotechnology.

Scope and importance of biotechnology

Biotechnology is controlled use of biological agents for beneficial use.

Biotechnology in medicine

- Production of antibody, DNA, RNA probes for diagnosis of various diseases.
- Valuable drugs like insulin and interferon have been synthesized by bacteria for the treatment of human diseases.
- DNA fingerprinting is utilized for identification of parents and criminals.
- Development of recombinant vaccines like human hepatitis B etc. by genetically engineered microbes.

Biotechnology in Agriculture

- Biotechnology help for production of virus-free genetic stocks and planting material as well.
- Genetic engineering techniques are utilized to produce transgenic plants with desirable genes like disease resistance, herbicide resistance, an increased shelf life of fruits etc.

Biotechnology in Industry

- Biotechnology deals with production of alcohol and antibiotics by microorganisms.
- Variety of pharmaceutical drugs and chemicals like lactic acid, glycerine etc. are being produced by genetic engineering for better quality and quantity.

Biotechnology in Environment

- Environmental problems like pollution control, depletion of natural resources for nonrenewable energy, conservation of biodiversity etc. are being dealt with using biotechnology.

Q: Define fermentation in detail with its types.

Fermentation Definition

"Fermentation is an anaerobic process in which energy can be released from glucose even if oxygen is not available."

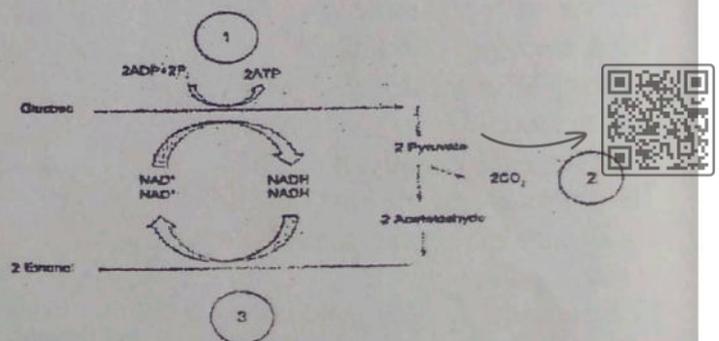
Fermentation occurs in yeast cells and bacteria and also in the muscles of animals. It is an anaerobic pathway in which glucose is broken down.

Lactic Acid Fermentation

In lactic acid fermentation, pyruvic acid from glycolysis changes to lactic acid.

OR

In this, starch or sugar is converted into lactic acid by yeast strains and bacteria. During exercise, energy expenditure is faster than the oxygen supplied to the muscle cells. This results in the formation of lactic acid and painful muscles.



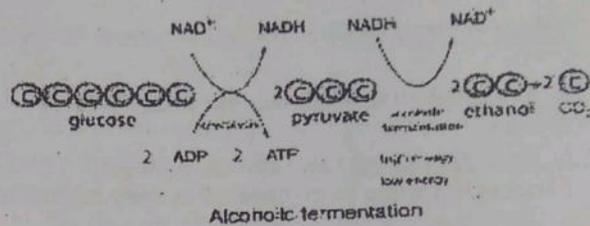
Alcohol Fermentation

In alcoholic fermentation, pyruvic acid changes to alcohol and carbon dioxide.

OR

Pyruvate, the end product of glycolysis is broken down into alcohol and carbon dioxide. Wine and beer are produced by alcoholic fermentation.

It is used to make bread, wine, and biofuels.



Q: What are applications of fermentation?

Application of fermentation

Fermentation as a food preservation technique

Fermented foods are foods that have been prepared in a way so that the bacteria naturally found within them starts to ferment.

Products of fermentation

- Foods that undergo fermentation include dairy products: yogurt, cheese, cereal products, bread, cakes fruit and vegetable products: flavorings, candy, fruit juice etc.
- Foods that are frequently pickled include beans, onions, cauliflower, cucumbers, tomatoes, and cabbage.
- Fermentation helps preserve the food and lowers the need of refrigerator.
- Non-food items that undergo fermentation include antibiotics, laundry detergent, insulin, growth hormones, cellulose, monoclonal antibodies, compost, chemicals and medicine to dissolve tumors and to clot blood.

