

RAO MOHAR SINGH COLLEGE OF PHARMACY

HUMAN ANATOMY AND PHYSIOLOGY

Diploma in Pharmacy First Year

Question No. 01 Define the following terms (2 marks each)

- (A) Arthrology (B) Myasthenia Gravis (C) Synovitis (D) Epiphysis (E) Histology (F) Anatomy & physiology
(G) Cranial cavity (H) Mesentery

Question No. 02 Define the following terms (2 marks each)

- (A) Appendicular skeleton (B) Osteocyte (C) Myology (D) Cardiac Output (E) Tachycardia (F) Bradycardia (G)
Gynaecomastia (H) Osteoporosis

Question No. 03 Define the following terms (2 marks each)

- (A) Rh factor (B) Tissue (C) Lymph (D) Tetanus (E) Menopause (F) Taxonomy (G) Cytology (H)

Pathology **Question No. 04** Differentiate the following:-

- (A) Tendon and Ligaments (B) Hyaline cartilages and Elastic Cartilages (C) Sympathetic nervous system and
Parasympathetic nervous system (D) S.A. node and A.V. node (E) Arteries and Veins

Question No. 05 Describe the structure and functions of kidney and nephron. Discuss in detail the physiology
of urine formation.

Question No. 06 Describe structure of heart with the help of neat and clean diagram. Explain various types of
cardiovascular disorders.

Question No. 07 Describe eye with the help of neat and clean diagram with functions of different parts. Discuss
various visual disorders.

Question No. 08. Write a short note on the following:

- (A) Define blood and give its component. Describe the various functions of Blood.
(B) Define coagulation of blood. Write down the steps and factors involved in blood clotting.
(C) Give short note on Anemia.
(D) Define blood pressure and pulse and give its normal range. Describe the method of recording of blood
pressure.

Question No. 09 Write a short note on the following:

- (A) Classify joints. Explain synovial joint in detail.
(B) Describe various disorders of joints.
(C) Functions of skeleton system.

Question No. 10 Write a short note on the following:

- (A) Reflex action or reflex arc with examples.
(B) Physiology of muscle contraction.

Question No. 11. Write a short note on (A) Menstrual cycle (B) Functions of uterus

Question No. 12. Write down the names and functions of hormones secreted from:

(A) Anterior lobe of pituitary gland (B) Thyroid gland (C) Pancreas gland (D) Pineal gland

Question No. 13. Write note on the followings:

(A) Physiology of respiration

(B) Functions of Liver.

(C) Enumerate different types of tissues with detail note on epithelial tissue.

(D) Digestion and absorption of carbohydrates, fats and proteins.

Question No. 14. (A) Give a short note on Male reproductive organ system.

(B) Give a short note on Female reproductive organ system.

Question No. 15. Draw a well labeled diagram of a typical cell and enumerate its various components.

Question No. 16. Name the parts of conduction system of heart.

The **cardiac conduction system** is a group of specialized **cardiac** muscle cells in the walls of the **heart** that send signals to the **heart** muscle causing it to contract. The main **components** of the **cardiac conduction system** are the SA node, AV node, bundle of His, bundle branches, and Purkinje fibers.

ANSWERS:

Question No. 01. Define the following terms (2 marks each)

(A) Arthrology (B) Myasthenia Gravis (C) Synovitis (D) Epiphysis (E) Histology (F) Anatomy & physiology (G) Cranial cavity (H) Mesentery

Ans. 01. (A) Arthrology: It is the scientific study of joints. It included various defects of joints also.

(B) Myasthenia Gravis: It is serious and sometimes fatal but a rare disease in which skeletal muscle are weak and fatigue easily. In this there is a reduction in the acetylcholine of synaptic vesicles.

(C) Synovitis: Inflammation of synovial membrane in a joint.

(D) Epiphysis: Epiphysis is the distal and proximal ends of the bone.

(E) Histology: Histology is the science that deals with the study of tissues.

(F) Anatomy and Physiology: Anatomy is the science of internal body structures and the relationship among them. Physiology is the science of body functions i.e. how the body parts work.

(G) Cranial Cavity: Cavity formed by the cranial bones, which contains the brain, is known as cranial cavity.

(H) Mesentery: A fan-shaped fold of the peritoneum is called as mesentery that binds the small intestine to the posterior abdominal wall. It extends from the posterior abdominal wall to wrap around the small intestine and then return to its origin forming a double layered structure.

Question No. 02. Define the following terms (2 marks each):

(A) Appendicular skeleton (B) Osteocyte (C) Myology (D) Cardiac Output (E) Tachycardia (F) Bradycardia (G) Gynaecomastia (H) Osteoporosis

Ans. 02. (A) Appendicular Skeleton: The appendicular skeleton consists of the shoulder girdle with the upper limbs and pelvic girdle with the lower limbs. The appendicular skeleton contains – 126 bones.

(B) Osteocyte: Specialized dense connective tissue, the young cells are called osteoblast, when mature is called as osteocyte.

(C) Myology: Study of the muscles and their parts is known as myology.

(D) Cardiac Output: The amount of blood pumped by heart in 1 min is called cardiac output. It is about five liters. Cardiac output = stroke volume * heart beat in (1 min)

(E) Tachycardia: Tachycardia refers to a rapid heart rate over 100 beats per minute.

(F) Bradycardia: Bradycardia refers to a slow heart rate below 50 beats per minute.

(G) Gynaecomastia: This is an excessive development of breast tissue in men. It usually affects one breast. It occurs due to endocrine disorder, malnutrition, drugs like chlorpromazine and digoxin.

(H) Osteoporosis: It is decreases in bone tissue mass, when the bone becomes progressively porous and decalcified. It occurs due to immobility, lack of exercise, smoke, excess alcohol intake, early menopause, low calcium diet intake, drugs like corticosteroid etc.

