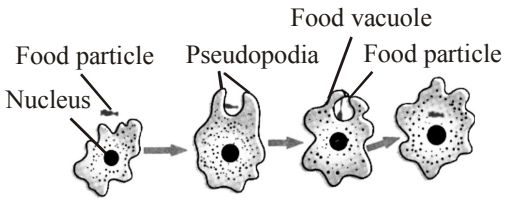
Chapter 3 Control And Coordination Of Life Processes

- The various processes essential for maintenance of life are called **life processes**, which are **nutrition**, **respiration, transportation** and **excretion.**
- These processes are needed to prevent damage and break-down for which energy is required.
- Living organisms take energy from outside in the form of food to the inside by the process of **nutrition**.
- The living organisms use the chemical energy for carrying out various life processes which obtained from food through **chemical reactions.**
- Most of the food sources are carbon-based, because of the dependency of life on carbon-based molecules.
- Most common chemical means of break-down molecules is **oxidising-reducing reactions**.
- For the break-down of molecules oxygen is taken inside from outside the body.
- During the occurrence of chemical reactions inside the body, by-products are also formed which are harmful to the body.
- The adjustment of all the vital activities of life is called as coordination.
- The vital processes of life are controlled by endocrine system and nervous system.
- The response of the part of plant to light is called phototropism.

- **Nutrition**

Nutrition is a process by which an organism obtains its food.

- **There are different types of nutrition :**
  - (i) **Autotrophic Nutrition :** Autotrophs contain chlorophyll pigment, which is capable of trapping and fixing the solar energy. This energy is utilized for synthesising food from the raw materials like carbon dioxide, water and a few minerals. *E.g.* green plants, Euglena.
  - (ii) **Heterotrophic Nutrition :** A heterotrophic organism is a consumer which derives its nutrition from other organisms. *E.g*. all animals, most bacteria and fungi.
  - (iii) **Parasitic Nutrition :** These animals live on or inside the body of the host and obtain their food. *E.g*. Tapeworm, *Cuscuta* (amarbel), etc.
  - (iv) **Saprophytic Nutrition :** Animals depend on dead decaying organic matters. *E.g*., fungi, bacteria.
  - (v) **Holozoic Nutrition:** The complex organic food material is taken into its body by the process of ingestion, the ingested food is digested and then absorbed into the body cells of the organism. *E.g.* man, cat, dog, fish, *Amoeba*, etc.



Nutrition in *Amoeba*

- **Nutrition in Plants**

Photosynthesis is the process by which autotrophic chlorophyll containing organisms manufacture their own energy sources (simple sugars) from intracellular chemical reaction of carbon dioxide and water in presence of sunlight and chlorophyll.

$$6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6H_2O + 6O_2$$

- **Chlorophyll** remains present in chloroplasts which is of green colour.
- CO_2 is obtained through **stomata**, which opens and closes by the turgidity of guard cells. The guard cells swell when water flows into them, causing the stomatal pore to open. Similarly the pore closes if the guard cells shrink.
- The factors which affect photosynthesis are light, CO_2, water, temperature.

Nutrition in Animals

- **Human Digestive System** is made up of two parts

(i) Alimentary canal and (ii) Digestive Glands.

- Alimentary canal is about nine meters long which starts from mouth and extends to anus.
- Saliva has an enzyme named **ptylain** which digests starch into maltose.
- The lining of alimentary canal has muscles that contract rythmically in order to push the food forward. This movement occurs all along the gut and the movement is called **peristaltic movement**.
- **Oesophagus** opens into J-shaped stomach and is on the left side of abdomen.
- Protein digestion starts in the stomach.
- Small intestine is a coiled and narrow tube which is divided into three parts : **duodenum, middle jejunum, distal ileum**.
- Small intestine is the site of the complete digestion of carbohydrates, proteins and fats.
- **Gall bladder** stores bile salts and pigments, secreted by the liver.

- Pancreas lies parallel to and beneath the stomach.
- Liver produces bile which emulsifies fat and make food alkaline.
- **Assimilation** is the process in which the absorbed food is taken in body cells and used for energy, growth and repair.

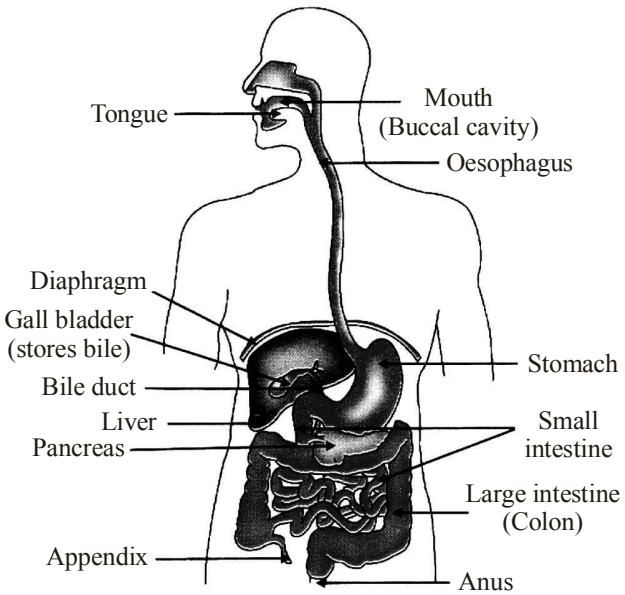


Fig. Human alimentary canal

Respiration

Respiration is a complex process which includes breathing *i.e.* exchange of O_2 and CO_2 and oxidation of food to release energy.

- There are two types of Respiration :
- **Aerobic Respiration** occurs in the presence of O_2. It involves two steps :

  (a) Glycolysis, (b) Krebs cycle.

$$\text{Glucose} \xrightarrow[\text{(in cytoplasm)}]{\text{Glycolysis}} \text{Pyruvic acid}$$

$$\xrightarrow[\text{(in mitochondria)}]{\text{Oxygen (Krebs cycle)}} 6CO_2 + H_2O + 38ATP$$

- ATP is the main source of energy. One ATP releases 30.5 KJ/mol energy. ATP can be used in the cells for the contraction of muscles, protein synthesis, conduction of nerve impulses and many other activities.
- **Anaerobic Respiration** takes place in certain bacteria and yeast which release energy in the absence of O_2.

$$\text{Glucose} \xrightarrow[\text{(in cytoplasm)}]{\text{Glycolysis}} \text{Pyruvic acid}$$

$$\xrightarrow[\text{Yeast fermentation}]{\text{in absence of } O_2} \underset{\text{Ethanol}}{2C_2H_5OH} + 2CO_2 + 2ATP$$

- In lower plants, exchange of gases takes place through general body surface.

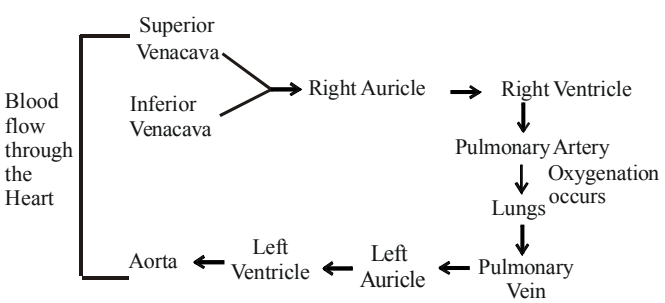
Respiration in Animals :

- Animals have specific organs for respiration like **skin, lungs, gills**.
- There should be large surface area, thin wall for efficient diffusion, rich supply of blood capillaries.
- Air travels through
  Nostril → Nasal passage → Pharynx → Larynx → Trachea → Bronchi → Bronchioles → Alveoli.
- Trachea is wind pipe supported by cartilaginous rings.
- Bronchioles terminate in a sac called **alveolar sac**.
- **Inspiration** is by which atmospheric air reaches lungs. In this volume of thorax increases and outside air reaches lungs.
- **Expiration** is the process by which foul air of lungs is released. It occurs by relaxing intercostal muscles and diaphragm.
- Rings of cartilage are present in throat to ensure not to collapse air passage.
- In human beings respiratory pigment is haemoglobin which remains present in RBC.
- CO_2 is more soluble in water than oxygen is and hence is mostly transported in the dissolved form in blood.
- In tissues, O_2 is used, CO_2 is released.
- Due to difference in concentration of gases, exchange takes place between tissues and blood capillaries.
- **Emphysema, asthma, pneumonia, bronchitis** are the respiratory disorders.