Q: Define genetic engineering and its uses.

Genetic Engineering:

The principle of genetic engineering is to manipulate and modify the genetic material of an organism or plants to insert desirable traits.

Recombinant DNA technology is the main pillar of genetic engineering.

Genetic engineering uses

Genetic engineering is the corner stone of modern biotechnology. It is based on scientific tools, developed in recent decades that enable researchers to:

1. Identify the gene that produces the protein of interest.
2. Cut the DNA sequence that contains the gene from a sample of DNA.
3. Place the gene into a vector, such as a plasmid or a bacteriophage.
4. Use the vector to carry the gene into the DNA of the host cells, such as Escherichia coil (E coil) or mammalian cells grown in culture.
5. Induce the cells to activate the gene and produce the desired protein.
6. Extract and purify the protein for therapeutic use.

Genetic Engineering Tools

To manipulate cells and DNA, scientists use tools that are borrowed from nature, including:

- **Restriction enzymes:** These naturally occurring enzymes are used as a defense by bacteria to cut up DNA from viruses. There are hundreds of specific restriction enzymes that researchers use like scissors to snip specific genes from DNA.

- **DNA Ligase:** This enzyme is used in nature to repair broken DNA. It can also be used to paste new genes into DNA.
- **DNA vector:**
 - a. **Plasmids:** These are mostly circular units of DNA. They can be engineered to carry genes of interest.
 - b. **Bacteriophages** (also known as phages): These are viruses that infect bacteria. Bacteriophages can be engineered to carry recombinant DNA.

Q: What are major achievements of genetic engineering

Major achievements of genetic engineering

- The creation of a new synthetic vaccine for foot-and-mouth disease is a strange and more impressive tale.
- A vaccine made against coccidiosis (a disease of vertebrates and invertebrates) by using avian protein to immunize chicken against avian coccidia.
- Sleeping sickness (trypanosomiasis) is caused by a parasite called Trypanosoma brucei. The availability of a genetic transformation made possible the treatment of this disease.
- Molecular biology has introduced in modern medicine a new way to cure diseases, namely genetic therapy, direct intervention in the genetic makeup of an individual.
- Genetically modified (GM) foods possess specific traits such as tolerance to herbicides or resistance to insects or viruses.
- Adding a gene from insect-killing bacteria to cotton so that insects, eat cotton will be poisoned!
- Genetic engineering also includes insertion of human genes into sheep so that they secrete alpha-1 antitrypsin in their milk - a useful substance in treating some cases of lung disease.
- By inserting a gene for human insulin into an E coli bacterium, the E coli will make lots of insulin, which scientists and doctors can collect and use.

Q: How are single-cell proteins produced and what is their significance?

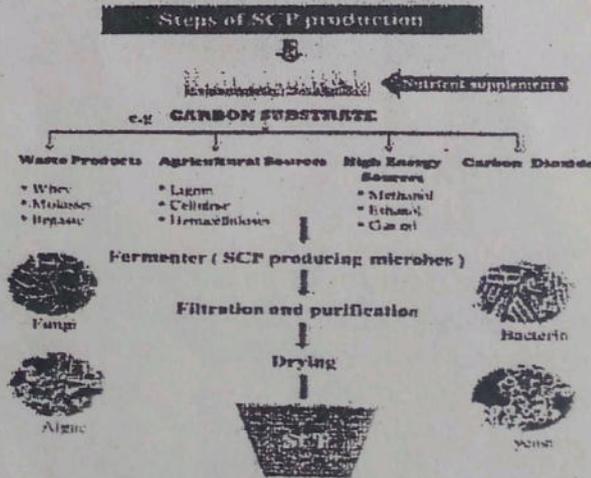
Single-cell protein:

"The isolated protein or the total cell material from microorganisms like bacteria, yeast, filamentous fungi and algae used as food or feed is called single-cell protein (SCP)."

Major source of single-cell protein:

Some of the major uses of SCP are as follows:

1. It is a rich source of protein (60 to 72%), vitamins, amino acids, minerals and crude fibers.
2. It is a popular healthy food.
3. It provides a valuable protein-rich supplement in the human diet.
4. It lowers the blood sugar level of diabetics and prevents the accumulation of cholesterol in the human body.