Question No. 03. Define the following terms (2 marks each)

(A) Rh factor (B) Tissue (C) Lymph (D) Tetanus (E) Menopause (F) Taxonomy (G) Cytology (H) Pathology

Ans. 03 (A) Rh factor: It is agglutinin called as Rhesus factor (Rh factor) since it was first seen in Rhesus monkey. Rh +ve individual have this factor but Rh –ve individual do not have this.

(B) Tissue: A group of cells having the same origin, similar shape and common function is known as tissue.

(C) Lymph: Lymph is a tissue fluid which is formed by the passage of substances from blood capillaries into tissue spaces.

(D) Tetanus: When a muscle is stimulated repeatedly at a very faster rate, the muscle contracts maximally. The muscle remains at this maximal rate of contraction till i) the stimulus continues or ii) it get fatigued. This sustained maximal contraction is called tetanus.

(E) Menopause: It is cessation of menstruation cycle which occurs in a women’s life at about 45 years of age. It is caused by changes in the concentration of sex hormones.

(F) Taxonomy: The branch of science concerned with identification, classification and naming of organism in an ordered system according to their natural relationship.

(G) Cytology: The branch of biology and medicine concerned with the structure and functions of plant and animal cells.

(H) Pathology: The scientific study of the nature, causes, processes, development and effects of disease is known as pathology.

Question No. 04. Differentiate the following:-

(A) Tendon and Ligaments (B) Hyaline cartilages and Elastic Cartilages (C) Sympathetic nervous system and Parasympathetic nervous system (D) S.A. node and A.V. node (E) Arteries and Veins

Ans. 04 (A)

| Tendons | Ligaments |
|---|---|
| 1. Type of connective tissue which joins muscles with bone. | 1. Type of connective tissue which joins bone with bone. |
| 2. Tendons are inflexible and can not be stretched. | 2. Ligaments are flexible and can be stretched. |
| 3. Large amount of collagen fibres are present which are thick. | 3. Large amount of elastic fibres are present which are thin. |
| 4. Made up of protein collagen. | 4. Made up of elastin protein. |
| 5. Fibroblasts lie in almost continuous rows. | 5. Fibroblasts lie scattered. |

Ans. (B)

| Hyaline cartilages | Elastic cartilages |
|--|--|
| 1. Hyaline cartilage is bluish green in appearance | 1. Elastic cartilage is yellowish in appearance. |

| | |
|---|---|
| 2. Has fewer, very fine white fibres in the matrix. | 2. Has abundant yellow fibres in the matrix. |
| 3. No fibres are visible in the matrix under light microscope. | 3. Fibres are visible under light microscope. |
| 4. Present in sternal ribs, nasal septum, tracheal and bronchial rings. | 4. Present in pinna, nose tip and epiglottis. |

Ans. (C)

| Sympathetic Nervous system | Parasympathetic Nervous system |
|---|--|
| 1. Sympathetic ganglia are the sites of synapses between sympathetic preganglionic and postganglionic neuron. | 1. Parasympathetic ganglionic are axon of parasympathetic division synapse with postganglionic neuron in the terminal ganglia. |
| 2. Dilation of the pupil of eye. | 2. Constriction of pupil of eye. |
| 3. Dilation of bronchi. | 3. Constriction of bronchi. |
| 4. Constriction of blood vessels. | 4. Dilation of blood vessels. |
| 5. Increase in the rate and force of contraction of heart. | 5. Decrease in the rate and force of contraction of heart. |

Ans. (D)

| Sinuauricular node (S.A. Node) | Atrioventricular node (A.V.Node) |
|--|---|
| 1. It is located in the wall of right auricle. | 1. It is located at the base of the right auricle near the interatrial septum. |
| 2. It has a capacity of self excitation. | 2. It lacks this ability. |
| 3. It spontaneously initiates auricular contraction. | 3. It initiates ventricular contraction when stimulated by auricular contraction. |
| 4. It is controlled by cardiovascular centre present in the medulla oblongata. | 4. It is controlled by cardiac impulses reaching from S.A. node. |
| 5. It acts as a pacemaker. | 5. It has no such role. |

Ans. (E)

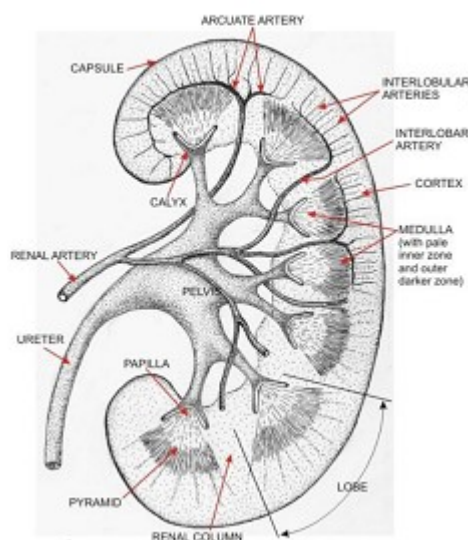
| Arteries | Veins |
|---|---|
| 1. Arteries carry oxygenated blood, away from the heart except pulmonary artery. | 1. Veins carry de-oxygenated blood, towards the heart except pulmonary veins. |
| 2. These are mostly deeply situated in the body. | 2. These are mostly superficial in location. |
| 3. These are thick walled, highly muscular except artery of cranium and vertebral column. | 3. These are thin walled. |
| 4. These possess narrow lumen. | 4. These possess wide lumen. |
| 5. Valves are absent. | 5. Valves are present which provide unidirectional |

| | |
|--|--|
| | flow of the blood. |
| 6. These are reddish in colour. | 6. These are bluish in colour. |
| 7. Blood in arteries moves with pressure. | 7. Blood in arteries moves with very low pressure. |
| 8. Arteries empty up at the time of death. | 8. Veins get filled up at the time of death. |

Question No. 05. Describe the structure and functions of kidney and nephron. Discuss in detail the physiology of urine formation.