Transportation

Transportation in human beings :

- **Transportation** is a process in which substances are absorbed in one part and move to the other parts of the body.
- Transportation in human beings is done through heart by pumping and receiving blood.
- **Erythrocytes, Leucocytes, blood platelets** are the three types of blood-cells.
- RBCs are circular shaped without nucleus.
- WBCs do not have Hb, they are large nucleated cells and provide immunity to the human body.
- **Blood platelets** are rounded, colourless, biconvex, non-nucleated which help in coagulation of blood.
- **Blood clotting** is a protective function and helps to prevent its own loss from the body.
- **Karl Landsteiner** discovered blood groups A, B and AB.
- Arteries are thick-walled and transport blood from heart to the various parts of the body.
- Veins are thin walled and carry blood from various organs to the heart.
- Capillaries are narrow and thin walled.
- **Heart** is situated in the thoracic cavity between two lungs. Heart is made up of cardiac muscles which works continuously. Human heart has four chambers *i.e.* two auricles and two ventricles.



- Normal heart rate is 72/minute.

- On contraction – Systolic phase – 120 mm of Hg
- On Relaxation – Diastolic phase – 80 mm of Hg.
- **Double Circulation in Man:** The circulatory system of man is called double circulation as the blood passes through the heart twice in one complete cycle of the body. **It involves two circulations:**

(i) **Pulmonary Circulation:** This circulation is maintained by the right side of the heart. It begins in the right ventricle which expels the blood into the pulmonary trunk. The blood flowing into the vascular system of the lungs, becomes oxygenated and returns to the heart (left atrium) through pulmonary veins.

(ii) **Systemic Circulation:** This circulation is maintained by the left ventricle which sends the blood into the aorta. The aorta divides into arteries, arterioles and finally to capillaries and thereby supplies oxygenated blood to various parts of the body. From there deoxygenated blood is collected by venules which join to form veins and finally vena cava and pour blood back into the heart.

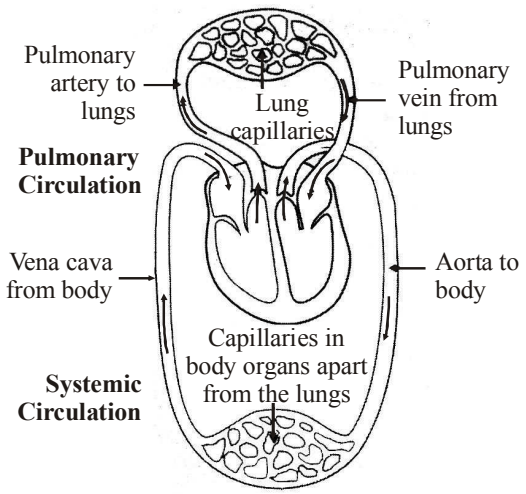


Fig : Double circulation in Man.

Transportation in Plants :

- The movement of molecules from lower concentration to higher concentration is known as **osmosis**.
- Vascular system helps the plants for transportation of water and minerals.
- **Xylem** and **Phloem** are conducting tissues of plants.
- Tracheids are long, thin, spindle shaped cells and have thick cell walls.
- The loss of water in the form of vapours from the leaf to the atmosphere is called as **transpiration**.
- Transpiration helps in the upward movement of sap or water from the root to leaves.
- Transport of food from leaves to other parts of the plant is called translocation, which is carried out by phloem.

Excretion

Excretion in Animals

- The removal of unwanted waste materials from the body is called **excretion**.

  Contractile vacuole helps in the excretion in single celled organisms.

Excretion in Human Beings :

- Excretory system of human beings consists of a pair of **kidneys, a pair of ureters, urinary bladder, urethra.**

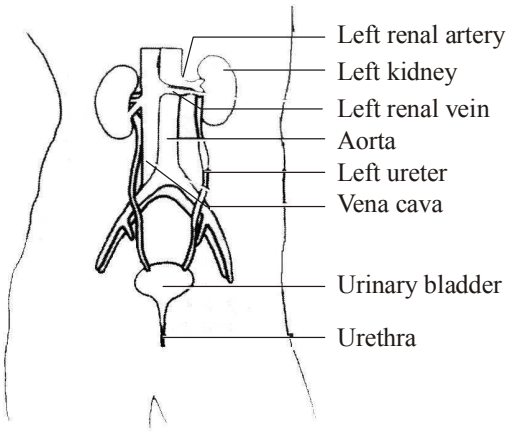


Fig : Excretory system in human beings

- Kidneys are bean-shaped. The waste material is brought to kidneys by renal arteries.
- Every nephron has two parts one is Bowman's capsule and the other is the collecting tubule.
- Bowman's capsule consist of network of capillaries called glomerulus and they are collectively called as Malpighian body.
- Kidneys also help to maintain osmotic potential in blood & tissue fluid.
- Improper functioning of the kidneys may lead to accumulation of water in the body called **Oedema, Nephritis, Kidney Stones, Gout.**
- An artificial kidney is a device to remove nitrogenous waste products from the blood through **dialysis**.

Excretion in Plants :

- Oxygen is waste product of photosynthesis in plants.
- Many waste products are stored as resins and gums in plants.
- **Co-ordination in Animals :**

Nervous System

- It comprises neurons, nerves, nervous organs which control the activities of different organs of the body.

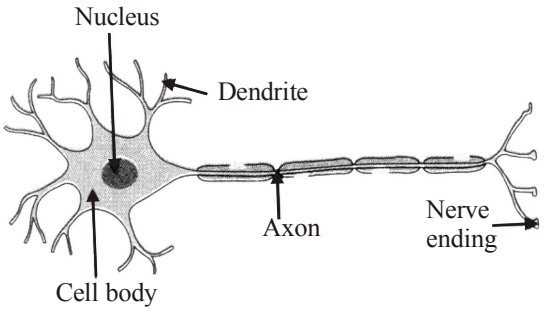


Fig. Structure of neuron

- **Neuron** is the structural and functional unit of nervous system.
- **Neuron (or nerve cell) has three components:**

  (i) **Cell body** is a rounded, stellate part of neuron that contains a central nucleus, abundant cytoplasm and various cell organelles except centrioles. It maintains the neuron through its metabolic activity and growth.

(ii) **Axon** has an insulating and protective sheath of myelin around it. Myelin is made up of fat and protein.

(iii) **Dendrites** are fine, short and branched protoplasmic processes of cell body that pick up sensations (physical, mechanical, electrical, chemical) and transmit the same to the cell body.

- The neurons transmit the messages to the nervous system in the form of electrical signals. They pass the impulse to the cell body and then along the axon. The axon passes the impulse to another neuron through a function called **synapse**.
- **There are three types of neurons :**
  (i) **Sensory Neuron :** It transmits impulses from sensory cells (or receptor) towards the central nervous system.
  (ii) **Motor Neuron :** It transmits impulses from the central nervous system towards the muscle cells (or effectors).
  (iii) **Relay Neuron :** It occurs in the central nervous system where they serve as links between other neurons.

Reflex Action :

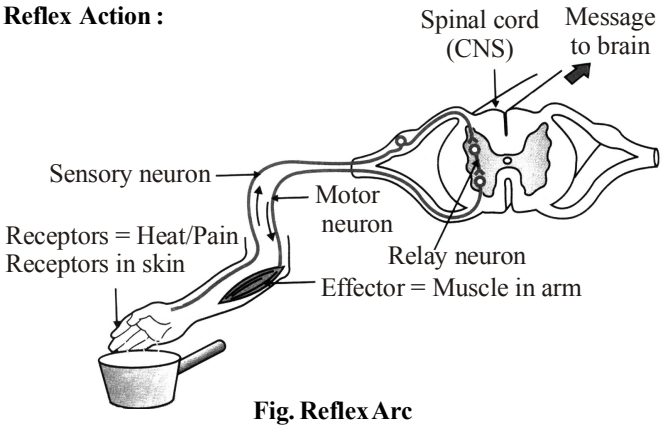


Fig. Reflex Arc

- **Reflex Action :** It is rapid, automatic, definite response to stimulus by an organ without involving brain for its initiation. The pathway which is followed by this is called **reflex arc**.