Q: What is a fermenter? Write its advantages.

Fermenter:

“A fermenter is an enclosed and sterilised vessel that maintains optimal conditions for the growth of a microorganism.”

Or

“Fermenter is a large container in which populations of microorganisms are grown to produce large quantities of products.”

Advantages of fermenter:

1. Fermenters (bioreactors) provide a suitable environment (temperature and pH etc.) for quick metabolism in microorganisms.
2. It provides a specialized medium in which all essential nutrients of microorganisms are present. When the raw material is added to the medium, microorganisms carry out metabolic reactions to make products.
3. Fermenters are used for the manufacture of many products e.g. medicines (Antibiotics), vaccines, interferons, hormones etc.

Differences between lactic acid and alcoholic fermentation.

Lactic acid fermentation refers to a metabolic process by which glucose is converted into the metabolite: lactate and cellular energy	Alcoholic fermentation refers to a metabolic process by which glucose is converted into ethanol and carbon dioxide
Occurs in <i>Lactobacillus</i> spps, yeast, and muscle cells	Occurs in yeast and other microorganisms
Produces lactic acid molecules from the pyruvate molecule	Produces ethanol and carbon dioxide from the pyruvate molecule
Involves lactate dehydrogenase and pyruvate decarboxylase	Involves alcohol dehydrogenase and pyruvate decarboxylase
Used in the production of yogurt and cheese	Used in the production of bread, beer, wine, and vinegar

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Solved exercise from book

Choose the correct answer:

- The artificial manipulation, medication and recombination of DNA
 (a) Genetic engineering (b) Biotechnology
 (c) Molecular biology (d) Genetic
- The earlier biotechnologist were
 (a) Biologist (b) Agriculturist
 (c) Genetics (d) Farmers
- The complete graph of human genome was studied by
 (a) PCR (b) HGP
 (c) Medicine (d) soma-clonal
- Alcohol and antibiotics on large scale production by organism is an area of
 (a) Environmental biotechnology (b) Fermentation
 (c) Biotechnology in industry (d) Medicinal biotechnology
- Most of the living things use oxygen to produce
 (a) ATP (b) Alcohol
 (c) Organic acid (d) Ecological pyramid
- In acidic formulation lactic acid produced from
 (a) Pyruvic acid (b) Acetic acid
 (c) Citric acid (d) Glyceric acid
- The bread dough rises during alcoholic fermentation is due to
 (a) Methyl alcohol (b) CO₂
 (c) Ethyl alcohol (d) H₂O
- The container use to grow bacteria on large scale are called
 (a) Chillers (b) Sterilizers
 (c) Fermenter (d) Ferments
- Naturally occurring enzyme used as a defense chemical by bacteria
 (a) Defense protein (b) Restriction enzyme
 (c) Hydrolytic enzyme (d) ligase enzyme
- Extra circular DNA which use as vector of gene is
 (a) Genome (b) Plasmid
 (c) Pilli (d) Ligase

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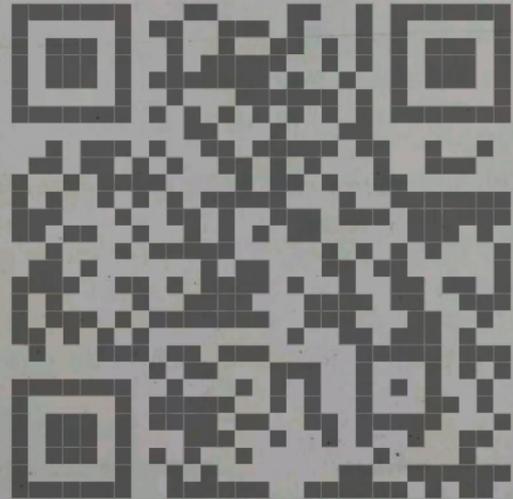