Ans. 05. Urinary system is the main excretory system of body. It contains two kidneys, two ureters, a urinary bladder and a urethra.

Kidney: These are two beans shaped organ lying on the each side of vertebral column.



Structure of human kidney

Functions: Kidney performs following functions:

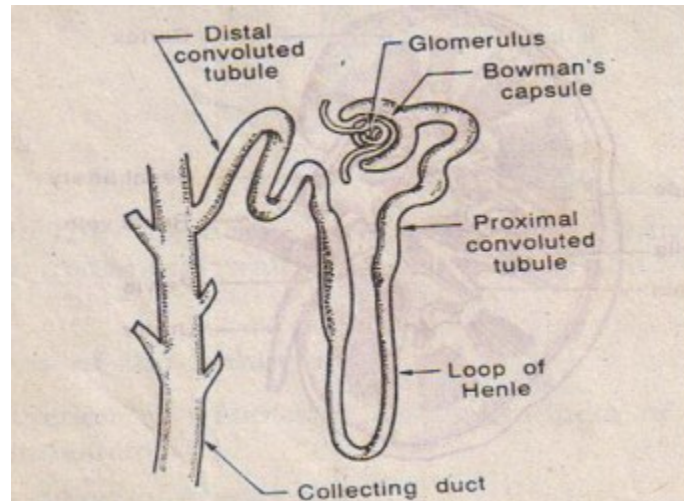
- 1) Excretion of water and waste products.
- 2) Excretion of excess salt.
- 3) Excretion of harmful substances, drugs and toxins.
- 4) Regulation of pH of blood.
- 5) Maintains acid base equilibrium.

Structure of Kidney: Kidney is surrounded by outer fibrous capsule and below this capsule lies:

- 1) An outer cortex, which is reddish brown in colour.
- 2) Inner medulla, which contains pyramids of kidney.
- 3) An upper expanded end of ureters called pelvis.

4) Contains number of structural and functional units called nephrons. There are about 1 million nephrons in each kidney.

Structure of nephrons: Nephron consists of malphigian bodies, renal tubules and collecting duct. Malphigian bodies are made up of Bowman's capsule and glomerulus. Renal tubules consist of proximal convoluted tubule (PCT), loop of Henle and distal convoluted tubule (DCT). Collecting tubules passes through the medulla and opens into pelvis



Structure of Nephron

Physiology of urine formation: Urine is formed by kidney by 3 processes, which are as follows:

1) Glomerular filtration 2) Tubular secretion 3) Tubular reabsorption.

1) Glomerular filtration: Filtration of water, salts and other substances occurs in the glomerulus and fluid formed after filtration is called as glomerular filtrate. Glomerular filtration rate (GFR) is the volume of glomerular filtrate produced by both kidneys in one minute. It is about 125 ml.

2) Tubular secretion: It is active process, which occurs in convoluted tubule and drugs like penicillin are excreted by tubular secretion.

3) Tubular reabsorption: GFR is about 125 ml so that about 180 liters of Glomerular filtrate is formed in a day. But the volume of urine eliminated per day is only 1.5 liter. It is so, because nearly 99% of glomerular filtrate is reabsorbed. Reabsorption of water occurs in the convoluted tubules and collecting tubule.

Question No. 06. Describe structure of heart with the help of neat and clean diagram. Explain various types of cardiovascular disorders.

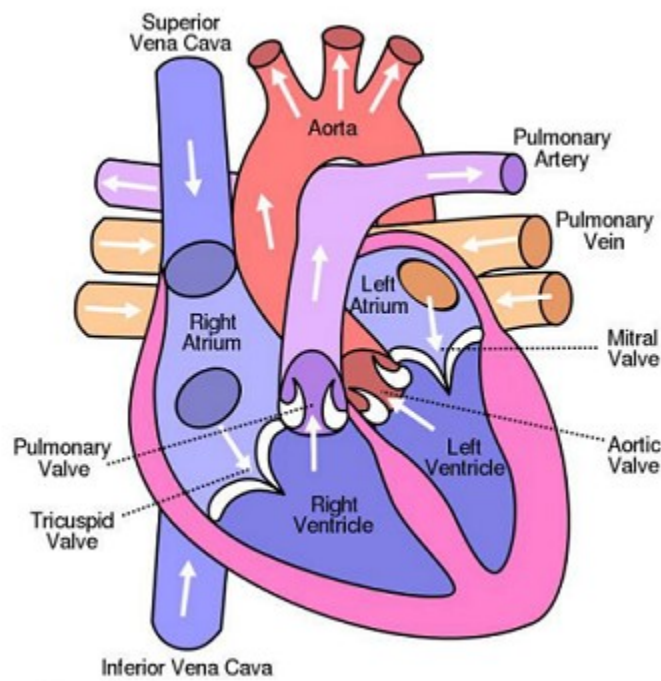
Ans. 06. CVS consist of heart and blood vessels. It transports gases, nutrients and excretory products to various parts of body through blood.

Heart: Heart is present between the lungs and behind the sternum. It is 10cm long and weight about 300gm.

Structure/Anatomy: Heart is surrounded by an outer covering called pericardium. Pericardium contains two inner layers, which touch the heart, is called as visceral pericardium and outer is called as parietal pericardium. Between these two layers pericardial fluid is present. The function of these layers is to protect the heart.