Stimulus ⟶ Receptor Organ ⟶ Sensory Neuron ↓ Spinal Cord ⟵ Motor Neurons ⟵ Effector organ

E.g. Knee-jerk reflex, sneezing , yawning , blinking of eye.

There are two types of reflexes :

(i) **Simple** or **unconditioned reflexes** – These reflexes are regulated through spinal cord (CNS) and participation of brain is not necessary.

(ii) **Conditional Reflexes :** In these reflexes, the participation of brain is essential.

Human Brain :

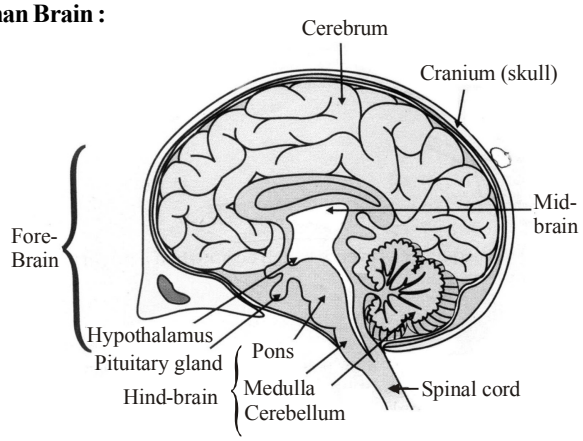


Fig. Human brain

- Nervous system of man consists of three parts –
  (i) **Central Nervous System**, which includes **brain** and **spinal cord**.
  (ii) **Peripheral Nervous System**, comprises of nerves arising from brain and spinal cord.
  (iii) **Autonomic Nervous System.**
- Olfactory lobes are concerned with sense of smell.
- Brain is inside the cavity called **cranium**, weighs about 1325 gm. It is covered by thin, non-nervous layer (piameter). It is filled with **cerebrospinal fluid**. It is divided into three parts –
  (a) Forebrain : (i) Olfactory lobes (ii) Cerebrum
  (b) Midbrain
  (c) Hind brain : (i) Cerebellum (ii) Medulla oblongata (iii) Pons
- **Fore brain** (Cerebrum) is the main thinking part of the brain. All our thoughts, sensations, actions and movements are controlled by the cerebrum.
- **Midbrain** consist of nerve cells, connects forebrain to the hind brain. It has reflex centres for eye movement and hearing response.
- **Hind brain** (Cerebellum) is the second largest part of brain. The surface is of grey matter, deeper part is of white matter. Cerebellum maintains posture, regulates muscle tone.
- **Medulla oblongata** controls involuntary movement, acts as reflex centre for vomiting, coughing, sneezing, swallowing etc.

Co-ordination in Plants :

- The plants coordinate their behaviour against environmental changes by using hormones.
- Plants also use electro-chemical means to convey the information from cell to cell, but unlike in animals, there is no specialised tissue in plants for conduction of information.
- Instead of the specialised proteins found in animal muscle cells, plant cells change shape by changing the amount of water in them resulting in swelling or shrinking and therefore in changing shapes.
- The plant movements made in response to external stimuli fall into two main categories :

Tropisms (Tropic Movements) : A growth movement of a plant part in response to an external stimulus in which the direction of stimulus determines the direction of response is called tropism.

- **Types of Tropism :**
  (i) *Phototropism* – movement in response to light.
  (ii) *Geotropism* – movement in response to gravity.
  (iii) *Thigmotropism* – movement in response to touch.

Nastic (Nastic movements) : It is not a directional movement of the plant part with respect to the stimulus.

Thigmonasty : It is the non-directional movement of a plant part in response to the touch of an object. E.g.- *Mimosa pudica* (Chui-mui).

- The folding up of the leaves of a sensitive plant on touching is due to the sudden loss of water from 'Pulvini' to droop and fall.

Photonasty : The non-directional movement of a plant part (usually petals of flowers) in response to light is called photonasty.

- **Growth hormones** are the natural growth substances which are produced in any part of the plant.

(i) **Auxins :** It stimulates growth, phototropism, geotropism 2, 4 - D is used to avoid pre-harvest fruit in oranges, apples, used as weedicide.

(ii) **Gibberellins :** These can increase the height of plant, can induce parthenocarpy, stimulate flowering.

(iii) **Cytokinins :** Promote cell division, inhibit or delay ageing, organ formation.

(iv) **Ethylene :** It's a gaseous plant hormone, used in artificial ripening of fruits, promote ageing in plants, breaks dormancy of several organs.

(v) **Abscisic Acid (ABA) :** Also known as stress hormone. It is a growth inhibitor, inhibit the process of flowering, seed development.

Hormones in Animals :

- Hormones are the substances which help in control and coordination of the body activities.
- Exocrine glands : **Mammary, salivary, sweat glands**.
- Endocrine glands : **Pituitary, thyroid, adrenal glands**.

(i) **Hypothalamus :** The hypothalamic hormones are also called releasing hormones : TSH, ACTH, FSH, LH.

(ii) **Pituitary gland :** It has two lobes **anterior (adenohypophysis)** and **posterior (neurohypophysis).**

1. **Anterior lobe :** Secretes TSH (Thyroid Stimulating hormone), ACTH (Adrenocorticotrophic hormone), GH (Growth hormone), FSH (Follicle stimulating hormone), LH (Luteinizing hormone), Prolactin.
2. **Intermediate lobe :** It is responsible for production of melanin pigment.
3. **Posterior lobe :** Secretes oxytocin, vasopressin produced in the hypothalamus and stored in posterior lobe.

(a) **Oxytocin :** Released during child birth, during breast feeding.

(b) **Vasopressin :** It's an antidiuretic hormone which controls the secretion of urine by kidney.

(iii) **Pineal :** It lies in the brain. It secretes biogenic amine hormone called **melatonin**. It inhibits ovarian growth and ovulation.

(iv) **Thyroid :** Largest endocrine gland. It produces three hormones **thyroxine**, **tri-iodothyroxine**, **calcitonin**. Thyroxine promotes the growth of body tissues. Calcitonin lowers blood calcium level.

(v) **Parathyroid :** It increases blood calcium level from bone to blood.

(vi) **Adrenal:** Produces three hormones –

1. **Glucocorticoids :** Increase blood glucose level, reduces inflammation caused by allergies. Regulated by ACTH.
2. **Mineral corticoids :** Controls sodium and potassium ratio.
3. **Sex corticoids :** These stimulate secondary sex characters in males such as voice, body hairs.

(vii) **Pancreas :** It is exocrine as well as endocrine. The endocrine part is called islets of Langerhans. It consists of α and β cells. β cells secrete hormone insulin which regulates blood sugar level. Excess of glucose starts appearing in urine and the disease is called **diabetes**. α - cells produce hormone **glucagon** which regulates the amount of glucose by converting glycogen into glucose.

(viii) **Testes :** It secretes hormone **testosterone** which is responsible for secondary sex characters such as hoarseness in voice, growth of moustaches, beard etc.

(ix) **Ovary :** These produces hormones **estrogen**, **progesterone**, **relaxin**. Estrogen stimulate secondary sexual characters in females such as development of breast, growth of uterus, vagina and onset of menstrual cycle. Progesterone fixes foetus to the uterus, forms placenta. Relaxin hormone is produced at the time of child birth. It softens pelvic ligament which helps in easy delivery.

Exercise 1

DIRECTIONS : This section contains multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which only one is correct.