Chapter # 09

Pharmacology

Multiple Choice Questions

- Which of these addictive drugs are also used as painkillers?
 - * **Narcotics**
 - * All can be used
 - * Hallucinogens
 - * Sedatives
- The substance used for the treatment cure, prevention of diagnosis of diseases are called.
 - * Sedatives
 - * Narcotics
 - * **Medicinal drugs**
 - * Hallucinogens
- Edward Jenner first introduced the world's first:
 - * Antibiotics
 - * Addictive drugs
 - * **Vaccination**
 - * Antigen
- Which of the following disease is cured by vaccines?
 - * Aids
 - * **Hepatitis B**
 - * Cancer
 - * Diabetes
- Sedation thinking can develop by using for a long time.
 - * Antibiotics
 - * Morphine
 - * **Sedatives**
 - * Marijuana
- This group indicates mescaline and psilocin.
 - * **Hallucinogens**
 - * Narcotics
 - * Sedatives
 - * Vaccines
- Streptomycin drug is obtained from:
 - * Fungi
 - * **Bacteria**
 - * Plants
 - * Animals
- Expired drugs can cause damage to:
 - * **Stomach**
 - * Kidney
 - * Heart
 - * Brain
- A material which contains weakened pathogen is called:
 - * Antibodies
 - * **Vaccines**
 - * Antigens
 - * Antibiotics
- Edward Jenner introduced vaccine of which disease?
 - * AIDS
 - * Malaria
 - * Hepatitis
 - * **Small pox**
- Cactus plant produces:
 - * **Mescaline**
 - * Codeine
 - * Morphine
 - * Psilocin
- Medicine prepared in Laboratory are called.
 - * Plants made
 - * **Synthetic**
 - * Mineral made
 - * Animals made



X-BIOLOGY

13. Medicine can help you to feel:
- * Best
 - * Weak
- * Stronger
* Better
14. Study of composition and medical application of drugs is called:
- * Mycology
 - * Biotechnology
- * Pharmacology
* Physiology
15. The role of antiseptics is:
- * Reduce infections
 - * Inhibit bacteria
- * Destroy micro-organisms
* Kill bacteria
16. Which scientist discovered the antibiotic penicillin?
- * Lan Wilmot
 - * Edward Jenner
- * Sir Alexander Fleming
* Joseph Lister
17. He is called as 'Father of Antiseptic Surgery'.
- * Joseph Lister
 - * Sir Alexander Fleming
- * Lan Wilmot
* Edward Jenner
18. Penicillin is discovered by:
- * Bu Ali Sina
 - * Edward Jenner
- * Joseph Lister
* Alexander Fleming
19. Aspirin belongs to the group of.
- * Derived from plants
 - * Derived from Animals
- * Derived from bacteria.
* Synthetic Drugs
20. Substance or antibiotic that inhibit further growth of bacterial cell.
- * Bactericidal
 - * Both of these
- * Bacteriostatic
* None of these



Pharmacology

Short Questions with Answers

Q: Define pharmacology and who is pharmacist?

Pharmacology:

Pharmacology is the branch of biomedical science which is concerned to the uses, effects, and modes of action of drugs. This branch is studied under the discipline of pharmacy.

Pharmacists:

One who studies pharmacy responsible for dispensing prescription medications to patients and advising them are called pharmacists.

Oswald Schmiedeberg (1838-1921) is generally recognized as the I founder of modern pharmacology.

Q: Why antibiotics are not effective against viral infection?

Viruses are different to bacteria; they have a different structure and a different way of surviving. Viruses don't have cell walls that can be attacked by antibiotics; instead, they are surrounded by a protective protein coat.

Q: Why the sedative is used for?

Sedative drugs are helpful for treating anxiety and sleep problems. such as, Diazepam (Valium), Alprazolam (Xanax), and Clonazepam (Klonopin).

Q: Why addiction is considered as harmful condition?

- People being an addictive, suffer in health issues which increases other illness.
- Addiction can damage the one's social life.
- Research reveals that, addictive people can easily involve in crimes such as robbery, stealing/ snatching, law violator and a criminal.
- It can also affect their family, when the addict does not get its need he become, angry, aggressive, harsh, short temper and does not behave well, ultimately lose relations.

Q: Is it possible to get drugs from animal's name some of them?

Certain animal parts and animal products are used as drug in therapeutics.

For example, Gonadotropin hormone are prepared commercially from either horse serum or from the urine of pregnant woman.