Chambers of heart: Human heart is made up of four chambers. Upper chambers are called as atrium and lower are called as ventricles. These are again divided into right atrium and left atrium and right ventricle and left ventricle. Two atriums are separated by interatrial septum and two ventricles are separated by interventricular septum. Atrio-ventricular septum is present between the atrium and ventricles.

- 1) **Right atrium:** It is above and on right side of the heart. It has two openings known as superior vena cava and
- 2) inferior vena cava that brings deoxygenated blood from whole of the body into the right atrium.



Structure of Human Heart

2) **Left Atrium:** It is present not as such on the left but on the back of the heart. It has thin walled than right atrium. Four openings for pulmonary veins are present in it which brings oxygenated blood from lungs.

3) **Right Ventricle:** This ventricle is on right side. It has thick walled as compared to right atrium but it is thinner than the walls of left ventricles. It receives deoxygenated blood from right atrium through tricuspid valve and pumps it to the lungs through pulmonary artery.

4) **Left ventricle:** It is present on left side, below left atrium and thick walled. It receives blood from left atrium through opening of bicuspid or (Mitral) valve and sent it to whole of the body by contraction through the aorta.

Valves of the heart: Opening between right atrium and right ventricle is guarded by tricuspid valve and opening between left atrium and left ventricle is guarded by bicuspid valve. These valves opens when atrium

contracts and close when ventricles contracts and thus prevents backward flow of blood. Pulmonary valve and aortic valve are present in the pulmonary artery and aorta respectively. These open when ventricles contracts and closed when ventricles relaxes.

Blood supply to the heart: Heart receives blood supply through right and left coronary artery, which are branches of aorta. Venous blood is collected by coronary vein, which opens into coronary sinus.

Conducting system of heart: The impulses for cardiac contraction are transported through this system. This is made up of following parts:

- 1) **Sino-atrial node/S.A. node:** It is present at the opening of superior vena cava into the right atrium. It is also called as pace-maker of heart. The impulses for cardiac contraction start at S.A. node.
- 2) **Atrioventricular node/A.V. node:** Present in upper part of atrio-ventricular septum. Impulses from S.A. node pass to A.V. node.
- 3) **Bundle of his:** Presents in the inter-ventricular septum. It receives impulses from A.V. node.
- 4) **Purkinje Fibres:** These are branches of bundle of his and present in the walls of left and right ventricles.

Cardiovascular disorders:

- 1) **Cardiac failure:** It is a condition in which the myocardium of ventricle is unable to maintain sufficient circulation of blood to meet the needs of the body. Depending on onset it may be classified as:
 - i) Acute cardiac failure: When the onset is sudden.
 - ii) Chronic cardiac failure: When the onset is gradual.
- 2) **Stenosis of valves:** It is the narrowing of the valves of the heart. In this condition, the edges of the cusps (of the valves) become rough. So they stick together and narrow the valvular opening.
- 3) **Incompetence of valves:** It is a functional defect caused by the failure of the valve to close completely. This allows blood to flow back into the ventricle when it relaxes.
- 4) **Ischaemic heart disease:** It occurs due to narrowing or occlusion of one or more branches of coronary arteries. It may lead to angina pectoris.
- 5) **Angina pectoris (angina of effort):** It is pain occurring due to myocardial ischaemia. It occurs due to narrowing of coronary arteries. Because of this, physical effort causes severe ischaemic pain.
- 6) **Myocardial infarction:** It is the death of an area of cardiac tissue due to lack of coronary blood supply to that segment of the myocardium. It occurs due to occlusion of coronary artery.
- 7) **Cardiac arrhythmia:** It is a disorder in cardiac rate and rhythm. It occurs due to defective impulse formation and defective impulse conduction in the heart.

Question No. 07. Describe eye with the help of neat and clean diagram with functions of different parts.

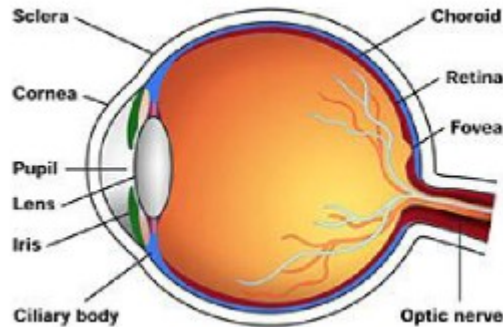
Discuss various visual disorders.

Ans. 07. Eye: It is the sensory organ of vision present in the orbital cavity. It is spherical in shape. Space between eye and orbital cavity is occupied by adipose tissue. **Structure:** There are three layers of tissues in each eye ball. These are:

- 1) Outer fibrous layer - Sclera and cornea
- 2) Middle vascular layer - Choroid, ciliary body and iris
- 3) Inner nervous tissue layer - Retina

Structures inside the eye ball are lens, aqueous fluid and vitreous body.

Sclera and cornea: Sclera or white portion of the eye forms outermost layer of the eyeball and forms transparent membrane in front known as cornea. Cornea is not supplied by blood vessels. Light rays pass through cornea to reach retina.



Structure of Human Eye

2) Choroid: It is the middle layer and very rich in blood vessels. Choroid contains melanocytes, which synthesize the melanin, which absorbs extra light.

Ciliary body: It is anterior part of choroid consists of ciliary muscles and ciliary process. Zonular fibres are attached to ciliary process, which hold the lens. Contraction of ciliary muscle increases the thickness of lens and relaxation of ciliary muscle decreases the thickness. Ciliary process secretes aqueous humor.