1. Molecular movements are needed for life
   (1) for repairing and maintaining structures
   (2) for nutrition
   (3) for respiration
   (4) for repairing only
2. Enzymes are
   (1) vitamins (2) proteins
   (3) carbohydrates (4) fats
3. In which of the following animals, respiration occurs without any respiratory organ?
   (1) Fish (2) Frog
   (3) Cockroach (4) Earthworm
4. The exchange of gases (O_2 and CO_2) in a mammal takes place in
   (1) trachea (2) bronchi
   (3) bronchiole (4) alveoli
5. The exchange of gases in the alveoli of the lungs takes place by
   (1) osmosis (2) simple diffusion
   (3) passive transport (4) active transport
6. The first step in photosynthesis is
   (1) conversion of light energy to chemical energy
   (2) reduction of carbondioxide
   (3) absorption of light energy by chlorophyll
   (4) formation of carbohydrates
7. The enzyme present in saliva is
   (1) amylase (2) lactase
   (3) pepsin (4) renin

8. In anaerobic respiration
(1) oxygen is taken in.
(2) carbon dioxide is taken in.
(3) oxygen is given out.
(4) carbon dioxide is given out.

9. The blood returning to the heart from lungs via pulmonary vein has more
(1) RBC per ml of blood.
(2) haemoglobin per ml of blood.
(3) oxygen per ml of blood .
(4) nutrient per ml of blood.

10. The first heart sound is
(1) 'Lubb' sound at the end of systole.
(2) 'Dub' sound at the end of systole.
(3) 'Lubb' sound at the beginning of systole.
(4) 'Dub' sound at the beginning of systole.

11. The acid present in the stomach is
(1) sulphuric acid (2) nitric acid
(3) hydrochloric acid (4) sulphurous acid

12. Breakdown of pyruvate using oxygen takes place in
(1) Golgi bodies (2) chloroplast
(3) mitochondria (4) nucleus

13. Nature of valves in the heart is
(1) membranous (2) muscular
(3) tendinous (4) ligamentous

14. Heart beat can be initiated by
(1) sinu-auricular node
(2) atrio-ventricular node
(3) sodium ion
(s) purkinje's fibres

15. Oxygenated blood is carried by
(1) pulmonary vein
(2) pulmonary artery
(3) renal vein
(4) hepatic portal vein

16. The longest part of the alimentary canal is
(1) small intestine (2) large intestine
(3) stomach (4) gall bladder

17. Blood from the heart enters the lungs from the
(1) right auricle (2) right ventricle
(3) left auricle (4) left ventricle

18. Largest heart is found in
(1) elephant (2) giraffe
(3) crocodile (4) lion

19. Heart beat originates from
(1) pacemaker (2) cardiac muscles
(3) left atrium (4) right ventricle

20. Which part of a nerve cell contains a nucleus ?
(1) Axon (2) Dendrite
(3) Cyton (4) Nerve endings

21. All informations from the environment is detected by
(1) receptors (2) axon
(3) nucleus (4) cell body

22. The respiratory pigment in the blood is
(1) haemocyanin (2) haemoerythrin
(3) haemoglobin (4) fucoxanthin

23. Reflex arc is formed by
(1) muscle → brain → receptor
(2) muscle → spinal cord → receptor
(3) receptor → brain → muscle
(4) receptor → spinal cord → muscle

24. Which of the following tissues provide control and coordination in animals ?
(1) Nervous and Skeletal
(2) Muscular and Skeletal
(3) Muscular and Transport
(4) Nervous and Muscular

25. How many pairs of cranial nerves are present in man ?
(1) 12 (2) 2 1
(3) 3 1 (4) 4 1

26. The instrument used to measure the blood pressure is
(1) barometer
(2) sphygmomanometer
(3) anaeroid barometer
(4) haemocytometer

27. The process that helps in translocation of water and mineral salts
(1) transpiration (2) photosynthesis
(3) dark reaction (4) glycolysis

28. Co-ordination is achieved through nervous system as well as circulatory system by respective agents like
(1) neurotransmitters and proteins
(2) neurotransmitters and hormones
(3) neurotransmitters and sugars
(4) sugars and hormones

29. The main effect of cytokinin in plants is to
(1) improve the quality of fruits
(2) prevent the growth of lateral buds
(3) regulate opening and closing of stomata
(4) stimulate cell division

30. Growth of pollen tube towards ovule is called
(1) phototropism (2) geotropism
(3) hydrotropism (4) chemotropism

31. The unit of the filtration system is
(1) neuron (2) glomerulus
(3) nephron (4) bowmans capsule

32. In the event of kidney failure the process used to remove nitrogenous wastes is
(1) dialysis (2) osmosis
(3) diffusion (4) plasmolysis

33. Plants bend towards a light source as a result of
(1) inability to synthesise chemical regulators.
(2) increased amount of food synthesised by leaves.
(3) necessity of light for transpiration.
(4) unequal auxin distribution in their stems.

34. Which statement is incorrect about auxins ?
(1) They promote the growth of root.
(2) They promote the growth of shoot.
(3) They influence the formation of flower and ripening of fruit.
(4) They inhibit the growth of root.

35. Which hormone regulates the ionic balance in the body ?
(1) Glucagon (2) Thyroxine
(3) Testosterone (4) Vasopressin

36. The waste materials in plants are stored in the form of
(1) water (2) gums and resins
(3) minerals (4) sugar

37. Control and Co-ordination is provided by
(1) muscular System (2) excretory System
(3) nervous System (4) reproductive System

38. Which is the correct sequence of parts in human alimentary canal?
(1) Mouth → stomach → small intestine → oesophagus → large intestine.
(2) Mouth → oesophagus → stomach → large intestine → small intestine.
(3) Mouth → stomach → oesophagus → small intestine → large intestine.
(4) Mouth → oesophagus → stomach → small intestine → large intestine.

39. The correct sequence of anaerobic reactions in yeast is :
(1) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{mitochondria}}$ Ethanol + Carbon dioxide
(2) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{cytoplasm}}$ Lactic acid
(3) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{mitochondria}}$ Lactic acid
(4) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{cytoplasm}}$ Ethanol + Carbon dioxide

40. Which of the following is most appropriate for aerobic respiration?
(1) Glucose $\xrightarrow{\text{mitochondria}}$ Pyruvate $\xrightarrow{\text{cytoplasm}}$ $CO_2 + H_2O$ + Energy
(2) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{mitochondria}}$ $CO_2 + H_2O$ + Energy
(3) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate + Energy $\xrightarrow{\text{mitochondria}}$ $CO_2 + H_2O$
(4) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate + Energy $\xrightarrow{\text{mitochondria}}$ $CO_2 + H_2O$ + Energy

41. The information acquired at the end of the dendritic tip sets off a chemical reaction. This creates an / a
(1) action (2) reaction
(3) electrical impulse (4) potential

42. The chemicals cross a region called
(1) synapse (2) reflex arc
(3) impulse (4) reception

43. Which of the following statement(s) is/are true about respiration?
(i) During inhalation, ribs move inward and diaphragm is raised.
(ii) In the alveoli, exchange of gases takes place i.e., oxygen from alveolar air diffuses into blood and carbon dioxide from blood into alveolar air.
(iii) Haemoglobin has greater affinity for carbon dioxide than oxygen.
(iv) Alveoli increase surface area for exchange of gases.
(1) (i) and (iv) (2) (ii) and (iii)
(3) (i) and (iii) (4) (ii) and (iv)

44. Which is the correct sequence of air passage during inhalation?
(1) Nostrils → larynx → pharynx → trachea → lungs.
(2) Nasal passage → trachea → pharynx → larynx → alveoli.
(3) larynx → nostrils → pharynx → lungs → trachea.
(4) Nostrils → pharynx → larynx → trachea → alveoli.