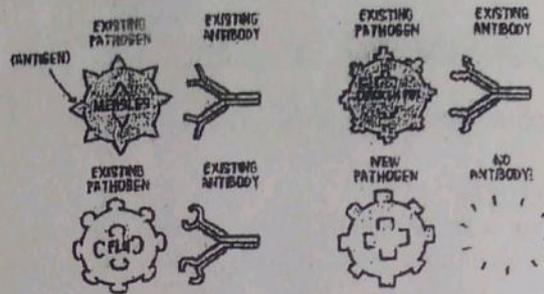
Hyaluronidase enzyme is produced by some microorganisms, found in the heads of leeches, in snake venom and in mammalian testes.

Q: Do we have any harm of antibiotics? If, so mention them.

- An allergic reaction could happen with any drug. That can range from itching and rash all the way to a life-threatening anaphylactic reaction
- Over dose of pain killers and sedatives can make the person addictive which on leaving causes severe risk factors.
- New study shows that children given antibiotics for routine upper respiratory infections are more susceptible to aggressive antibiotic-resistant strains of the bacteria.
- Aggressive antibiotics, while helpful if you have a serious infection, can wipe out many useful gut bacteria.

Q: How vaccine work against pathogen?

A vaccine is a biological preparation that improves immunity to a particular disease. A vaccine typically contains an agent that resembles a disease-causing microorganism, and is often made from weakened or killed form of the microbe, its toxins or one of its surface proteins. A vaccine can confer active immunity against a specific harmful agent by stimulating the immune system to attack the agent.



When a new pathogen or disease enters our body, it introduces a new antigen. For every new antigen, our body needs to build a specific antibody that can grab onto the antigen and defeat this pathogen.

Q: What are drugs? Define its two categories.**Drugs:**

Drug is a chemical substance used to treat, cure, prevent a disease or to promote well-being or artificial pleasure. Drugs can be derived from plants and animals.

There are two categories of drugs:

1. **Pharmaceutical drugs** or medicinal drugs are used to treat the diseases and makes the patient physically normal.
2. **Addictive drugs** which makes the person relaxed by feeling pleasure, acting on the CNS of the person, finally the person become dependent on it.

Q: What is drug addiction and what are the effects of addiction?**Drug Addiction:**

There are some drugs, which permanently change the chemistry and neural structures of the brain if used continuously. As a result, normal functioning without the drug is made nearly impossible. The body craves these drugs if discontinued. This is known as drug addiction.

Effects of Addiction:

- Negative physical effects
- The self-esteem of drug addicts is damaged.
- Lose the ability to develop caring and honest relationships.
- They become less assertive and have great difficulty expressing opinions or needs.
- They are generally marginalized.
- Drug abuse let to an increase in the crime rate.

Q: Give two examples of drugs, which are extracted from plants.

Cinchona tree contains Quinine in its bark which is used in the prevention and treatment of malaria and Opium is used as pain-killer drug extracted from the unripe seed pods of the opium poppy.

Q: What are the three major categories of drugs, which can cause addiction?

There are three major categories of drugs;

1. Sedatives
2. Hallucinogen
3. Narcotics

Q: How antibiotics misused?

MISUSE OF antibiotics

Antibiotics are prescribed for a particular infection, but can harm to your normal flora which is beneficial for your body. Apart from it, side effects can also occur which are:

- Antibiotic resistance
- Diarrhea
- Upset stomach
- Thrush, which is a fungal infection that can affect the mouth or digestive tract
- Vaginal yeast infection caused by *Candida albican*
- Can cause yellowing of teeth.

Extended Response Questions with Answers

Q: Discuss in detail about medicinal drugs and their resources.

Medicinal drugs:

Medicinal drugs are beneficial for the patients as these drugs treat the disease to prevent them so many of the diseases can easily be cured. These beneficial drugs are obtained from various sources:

Types of medicinal drugs:

i. Drugs from plants

Many plants produce special substances in their roots, leaves, flowers, or seeds that help to form drugs in laboratory or can be used directly as herbs.

For example, cinchona tree contains Quinine in its bark which is used in the prevention and treatment of malaria and Opium is used as pain-killer drug extracted from the unripe seed pods of the opium poppy.

ii. Drugs from microorganisms

Microorganisms such as Bacteria and fungi not only produce many primary metabolites.