Iris: It is the visible colored part of the eye and present above ciliary body. Pigments are present in iris, which determine the color of the eye. In the centre of the iris a hole is present called as pupil. Iris contains circular muscle fibres and radial muscle fibres. Contraction of circular muscle fibres constricts the pupil and contraction of radial muscle fibres dilates the pupil. Iris divides the anterior segment into two parts i.e. anterior and posterior chamber. Anterior chamber is the space between cornea and iris and the posterior chamber is the space behind iris and in front of lens. These two chambers are filled with a fluid known as aqueous humor, which is secreted by ciliary process and this fluid flows into canal of schlemm and then into blood. This fluid exerts pressure that is known as intraocular pressure (16 mm of Hg)

Lens: Lens is highly elastic, biconvex, lying behind the pupil and made up of protein. Lens is hold in position by Zonular fibres.

3) Retina: It is the innermost layer. It consists of photoreceptors known as rods and cones. Rods contain pigment rhodopsin and cones contain iodopsin. Rods are 120 million and cones are about 6 million in an eye. Cones are sensitive to bright light and colour. Rods are sensitive to dim light and dark. There are three types of cones known as red, green and blue. Colour vision provided by combination of these colour. Therefore retina is the photosensitive part of eye. Rods and cones generate nerve impulses which are taken to the visual centre of brain. In the centre of retina space known as macula-lautea or yellow spot is present. In this a depression fovea centralis is present which consist of only cones. About 0.5 cm to the nasal side all the nerve fibres leave the retina, this space is called as optic disc or blind spot. It has no light sensitive cells. Space between lens and retina is called as vitreous chamber, which is filled with vitreous body fluid. This fluid is formed during embryonic life and is not replaced thereafter. This fluid contains phagocytic cells also.

Physiology of vision:

The First step in vision is retinal image formation and generation of nerve impulses which are carried to visual areas of brain. Retinal image formation occurs in following ways:

- 1) Size of pupil:** In bright light pupils constricted and in dim light they dilated and thus regulate the amount of light, which enter into the eye.
- 2) Refraction:** This principle is used to focus light on retina. Light is refracted through conjunctiva, cornea, aqueous fluid, lens and vitreous body fluid.
- 3) Lens:** Lens changes its curvature for far vision and near vision and the process is called accommodation. In far vision ciliary muscle relaxed and lens is flattened and for near vision ciliary muscle contracts this cause shortening and thickening of lens for focusing of light on retina.
- 4) Convergence:** It refers to the movement of two eye balls to see the object. Convergence is function of extrinsic eye muscles.
- 5) Stimulation of photoreceptors:** After formation of image on retina, it is converted into nerve impulses, which is occurs through activation of rods and cones. These impulses are then passed to brain.

Various visual disorders of eye: The various visual disorders are as follows:

- 1) Age related Macular Degeneration (AMD):** It is a degenerative disorder of retina in older persons of 50 years or more. In this abnormality occurs in macula lautea. In this person loose ability to see straight ahead.
- 2) Presbyopia:** It occurs in old age due to loss of elasticity of lens. Therefore loses ability to focus on objects that are close. Therefore older people cannot read print at the same close range, as can youngsters.
- 3) Myopia (Short Sightedness):** In this disorder eyeball is too long and distant objects are focused in front of retina. Patients can see close objects clearly but not distant objects. This is corrected by using concave lens.

4) Hypermetropia (Far Sightedness): In this a near image is focused behind the retina because the eyeball is too short. Hypermetropic patients can see distant objects clearly, but not close ones. It is corrected by using convex lens.

5) Astigmatism: Results in blurred vision when there is abnormal curvature of part of the cornea or lens that prevents focusing on the retina. Correction requires cylindrical lenses.

6) Glaucoma: It is increase in intraocular tension produced due to excessive collection of aqueous humor (due to impaired drainage of aqueous fluid through canal of schlemm) in the anterior chamber.

7) Cataract: A common cause of blindness and loss of transparency of the lens is known as cataract. Lens becomes cloudy due to change in protein structure.

Question No. 08. Write a short note on the following:

(A) Define blood and give its component. Describe the various functions of blood.

(B) Define coagulation of blood. Write down the steps and factors involved in blood clotting.

(C) Give short note on anemia.

(D) Define blood pressure and pulse and give its normal range. Describe the method of recording of blood pressure.

Ans. 08. (A) Blood: Blood is a specialized connective tissue, which is fluid in nature. It has alkaline pH i.e., 7.4 and specific gravity 1.055. It is reddish in colour due to presence of pigment hemoglobin.

Components of Blood: Blood consist of two Components. They are plasma (55%) and cells (cellular elements) which are suspended in plasma (45%).

(a) Plasma: It is pale colored fluid, which consist of water up to 91%, Proteins like albumin, globulin, fibrinogen up to 7 to 8%, other substances which are present in plasma, are glucose, sodium chloride, iron, urea, uric acid, fats, enzymes, hormones, vitamins etc.

(b) Cells or cellular components of blood: (i) Red blood cells or Erythrocytes (RBC's) (ii) white blood cells or leucocytes (WBC's) and (iii) platelets or thrombocytes

(i) RBC's: These are circular, biconvex, disc shaped and non-nucleated cells contain hemoglobin. These are synthesized in the bone marrow. Average life span is about 120 days and normal count is 4.5-5 million/ cu mm.

(ii) WBC's: WBC's are of two types: *Granulocytes and Agranulocytes.*

Granulocytes: Granulocytes contains granules in their cytoplasm and nucleus is multilobed. These are of three types.

Neutrophils (Polymorphs): They stain with neutral dyes. Nucleus may contain 2-5 lobes and forms 65-70% of total WBC's.

Eosinophils or Acidophils: These cells are longer than neutrophils and takes acidic stain. Nucleus is 2 lobed. Their amount is 2-4% of total WBC's.

Basophils or mast cells: They stain blue with basic dyes. Nucleus is kidney shaped. They contain histamine, heparin etc. Their count is 0.5% of total WBC's.