45. Which of the following statement(s) is/are true about heart?
(i) Left atrium receives oxygenated blood from different parts of body while right atrium receives deoxygenated blood from lungs.
(ii) Left ventricle pumps oxygenated blood to different body parts while right ventricle pumps deoxygenated blood to lungs.
(iii) Left atrium transfers oxygenated blood to right ventricle which sends it to different body parts.
(iv) Right atrium receives deoxygenated blood from different parts of the body while left ventricle pumps oxygenated blood to different parts of the body.
(1) (i) (2) (ii)
(3) (ii) and (iv) (4) (i) and (iii)

46. The nervous tissue is made up of
(1) nephrons (2) neurons
(3) cells (4) capillaries

47. The process of detecting the input and a quick response to it is called
(1) impulse (2) action
(3) sensation (4) reflex arc

48. Which of the following equations is the summary of photosynthesis?
(1) $6CO_2 + 12H_2O \rightarrow C_6H_{12}O_6 + 6O_2 + 6H_2O$
(2) $6CO_2 + H_2O$ + Sunlight $\rightarrow C_6H_{12}O_6 + O_2 + 6H_2O$
(3) $6CO_2 + 12H_2O$ + Chlorophyll + Sunlight $\rightarrow C_6H_{12}O_6 + 6O_2 + 6H_2O$
(4) $6CO_2 + 12H_2O$ + Chlorophyll + Sunlight $\rightarrow C_6H_{12}O_6 + 6CO_2 + 6H_2O$

49. Choose the forms in which most plants absorb nitrogen
(i) Proteins
(ii) Nitrates and Nitrites
(iii) Urea
(iv) Atmospheric nitrogen
(1) (i) and (ii) (2) (ii) and (iii)
(3) (iii) and (iv) (4) (i) and (iv)

50. Which of the following statement(s) is/are correct?
(i) Pyruvate can be converted into ethanol and carbon dioxide by yeast.
(ii) Fermentation takes place in aerobic bacteria.
(iii) Fermentation takes place in mitochondria.
(iv) Fermentation is a form of anaerobic respiration.
(1) (i) and (iii) (2) (ii) and (iv)
(3) (i) and (iv) (4) (ii) and (iii)

51. The communication between CNS and other parts of the body is facilitated by
(1) peripheral nervous system
(2) brain
(3) spinal cord
(4) reflexes

52. The main thinking part of the brain is
(1) fore-brain (2) mid-brain
(3) hind-brain (4) medulla oblongata

53. Choose the correct path of urine in our body
(1) kidney → ureter → urethra → urinary bladder.
(2) kidney → urinary bladder → urethra → ureter.
(3) kidney → ureters → urinary bladder → urethra.
(4) urinary bladder → kidney → ureter → urethra.

54. Electrical impulse travels in a neuron from
(1) dendrite → axon → axonal end → cell body.
(2) cell body → dendrite → axon → axonal end.
(3) dendrite → cell body → axon → axonal end.
(4) axonal end → axon → cell body → dendrite.

55. Which is the correct sequence of the components of a reflex arc?
(1) Receptors → muscles → sensory neuron → motor neuron → spinal cord.
(2) Receptors → motor neuron → spinal cord → sensory neuron → muscle.
(3) Receptors → spinal cord → sensory neuron → motor neuron → muscle.
(4) Receptors → sensory neuron → spinal cord → motor neuron → muscle.

56. Involuntary actions like blood pressure, vomiting and salivation are controlled by
(1) cerebral cortex
(2) spinal cord
(3) central nervous system
(4) medulla in the hind brain

57. The brain is protected by
(1) cranium (2) vertebral column
(3) spinal cord (4) joints

58. Activities like walking in a straight line, riding a bicycle, picking up a pencil are controlled by
(1) cerebrum (2) cerebellum
(3) medulla oblongata (4) spinal cord

59. The element required for the thyroid gland to make Thyroxine hormone is
(1) calcium (2) phosphorus
(3) iodine (4) magnesium

60. Which of the following statement(s) is/are true?
(i) Sudden action in response to something in the environment is called reflex action.
(ii) Sensory neurons carry signals from spinal cord to muscles.
(iii) Motor neurons carry signals from receptors to spinal cord.
(iv) The path through which signals are transmitted from a receptor to a muscle or a gland is called reflex arc.
(1) (i) and (ii) (2) (i) and (iii)
(3) (i) and (iv) (4) (i) , (ii) and (iii)

61. Which of the following statement(s) is/are true about the brain?
(i) The main thinking part of brain is hind brain.
(ii) Centres of hearing, smell, memory, sight etc are located in fore brain.
(iii) Involuntary actions like salivation, vomiting, blood pressure are controlled by the medulla in the hind brain.
(iv) Cerebellum does not control posture and balance of the body.
(1) (i) and (ii) (2) (i), (ii) and (iii)
(3) (ii) and (iii) (4) (iii) and (iv)

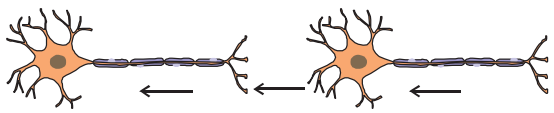
62. Adrenal glands are located above these organs
(1) kidneys (2) lung
(3) intestine (4) stomach

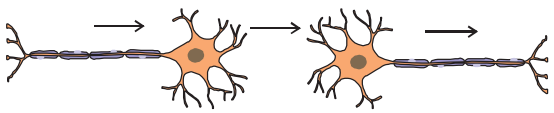
63. The sugar level in the blood is controlled by
(1) adrenal gland (2) thyroid gland
(3) pancreas (4) liver

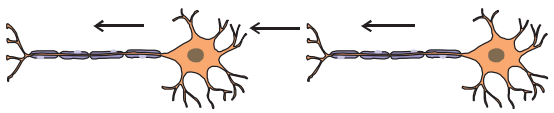
64. The changes associated with puberty in males & females is due to the secretion of
(1) estrogen / testosterone
(2) testosterone / estrogen
(3) estrogen / growth hormone
(4) growth hormone / testosterone

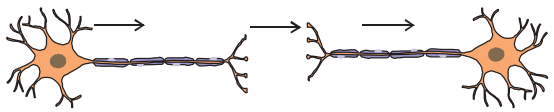
65. Select the mis-matched pair
(1) Adrenaline : Pituitary gland
(2) Testosterone: Testes
(3) Estrogen : Ovary
(4) Thyroxin : Thyroid gland

66. What is the correct direction of flow of electrical impulses?

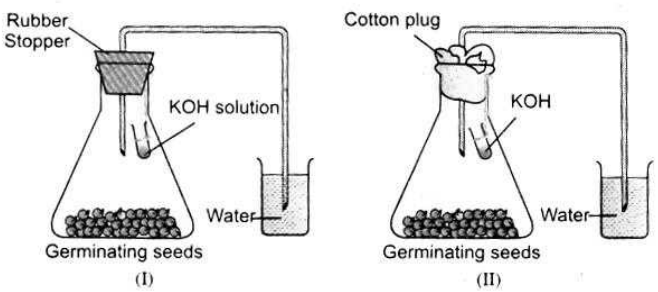
(1) 

(2) 

(3) 

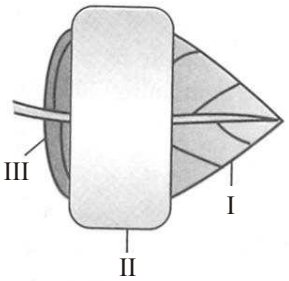
(4) 

67. The following experimental set ups were kept in the laboratory to show that CO_2 is given out during respiration. After two hours, students observed that water rises in the delivery tube



(1) only in set up (i)
(2) only in set up (ii)
(3) in both (i) and (ii)
(4) neither in set up (i) nor in set up (ii)

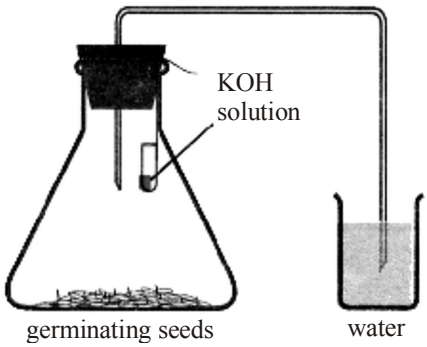
68. Given alongside is a sketch of a leaf partially covered with black paper and which is to be used in the experiment to show that light is compulsory for the process of photosynthesis. At the end of the experiment, which one of the leaf parts labelled I, II and III will become black when dipped in iodine solution ?