Example: Tetracycline are produced by bacteria and Lovastatin produced by fungi.

iii. Drugs from animals

Certain animal parts and animal products are used as drug in therapeutics.

For example, Gonadotropin hormone are prepared commercially from either horse serum or from the urine of pregnant woman.

Hyaluronidase enzyme is produced by some microorganisms, found in the heads of leeches, in snake venom and in mammalian testes.

iv. Drugs from minerals

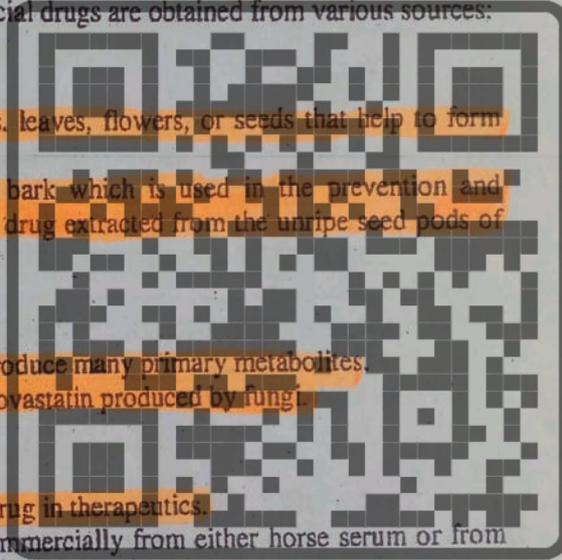
Some of the drugs are synthesized from minerals or can be given with mineral as supplement, such as iron is used in treatment of iron deficiency (anemia).

Gold salts are used in the treatment of rheumatoid arthritis etc.

v. Synthetic drugs:

Synthetic drugs are synthesized in labs by using man-made chemicals rather than natural ingredients.

Example: Synthetic marijuana goes by many names: IC2, Spice, fake pot, potpourri, legal weed, and more.



Q: What are the uses of drugs?

a. Pain killers

Painkillers (analgesic) reduces the pain by acting on CNS.
Example: Paracetamol, Aspirin and Panadol etc.

b. Antibiotics

A recent study found that aspirin may be most effective when taken at night, rather than in the morning.
Antibiotics work against bacterial infections.

For example: Penicillin, Cephalosporin and Tetracycline etc.

c. Vaccine:

The vaccine is vital for One's life, vaccine prevent the living body from the microbial diseases by developing immunity in the body.

d. Sedatives

Sedative drugs are helpful for treating anxiety and sleep problems. such as, Diazepam (Valium), Alprazolam (Xanax), and Clonazepam (Klonopin).

Q: Define in detail about addictive drug and its types.

Addictive Drugs:

Addictive drugs act on the pleasure center in the brain, causing a shortcut to reward that, when repeated, can change the way a person processes information.
Following are the major categories of addictive drugs:

1. Sedatives

- Sedatives are central nervous system (CNS) depressants, a category of drugs that slow normal brain function.
- It can cause drowsiness and sleepiness and are used to reduce anxiety.
- They also reduce heart rate and breathing, and can reduce them to the point that death occurs, if there is an overdose.

2. Narcotics

Narcotics are also called painkiller.

These drugs bind with the pain receptor present in CNS and reduces the pain.

They are used to treat moderate to severe pain that may not respond well to other pain medications.

(a) Heroine

- Heroin is considered highly addictive.
- Heroin causes the burst of pleasure associated with their use.
- Abuse of heroin can quickly lead to drug tolerance, dependence, and addiction.