Agranulocytes: They do not contain granules in their cytoplasm and nucleus is not lobed. These are of two types i.e., Lymphocytes and Monocytes

Lymphocytes: These are of two types i.e. small and large. Small are 25% of total WBC's and large are 3- 5% only. In small lymphocytes nucleus almost occupies the whole cell, leaving a thin rim of cytoplasm. Large lymphocytes contain more amount of cytoplasm.

Monocytes: They are the largest of WBC's and about 2-4% of total WBC's.

Functions of WBC's:

- 1) They protect the body against infection.
- 2) They repair injured tissues.
- 3) They secrete anticoagulant heparin.

iii) Platelets or Thrombocytes: Round and biconvex. Normal platelets count is 2-5 lakh per cu mm of blood.

Platelets do not contain nucleus and formed by red bone marrow.

Functions of Platelets:

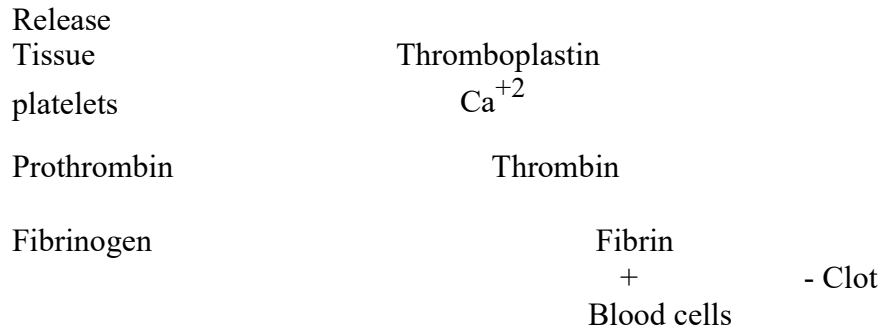
- 1) Help in blood clotting.
- 2) Protect body from bacteria, viruses.
- 3) Contain histamine and serotonin.

Functions of Blood: Blood performs following functions:

- 1) It transports oxygen and nutrients (Food) to various tissues.
- 2) It excretes the waste products.
- 3) It carries hormone to various tissues.
- 4) It contains antibodies and WBC's, which protect the body from diseases.
- 5) Clotting of blood protects against blood loss.
- 6) It maintains the water balance in the body
- 7) It regulates the body temperature.

Ans. 08. (B) Blood clotting: It prevents the loss of blood from the site of injury. If a leak develops in blood vessels then a clot is formed which prevents the loss of blood. **Mechanism of blood clotting:** The various steps in blood clotting are:

- 1) Thromboplastin is liberated from disintegrated tissues.
- 2) Thromboplastin converts prothrombin into thrombin in presence of Ca^{+2} ions.
- 3) Thrombin converts fibrinogen to fibrin.
- 4) This insoluble fibrin forms threads and then clot.



This mechanism of blood clotting is not so simple but very complex. There are 13 factors involved in this mechanism, which are as follows:

- Factor I - Fibrinogen
- Factor II - Prothrombin
- Factor III - Thromboplastin
- Factor IV - Calcium
- Factor V - Proaccelerin or Labile factor or Accelerator globulin factor
- Factor VI - Not present
- Factor VII - Stable factor or Proconvertin
- Factor VIII - Antihæmophilic factor (AHF) or Antihæmophilic Globulin (AHG)
- Factor IX - Platelet co factor-II or Plasma Thromboplastin Component (PTC) or Christmas factor
- Factor X - Stuart factor
- Factor XI - Plasma Thromboplastin Antecedent (PTA)
- Factor XII - Surface factor or Hageman factor
- Factor XIII - Fibrin stabilising factor.

Ans. 08. (C) Anemia: It is the disease which occurs due to deficiency in the number of red blood cells or deficiency of hemoglobin. Because of any one of these deficiencies, there is decrease in oxygen carrying capacity of blood. The symptoms of anemia are in the form of breathlessness, tiredness, loss of appetite and pallor of skin. The important types of anemia are:

- 1) Iron deficiency anemia
- 2) Megaloblastic anemia
- 3) Hemolytic anemia
- 4) Aplastic anemia

1) Iron deficiency anemia: This type of anemia is occurs due to deficiency of iron in low dietary intake or decreased absorption. Due to lack of oxygen iron, sufficient hemoglobin is not formed.

2) Megaloblastic anemia: This type of anemia occurs due to deficiency of either vitamin B₁₂ (also known as **pernicious anemia**) or folic acid. Both are required for the maturation of red blood cells. So immature, large sized red blood cells called magaloblasts, are released in circulation.

3) Hemolytic anemia: It occurs due to increased destruction of red blood cells. It occurs due to hereditary disorder, mechanical injury to red blood cells and infections like malaria.

4) Aplastic anemia: It occurs due to suppression of bone marrow function. It can be caused by drugs, chemicals, irradiation or malignant disease.

Ans. 08. (D): Blood Pressure: It is define as the lateral pressure exerted by blood on the walls of the blood vessels. The blood pressure which is normally expressed is arterial blood pressure. It has two phases:

1) Systolic blood pressure: It is the maximum blood pressure. This occurs during the systole of the heart. Normal range is 100 to 120 mm Hg.

2) Diastolic blood pressure: It is the minimum blood pressure. This occurs during the diastole of the heart. Normal range is 60 to 80 mm Hg.

Pulse: It is a throbbing sensation felt over the wall of arteries. It is defined as the pressure difference transmitted in the form of a wave over the arterial wall. Pulse rate is almost the same as heart rate (60-80 per minute). The wrist is the common site where pulse is usually felt. At this site, radial artery is very superficial. In case of fever, the rate of pulse increases at the rate of 10 pulses per every rise of 1⁰F.