(1) I only (2) II only
(3) I and III (4) II and III

69. The hypothalamus, pineal gland and pituitary gland are located in the
(1) brain (2) kidneys
(3) lungs (4) heart

70. In the experiment shown in the figure, water is found to rise in the bent tube because



(1) seeds use up oxygen in the flask.
(2) carbon dioxide is given out by the germinating seeds.
(3) germinating seeds attract water from the beaker.
(4) seeds use oxygen and release carbon dioxide which is absorbed by potassium hydroxide.

Exercise 2

Matching Based MCQ

DIRECTIONS (Qs.1 to 8) : Match Column-I with Column-II and select the correct answer using the codes given below the columns.

1.

Column I (Organisms)	Column II (Mode of Nutrition)
(A) Yeast	(p) Holozoic
(B) Tapeworm	(q) Autotrophic
(C) *Amoeba*	(r) Carnivore
(D) Snake	(s) Saprophytic
(E) Green Plants	(t) Parasitic

(1) A – (s); B – (t); C – (p); D – (r); E – (q)
(2) A – (t); B – (s); C – (p); D – (r); E – (q)
(3) A – (t); B – (s); C – (p); D – (q); E – (r)
(4) A – (t); B – (p); C – (s); D – (q); E – (r)

2.

Column I (Organisms)	Column II (Respiratory Organ)
(A) Earthworm	(p) Cell surface
(B) Cockroach	(q) Gills
(C) Fish	(r) Trachea
(D) *Amoeba*	(s) Skin

(1) A – (r); B – (s); C – (p); D – (q)
(2) A – (s); B – (r); C – (p); D – (q)
(3) A – (s); B – (r); C – (q); D – (p)
(4) A – (s); B – (q); C – (r); D – (p)

3.

Column I	Column II
(A) Thyroxine	(p) Dwarfism
(B) Growth hormone	(q) Cretinism
(C) Parathormone	(r) Pregnancy
(D) Prolactin	(s) Calcium level
(E) Vasopressin	(t) Dilute urine
(F) Progesterone	(u) Mammary gland

(1) A – (p); B – (q); C – (s); D – (u); E – (t); F – (r)
(2) A – (q); B – (p); C – (s); D – (u); E – (t); F – (r)
(3) A – (q); B – (p); C – (s); D – (u); E – (r); F – (t)
(4) A – (q); B – (p); C – (u); D – (s); E – (r); F – (t)

4.

Column I	Column II
(A) Cell growth	(p) Abscisic acid
(B) Wilting	(q) Nerve conduction
(C) Emergency	(r) Adrenaline
(D) Electrical impulse	(s) Auxin

(1) A – (r); B – (s); C – (q); D – (p)
(2) A – (s); B – (r); C – (q); D – (p)
(3) A – (s); B – (r); C – (p); D – (q)
(4) A – (s); B – (p); C – (r); D – (q)

5.

Column I	Column II
(A) Phloem	(p) Excretion
(B) Nephron	(q) Translocation of food
(C) Veins	(r) Clotting of blood
(D) Platelets	(s) Deoxygenated blood

(1) A – (q); B – (p); C – (s); D – (r)
(2) A – (p); B – (q); C – (s); D – (r)
(3) A – (q); B – (p); C – (r); D – (s)
(4) A – (q); B – (s); C – (p); D – (r)

6.

Column I	Column II
(A) Autotrophic nutrition	(p) Leech
(B) Heterotrophic nutrition	(q) *Paramocium*
(C) Parasitic nutrition	(r) Deer
(D) Digestion in food vacuoles	(s) Green plants

(1) A – (r); B – (s); C – (p); D – (q)
(2) A – (s); B – (r); C – (p); D – (q)
(3) A – (s); B – (r); C – (q); D – (p)
(4) A – (s); B – (p); C – (r); D – (q)

7.

	Column I		Column II
(A)	Trypsin	(p)	Pancreas
(B)	Amylase	(q)	Liver
(C)	Bile	(r)	Gastric glands
(D)	Pepsin	(s)	Saliva

(1) A – (p); B – (s); C – (q); D – (r)
(2) A – (s); B – (p); C – (q); D – (r)
(3) A – (p); B – (s); C – (r); D – (q)
(4) A – (p); B – (q); C – (s); D – (r)

8.

	Column I		Column II
(A)	Olfactory receptors	(p)	Tongue
(B)	Thermo receptors (temperature receptors)	(q)	Eye
(C)	Gustatoreceptors	(r)	Nose
(D)	Photoreceptors	(s)	Skin

(1) A – (s); B – (r); C – (p); D – (q)
(2) A – (r); B – (s); C – (q); D – (p)
(3) A – (r); B – (p); C – (s); D – (q)
(4) A – (r); B – (s); C – (p); D – (q)

Statement Based MCQ

9. Consider the following statements :
(a) Osmoregulation is the process which helps to maintain the right amount of water balance in the body.
(b) The process of formation of blood marrow is called as haemopoiesis.
Which of these statement(s) is/are correct ?
(1) (a) only (2) (b) only
(3) Both (a) and (b) (4) Neither (a) nor (b)

10. Consider the following statements :
(a) We can detect the malfunctioning of heart is by EEG.
(b) Sphygmomanometer is the instrument used for measuring blood pressure.
Which of these statement(s) is/are correct ?
(1) (a) only (2) (b) only
(3) Both (a) and (b) (4) Neither (a) nor (b)

11. Consider the following statements :
(a) Lenticles are aerating pores present in cork and bark of plants.
(b) Oesophagus does not possess digestive glands but action of salivary amylase over starch continues in it.
Which of these statement(s) is/are correct ?
(1) (a) only (2) (b) only
(3) Both (a) and (b) (4) Neither (a) nor (b)

12. Consider the following statements :
(a) Herbivore is an animal that feeds on both plants and animals.
(b) Egestion is the process of passing out undigested components of food.
Which of these statement(s) is/are correct ?
(1) (a) only (2) (b) only
(3) Both (a) and (b) (4) Neither (a) nor (b)

13. Consider the following statements :
(a) Fore brain is the centre of intelligence, control of movement and hearing.
(b) Control and coordination are functions of nervous and endocrine systems.
Which of these statement(s) is/are correct ?
(1) (a) only (2) (b) only
(3) Both (a) and (b) (4) Neither (a) nor (b)

14. Consider the following statements :
(a) Immediate response to stimulus is shown by *Mimosa pudica*.
(b) Stems are positively geotrophic while roots are negatively geotrophic.
Which of these statement(s) is/are correct ?
(1) (a) only (2) (b) only
(3) Both (a) and (b) (4) Neither (a) nor (b)

15. Consider the following statements :
(a) Growth hormone is secreted by adrenal gland.
(b) Spinal cord originates from cerebellum.
Which of these statement(s) is/are correct ?
(1) (a) only (2) (b) only
(3) Both (a) and (b) (4) Neither (a) nor (b)

16. Consider the following statements :
(a) Rise in sugar level in blood stops secretion of insulin by pancreas.
(b) Cytokinin are present in greater concentration in young fruits and seeds.
Which of these statement(s) is/are correct ?
(1) (a) only (2) (b) only
(3) Both (a) and (b) (4) Neither (a) nor (b)

17. Consider the following statements :
(a) Junction between two neurons is called synapse.
(b) Ductless glands which manufacture hormones and secrete them directly into the blood stream.
Which of these statement(s) is/are correct ?
(1) (a) only (2) (b) only
(3) Both (a) and (b) (4) Neither (a) nor (b)

18. Consider the following statements :
(a) Excretion is the filtration under pressure of small particles, solute and solvents through a finely porous membrane.
(b) Anaerobic respiration is step-wise complete oxidative break down of respiratory substrate into carbon-dioxide and water with the help of oxygen that acts as terminal oxidant.
Which of these statement(s) is/are correct ?
(1) (a) only (2) (b) only
(3) Both (a) and (b) (4) Neither (a) nor (b)

Passage Based MCQ

DIRECTIONS (Qs. 19 to 25) : Read the passage(s) given below and answer the questions that follow.