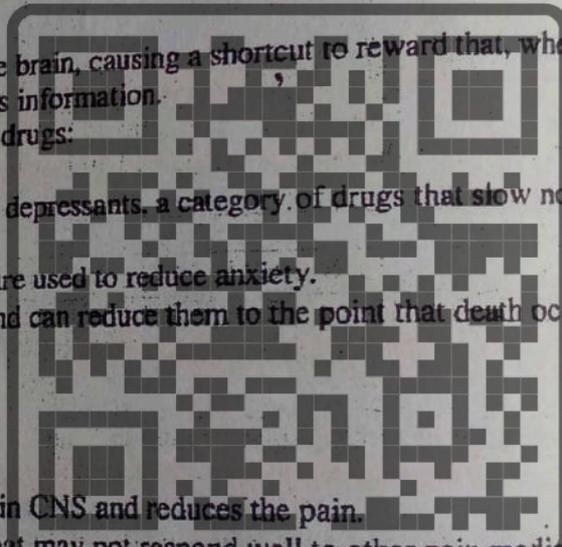
(b) Morphine

- Morphine is used to relieve moderate to severe pain.
- It remains active in blood stream upto 6 Hrs.
- Its overdose can cause many side effects including nausea, vomiting, constipation, lightheadedness, dizziness, drowsiness, or sweating.

3. Hallucinogen

Hallucinogens are a class of drugs that cause hallucinations—profound distortions in a person's perceptions of reality.

Some of the typical effects are: increased breathing rate, increased heart rate and blood pressure, irregular heartbeat, palpitations and blurred vision etc.



i. **Marijuana**

- Marijuana is the most commonly used illicit drug in the United States.
- It can be obtained from the flower, stem and leaves of the Cannabis indica plant.
- People smoke marijuana in hand-rolled cigarettes or in pipes or water pipes.
- The intake of this drug produces

Differences:

Antibiotics	Vaccine
These are the medicines which kill microorganism.	These are weakened microorganisms which can cause diseases.
This provides protection for short period of time.	This provides protection for long period of time because it produces antibodies.
The first antibiotic was discovered by DR Alexander Fleming	The first vaccine was discovered by Dr Edward Jenner.
Examples: Streptomycin, Erythromycin etc.	Examples: polio drops, measles vaccine, Covid-19 vaccine etc.

Antiseptic	Antibiotic
Effective against a wide range of microorganisms	Effective against bacteria only
Inhibits the growth and development of microorganisms without necessarily killing them	Kills and inhibits the growth and development of bacteria
Antiseptics applied topically	Usually taken orally
A few common examples of antiseptic are hydrogen peroxide, boric acid, alcohol and iodine	A few common examples of antibiotic are penicillin, Keflex, Zithromax

Bactericidal	Bacteriostatic
Substance or antibiotic that can kill bacteria.	Substance or antibiotic that inhibit further growth of bacterial cell.
Its action is irreversible	Its action is reversible
It does not work with immune system of the host	Work with the immune system of the host to prevent the growth and reproduction of bacteria

Vaccination	Immunization
The process involves introducing a weakened / deactivated disease-causing microbe into a person	The process starts after the person is exposed to the vaccine and the body starts building resistance to that disease
It is usually injected or administered orally	It is not administered in any way. The body develops resistance from vaccines.
Imovax Rabies is the trade name for rabies vaccine	The body builds up immunity through this vaccine for the disease rabies.
Vaccination does not guarantee complete resistance to a disease	Complete immunity occurs when the person fully recovers from the disease.

Solved exercise from book

Choose the correct answer:

- i) Who is called father of antiseptic?
 * Alexander Fleming
 * Edward Jenner
 * J. Lister
 * Oswald Schmiedeberg
- ii) Drugs for treatment of rheumatoid arthritis can be obtain from:
 * Animals
 * Plants
 * Minerals
 * Microorganisms
- iii) Drugs that slow normal brain functioning are categorized as:
 * Narcotics
 * Marijuana
 * Hallucinogen
 * Sedatives
- iv) Vaccination can be administered:
 * After infection
 * During infection
 * Before infection
 * All are Correct
- v) The substance which inhibit the growth of bacteria can be considered as:
 * Vaccine
 * Bacteriostatic
 * Bactericidal
 * Antibiotics
- vi) Earls is addicted to a drug, which left the following effect on Hans:
 i. Blurred vision ii. Making unseen faces in imagination iii. Euphoria Identify the drug.
 to which Nazis is addicted?
 * Narcotics
 * Antibiotics
 * Hallucinogen
 * Antiseptic
- vii) Which one is not the effect of misuse of antibiotics?
 * Diarrhea
 * Stomach upset
 * Immunization
 * Antibiotic resistance