Measurement of blood pressure: Blood pressure is usually measured by an instrument called sphygmomanometer. It consists of a mercury manometer, cuff and hand pump. The cuff is tied around the cubital fossa of the individual. Then hand pump is pressed so that air is inflated in the cuff. When the cuff is fully inflated, air pressure is more than blood pressure. So blood flow in the bronchial artery is completely obstructed. Now the hand pump is slowly released, till the time the appearance of the first sound is heard. The manometric reading is now noted. This reading is the systolic blood pressure.

Later, the hand pump is slowly released till the time the sound becomes louder and louder. Later it stops. The manometric reading is noted when sound disappears. This reading is diastolic blood pressure.

Question No. 09. Write a short note on the following:

(A) Classify joints. Explain synovial joint in detail.

(B) Describe various disorders of joints.

(C) Functions of skeleton system.

Ans. 09. (A) Joint: Joint is the site at which two or more bones articulate with each other. Joints allow flexibility and movement of the skeleton.

Types of joint: Joints are of following three types:

1) Fibrous joint 2) Cartilagenous joint 3) Synovial joint

1) Fibrous joint: In this joint bones are not movable. Bones are joined together by fibrous tissue example – sutures of skull and teeth in their socket

2) Cartilagenous joint: In these bones are slightly movable. In this type of joints articular ends of bones are covered by hyaline cartilage and a pad of fibrocartilage is present between joints.

Example – intervertebral joints.

3) Synovial joint: It is freely movable joint. Characteristics of this joint are as follows:

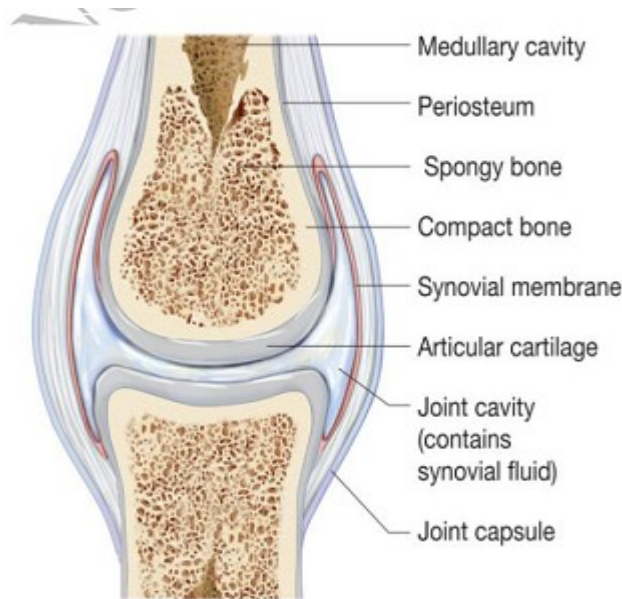
- i) The surface of articulating bones are covered with cartilage. These cartilages are not attached to each other.
- ii) There is a cavity around the joint called synovial cavity.
- iii) Synovial cavity is surrounded by ligament or capsule.
- iv) Synovial membrane covered all around the cavity.
- v) The cavity is filled with a fluid known as synovial fluid secreted by synovial membrane.

Functions of synovial fluid:

- i) Provides nutrients for the structure within the joint.
- ii) Contains phagocytes, which removes microbes.
- iii) Act as lubricant.

Various types of synovial joints are:

1. Ball and socket joint: In this type, rounded part of one bone i.e. ball fits into cavity (socket) of another bone and thus help in movement in all direction. Here a ball is moving in a cup shaped socket cavity examples are shoulder joint, hip joint.



Structure of Synovial Joint

2. Hinge joint: In this movement is possible in only one direction, examples are elbow joint, knee joint etc.

3. **Condyloid joint:** It resembles with hinge joint but helps in movement in two planes, examples are wrist joint, ankle joint etc.
4. **Gliding joint:** In this joint two bones are flat which glide on each other; examples are carpal and tarsal joint etc.
5. **Saddle joint:** In this the articulating bones fit together like a man sitting on a saddle, example is joint at base of thumb.
6. **Pivot joint:** This joint help in rotation, example is movement of head.

Ans. 09. (B) Disorders of joints:

1) Arthritis: It is a type of inflammatory disorder characterized by changes in joint. Two types of arthritis are-

(i) Rheumatoid Arthritis: It is inflammatory autoimmune disease mainly affecting peripheral joints. In this inflammatory changes also affect heart, blood vessels and skin. It is more common in females than males and can affect all ages. Symptoms are joint pain, stiffness etc.

(ii) Osteoarthritis: This is degenerative non-inflammatory disease. In this disorder articulating cartilage become thinner and bone begin to degenerate. Some time there are abnormal outgrowths of cartilage at the edges of bone, which is painful. It is generally occurs in middle age and affects mostly lower joints.

2) Gout: It is caused by deposition of sodium urate crystals in joints. It occurs in people with high uric acid levels.

Ans. 09. (C) Functions of skeleton system: Bones and joints form the skeleton system of the body. Functions of skeleton system are:

- 1) Support and protection of soft tissues and vital organs.
- 2) To give attachment to the muscles.
- 3) Formation of RBCs in the red bone marrow of long bones.
- 4) Storage of mineral salts like phosphorus and calcium.

Question No. 10. Write a short note on the following:

(A) Reflex action or reflex arc with examples.

(B) Physiology of muscle contraction.

Ans. 10. (A) Reflex action: It is an involuntary and immediate motor response to a sensory stimulus. Reflex action occur independent of will. It is a defense mechanism for a quick and automatic motor response for a sensory stimulus.

Reflex arc: It consists of structures, which are involved in the production of a reflex action. These structures are:

- 1) A sensory organ like skin, which receives the sensory stimulus.