PASSAGE - 1

Autotrophs are organisms that are able to synthesize their own organic substances using an external energy source. The most obvious autotrophs are plants which use the sun's energy to synthesize organic molecules; a process known as photosynthesis. Some prokaryotes show a form of autotrophy known as chemosynthesis. These bacteria derive their energy from chemical reactions involving inorganic molecules and can use this energy to synthesize organic molecules. Heterotrophs are organisms that derive their energy from ingested organic molecules.

19. Autotrophic nutrition occurs in
(1) fungi
(2) plants
(3) some protists and prokaryotes
(4) Both (2) and (3)

20. The site of photosynthesis in plants is
(1) mitochondria (2) chloroplasts
(3) leucoplasts (4) dictyosomes

PASSAGE - 2

In biology, the removal of the waste products of metabolism from living organisms is called excretion. In plants and simple animals, waste products are removed by diffusion. Plants, for example, excrete O_2, a product of photosynthesis. In mammals, waste products are removed by specialized excretory organs, principally the kidneys, which excrete urea. Water and metabolic wastes are also excreted in the faeces and, in humans, through the sweat glands in the skin; carbon dioxide and water are removed via the lungs. The liver excretes bile pigments.

21. Which of the following is not an accessory excretory organ of vertebrates?
(1) Skin (2) Lungs
(3) Liver (4) Heart

22. Contractile vacuole of Amoeba takes part is
(1) locomotion (2) digestion of food
(3) ingestion of food (4) osmoregulation

23. Which of the following is not a waste product of plants?
(1) Urea (2) Latex
(3) Resins (4) Alkaloids

PASSAGE - 3

Spinal cord is a cylindrical structure. The spinal cord begins in continuation with medulla and extends downwards. It is enclosed in a bony cage called vertebral column. Spinal cord is also surrounded by membranes called meninges. The spinal cord is concerned with spinal reflex actions and the conduction of nerve impulses to and form the brain.

24. Spinal cord is a part of
(1) autonomic nervous system
(2) voluntary peripheral nervous system
(3) involuntary peripheral nervous system
(4) central nervous system

25. Which one is not a reflex action ?
(1) Knee jerk
(2) Caughing
(3) Closing of eyes on flashing light
(4) Swallowing

Assertion Reason Based MCQ

DIRECTIONS (Qs. 26 to 30) : Following questions consist of two statements, one labelled as the **'Assertion'** and the other as **'Reason'**. You are to examine these two statements carefully and select the answer to these items using the code given below.

Code :
(1) Both A and R are individually true and R is the correct explanation of A:
(2) Both A and R are individually true but R is not the correct explanation of A.
(3) A is true but R is false
(4) A is false but R is true.

26. **Assertion :** Leguminous plants are nitrogen fixers.
Reason : Leguminous plants have *Rhizobium* in their root nodules.

27. **Assertion :** Blood of insects is colourless.
Reason : The blood of insect does not play any role in transport of oxygen.

28. **Assertion :** Blood pressure is arterial blood pressure.
Reason : It is measured by sphygmomanometer.

29. **Assertion :** Glomerulus acts as a dialysis bag.
Reason : Bowman's capsule is found in heart.

30. **Assertion :** Plants close the stomata at night.
Reason : The opening and closing of stomata is a function of guards cells.

Correct Definition Based MCQ

31. Capillaries are
(1) blood vessels which are thick walled and carry blood from the hearts to all the parts of the body.
(2) blood vessels which are thin walled and extremely narrow tubes or which connect arteries to veins.
(3) blood vessels which are thin walled and carry blood from all the parts of body to the heart.
(4) blood vessels which are thick walled and carry blood from all the parts of body to the brain.

32. Platelets are
(1) colourless liquid which consists mainly of water with dissolve nutrients, hormones and digest or undigested food in it.
(2) red-pigmented blood cell which carry oxygen from the lungs to all cells of the blood.
(3) the blood cells, which fight against infection and protect us from diseases.
(4) the tiny fragments of special cells formed in bone marrow and helps in coagulation of blood.

33. Excretion is
(1) the process of taking food into the body.
(2) the process in which the digested food passes through the intestinal wall into blood stream.
(3) the process of removal of toxic wastes from the body of an organism.
(4) the process in which the absorbed food is taken in by body cells and used for energy, growth and repair.

34. Photosynthesis is
(1) the process in which food is oxidised to release energy.
(2) the process by which organism, ingests, digests, absorbs, transports and utilise nutrients and dispose of their end products.
(3) the process by which green parts of plant synthesise organic food in the form of carbohydrates from CO_2 and water in the presence of sunlight.
(4) the process by which organism synthesise the organic materials they require from inorganic sources.

Feature Based MCQ

35. On the basis of following features identify correct option.
(I) It is the structural and functional unit of lungs.
(II) It is thin walled, has a large surface area and is richly supplied with blood vessels.
(1) Alveoli (2) Nephron
(3) Neuron (4) Lymph

36. On the basis of following features identify the correct option.
(I) It is the structural and functional unit of kidneys.
(II) It removes nitrogenous wastes from the blood.
(1) Neuron (2) Arteries
(3) Platelets (4) Nephron

37. On the basis of following features identify the correct option.
(I) It promotes cell elongation.
(II) It can cause formation of seedless fruits.
(1) Cytokinin (2) Gibberellin
(3) Ethylene (4) Auxin

38. On the basis of following features identify the correct option.
(I) This system has direct connection and control over the tissues or organs.
(II) The information is transmitted very fast and the effect is short lived.
(1) Endocrine system (2) Excretory system
(3) Nervous system (4) Respiratory system

Hints & SOLUTIONS

Exercise 1

1. **(1)** The process of repairing and maintaining requires molecular movements in life. When there is a bleeding from the cut finger, these molecular movements not only helps to stop the bleeding but also helps in healing the wounds.

2. **(2)** Enzymes are proteins that catalyze chemical reactions. Almost all processes in a biological cell need enzymes in order to occur at significant rates. The set of enzymes made in a cell determines which metabolic pathways occur in that cell.

3. **(4)** Earthworm respires, but has no respiratory organs, exchange of gases takes place through moist skin.

4. **(4)**

5. **(2)** The gaseous exchange is the simple diffusion of oxygen from alveolar air into the blood and diffusion of CO_2 from blood to alveolar air.

6. **(3)** Photosynthesis uses light energy and carbon dioxide to make triose phosphates (G3P). G3P is generally considered as the prime end-product of photosynthesis. It can be used as an immediate food nutrient, or combined and rearranged to form monosaccharide sugars, such as glucose, which can be transported to other cells, or packaged for storage as insoluble polysaccharides such as starch.

7. **(1)** Saliva is the watery and usually frothy substance produced in the mouths of humans and some animals. In animals, saliva is produced in and secreted from the salivary glands. Saliva contains the enzyme amylase that breaks down some starches into maltose and dextrin. Thus, digestion of food occurs within the mouth, even before food reaches the stomach.

8. **(4)** **9.** **(3)** **10.** **(3)**

11. **(3)** Gastric juice is a strong acidic liquid, pH 1 to 3, which is close to being colourless. The hormone gastrin is released into the bloodstream when peptides are detected in the stomach. This causes gastric glands in the lining of the stomach to secrete gastric juice. Its main components are digestive enzymes pepsin and rennin, hydrochloric acid, and mucus.

12. **(3)** In cell biology, a mitochondrion is a membrane-enclosed organelle, found in most eukaryotic cells. Mitochondria are "cellular power plants," because they generate most of the cell's supply of ATP, used as a source of chemical energy. Each pyruvate molecule produced by glycolysis is actively transported across the inner mitochondrial membrane, and into the matrix where it is oxidized and combined with coenzyme A to form CO_2, acetyl-CoA and NADH.

13. **(1)** **14.** **(1)**

15. **(1)** The left atrium receives oxygenated blood from the lungs through two parts of pulmonary veins.

16. **(1)** Small intestine is the largest part of the human alimentary canal whose length is approximately 7.2 m.

17. **(2)** De-oxygenated blood enters the right atrium of the heart and flows into the right ventricle where it is pumped through the pulmonary arteries to the lungs. Pulmonary veins return the now oxygen-rich blood to the heart, where it enters the left atrium before flowing into the left ventricle. From the left ventricle the oxygen-rich blood is pumped out via the aorta, and on to the rest of the body.

18. **(1)**

19. **(1)** Cardiac impulse (Heart beat) normally originate from the pacemaker (S.A. node).

20. **(3)**

21. **(1)** Sensory receptor, in physiology, any structure which, on receiving environmental stimuli, produces an informative nerve impulse.

22. **(3)** Blood oxygenation is measured in several ways, but the most important measure is the haemoglobin (Hb) saturation percentage. The haemoglobin molecule is the primary transporter of oxygen in mammals.

23. **(4)** **24.** **(4)** **25.** **(1)**

26. **(2)** A sphygmomanometer or blood pressure meter is a device used to measure blood pressure, comprising an inflatable cuff to restrict blood flow, and a mercury or mechanical manometer to measure the pressure. Manual sphygmomanometers are used in conjunction with a stethoscope.

27. **(1)** Transpiration is the evaporation of water from aerial parts and of plants, especially leaves but also stems, flowers and fruits. Transpiration is a side effect of the plant need to open its stomata in order to obtain carbon dioxide gas from the air for photosynthesis. Transpiration also cools plants and enables mass flow of mineral nutrients from roots to shoots.

28. **(2)** **29.** **(4)** **30.** **(4)**

31. **(3)** A nephron is the basic structural and functional unit of the kidney. Its chief function is to regulate water and soluble substances by filtering the blood, reabsorbing what is needed and excreting the rest as urine.

32. **(1)** In medicine, dialysis is a type of renal replacement therapy which is used to provide an artificial replacement for lost kidney function due to renal failure.Dialysis may be used for very sick

patients who have suddenly lost their kidney function (acute renal failure) or for quite stable patients who have permanently lost their kidney function (end stage renal failure).

33. **(4)** **34.** **(1)** **35.** **(4)**

36. **(2)** Resin is a hydrocarbon secretion of many plants, particularly coniferous trees, valued for its chemical constituents and uses such as varnishes, adhesives, as an important source of raw materials for organic synthesis, or for incense and perfume. Gum is also a byproduct produced and is sent out through the bark of the tree.

37. **(3)** Control and co-ordination in an organism is provided by the nervous system. The nervous system consists of the brain and the spinal cord and the nerves.

38. **(4)** **39.** **(4)** **40.** **(4)**

41. **(3)** An action potential is a "spike" of electrical discharge that travels along the membrane of a cell.

42. **(1)** Chemical synapses are specialized junctions through which the cells of the nervous system signal to each other and to non-neuronal cells such as those in muscles or glands. Chemical synapses allow the neurons of the central nervous system to form interconnected neural circuits.

43. **(4)** **44.** **(4)** **45.** **(3)**

46. **(2)** Neurons are electrically excitable cells in the nervous system that process and transmit information. In vertebrate animals, neurons are the core components of the brain, spinal cord and peripheral nerves.

47. **(4)** A reflex arc is the neural pathway that mediates a reflex action. In higher animals, most sensory neurons do not pass directly into the brain, but synapse in the spinal cord. This characteristic allows reflex actions to occur relatively quickly by activating spinal motor neurons without the delay of routing signals through the brain, although the brain will receive sensory input while the reflex action occurs.

48. **(3)** **49.** **(2)** **50.** **(3)**

51. **(1)** The peripheral nervous system is part of the nervous system, and consists of the nerves and neurons that reside or extend outside the central nervous system (the brain and spinal cord) to serve the limbs and organs, for example.

52. **(1)** The prosencephalon (fore brain), the mesencephalon (midbrain), and rhombencephalon (hindbrain) are the three primary portions of the brain during early development of the central nervous system. Fore-brain is the main thinking part of brain.

53. **(3)** **54.** **(3)** **55.** **(4)**

56. **(4)** It controls autonomic functions and relays nerve signals between the brain and spinal cord.The Medulla oblongata is responsible for controlling several major autonomic functions of the body : respiration (via dorsal respiratory group and ventral respiratory group), blood pressure, heart rate, reflex arcs and vomiting.

57. **(1)** The skull is a bony structure found in many animals which serves as the general framework for the head. Those animals having skulls are called Craniates. The skull supports the structures of the face and protects the head against injury. The skull is made up of two bones: the cranium and the mandible.

58. **(2)** The cerebellum is a region of the brain that plays an important role in the integration of sensory perception and motor output. Many neural pathways link the cerebellum with the motor cortex which sends information to the muscles causing them to move and the spinocerebellar tract which provides feedback on the position of the body in space (proprioception).

59. **(3)** Thyroxine is critical to the regulation of metabolism and growth throughout the animal kingdom.Calcium is required for the thyroid gland to make thyroxine hormone.

60. **(3)** **61.** **(3)**

62. **(1)** In mammals, the adrenal gland also known as suprarenal glands are the triangle-shaped endocrine glands that sit on top of the kidneys; their name indicates that position.

63. **(3)** The pancreas is a gland organ in the digestive and endocrine systems of vertebrates. It is both exocrine (secreting pancreatic juice containing digestive enzymes) and endocrine (producing several important hormones, including insulin, glucagon, and somatostatin).

64. **(2)** Testosterone is a steroid hormone from the androgen group. Testosterone is primarily secreted in the testes of males. It is the principal male sex hormone and an anabolic steroid. Estrogens are a group of steroid compounds, named for their importance in the estrous cycle, and functioning as the primary female sex hormone.

65. **(1)** **66.** **(3)** **67.** **(1)** **68.** **(3)**

69. **(1)** The hypothalamus links the nervous system to the endocrine system via the pituitary gland.The hypothalamus, is located below the thalamus, just above the brain stem. The pineal gland is a small endocrine gland in the brain. It is shaped like a tiny pine cone, and is located near the center of the brain, between the two hemispheres, tucked in a groove where the two rounded thalamic bodies join. The pituitary gland, or hypophysis, is an endocrine gland about the size of a pea that sits in a small, bony cavity covered by a dual fold at the base of the brain.

70. **(4)** Seeds release CO_2 during respiration, which is absorbed by KOH creating a partial vacuum in the flask. To fill that water rises.

Exercise 2

1. **(1)** **2.** **(3)** **3.** **(2)** **4.** **(4)**
5. **(1)** **6.** **(2)** **7.** **(1)** **8.** **(4)**
9. **(3)**

10. **(2)** We can detect the malfunctioning of heart by Electrocardiogram. It records the electrical activity of heart.

11. **(3)**

12. **(2)** Herbivore is an animal that feeds on plants only.

13. **(3)**

14. **(1)** Stems are negatively geotrophic while roots are positively geotrophic.

15. **(4)** **16.** **(3)** **17.** **(3)** **18.** **(4)**

19. **(4)** Autotrophs are organisms that are able to synthesize their own food using an external energy source, *e.g.*, plants, green algae and cyanobacteria make their food with the help of chlorophyll.

20. **(2)** Plants possess pigment molecules for absorption of light energy. These pigments occur in green coloured cell oganelles called chloroplasts.

21. **(1)** **22.** **(2)**

23. **(1)** Urea is a waste products of animals.

24. **(4)** Spinal cord is a narrow cylindrical lower part of central nervous system which lies inside vertebral column that extends from base of brain upto early part of lumbar region.

25. **(4)**

26. **(1)**

27. **(2)** The blood of an insect functions differently than the blood of a human. Insect blood, however, does not carry gases and has no haemoglobin which gives red colour to the blood.

28. **(2)** Blood pressure, sometimes called arterial blood pressure, is the pressure exerted by circulating blood upon the walls of blood vessels.

29. **(3)** Bowman's capsule found in heart which accomodates one glomerulus, is lined by flat cells some of which have fine pores to allow passage of materials filtered out of a glomerulus.

30. **(2)**

31. **(2)** **32.** **(4)** **33.** **(3)** **34.** **(3)**
35. **(1)** **36.** **(4)** **37.** **(4)** **38.** **(3)**