- 2) A sensory nerve, which arises from the sensory organ.
- 3) The spinal cord.
- 4) A motor nerve. This nerve transmits the impulses to the motor organ such as muscle.

Importance of reflex action: The impulses of reflex action are carried only to the spinal cord and not to the brain. The impulses (signals) from the spinal cord are then carried to the motor organ. So that the response is quick and immediate, for example removal of finger immediately when it touches a hot plate.

Ans. 10. (B) Physiology of muscle contractions:

- 1) During normal resting state of a muscle, the muscle membrane is in a polarized state. This occurs because:
 - a) The interior of the muscle cell is negatively charged. It contains a large concentration of K^+ ions.
 - b) The exterior of the muscle cell is positively charged. It contains a large concentration of Na^+ ions.
- 2) When a nerve is stimulated, acetylcholine is liberated at the neuromuscular junction.
- 3) Acetylcholine increases the permeability of the muscle membrane. So Na^+ ions come inside of the cell. This produces a change in electrical charge. Both the interior and exterior of the muscle cell become positively charged. Now the membrane becomes depolarized. This depolarization produces a muscle contraction.
- 4) When the muscle contraction is over, acetylcholine is destroyed by the enzyme acetylcholinesterase.
- 5) Now, K^+ ions move into the cell and Na^+ ions out of the cell. This produces repolarisation of the muscle membrane. Now the muscle is ready for a second contraction.

Structure of Skeletal muscle fiber

Structure of Neuromuscular junction

Energy for muscle contraction: Actin and myosin are the two important muscle proteins. They form the contractile elements of a muscle. Muscle contraction is produced by the contraction of actin filaments over the stationary myosin filaments. The energy for muscle contraction is provided as follows:

- 1) Adenosine triphosphate (ATP) is broken down by the enzyme ATPase. This liberates Adenosine diphosphate (ADP) and also phosphate bond energy which is utilized for muscle contraction.
- 2) ATP is regenerated again by the reaction between phosphocreatinine and ADP.
- 3) Regeneration of phosphocreatinine occurs by the combination of creatinine and phosphate energy which is formed in the conversion of glycogen to lactic acid.
- 4) About one fifth of the lactic acid produced from glycogen is oxidized to carbon dioxide and water. The remaining is converted to glycogen and stored in liver, muscles and other tissues.

Question No. 11. Write a short note on (A) Menstrual cycle (B) Functions of uterus

Ans. 11. (A) Menstrual cycle: The menstrual cycle commences at the age of puberty which is the start of the reproductive life in the case of females. It normally occurs at the age of 12-15 years. The onset of menstruation is also called menarche. The uterus and vagina enlarge and also the breasts. There is also increase of fat, connective tissue and blood vessels. Secondary sexual characters also start appearing at this age. These are appearance of hair in axilla and pubic region, deposition of adipose tissue and widening of the pelvis.

Uterine cycle: Uterine cycle is the cyclic changes which take place in the uterus during menstrual cycle. It can be divided into three phases:

- 1) **Destructive phase or menstrual phase:** This phase lasting for the first five days of the cycle during which menstrual bleeding occurs (01-5) days.
- 2) **Proliferative phase:** This phase begins at the fifth day and extends through ovulation which occurs at the mid-point of the cycle (14th day).
- 3) **Secretory phase:** During this phase there is increase in the level of progesterone. There is a similar but lesser rise in estrogen level also.

Ans. 11. (B) Functions of Uterus: Uterus is the main part of the female reproductive system. It can be divided into three parts i.e., fundus, body and cervix. It plays important functions in reproduction in the following manners:

- 1) Uterus helps to receive the fertilized ovum and it is the place where ovum gets implanted.
- 2) Uterus retains, nourish and protect the foetus during pregnancy.
- 3) It helps to deliver the baby at the end of pregnancy by contraction of uterine muscles.
- 4) It plays an active role in menstruation cycle.

Question No. 12. Write down the names and functions of hormones secreted from:

(A) Anterior lobe of pituitary gland (B) Thyroid gland (C) Pancreas gland (D) Pineal gland

Ans. (A) Anterior lobe of pituitary gland: Anterior lobe of Pituitary gland secrete following hormones:

(1) Growth Hormone (2) ACTH (3) TSH (4) Prolactin (5) Gonadotrophins

(1) Growth hormone (GH):

Functions: Growth hormone performs following functions:

- 1) Required for overall growth of body especially of skeletal system.
- 2) Stimulate protein synthesis.
- 3) Promote break down of fats (Lipolysis).
- 4) Increases blood glucose level by reducing uptake of glucose by muscles and its output from liver is increased.
- 5) Increases glycogenolysis.

Disorders: Hyperpituitarism causes gigantism in children and acromegaly in adults. Hypo-secretion causes dwarfism.

(2) Adreno Corticotrophic Hormone (ACTH):

CRH (Corticotrophin Releasing Hormone) from hypothalamus promotes the synthesis and release of ACTH from anterior pituitary. ACTH stimulates the adrenal cortex to synthesize and releases its hormone.

Disorder: Excess production causes Cushing's syndrome.

(3) Thyroid Stimulating Hormone (TSH):

Function: TSH stimulates the thyroid gland for production of T₃ and T₄ by increasing growth and blood supply to thyroid gland.

Disorder: Hypothyroidism and Hyperthyroidism.

(4) Prolactin:

Function: Stimulate lactation (Milk production)

Disorder: Hyper secretion causes Infertility.

(5) Gonadotrophins:

Functions: In female increases secretion of oestrogen and progesterone.

In male stimulate the interstitial cells of the testes to secrete hormone testosterone.

Ans. 12. (B) Thyroid gland: Thyroid gland is situated in the lower part of neck on the thyroid cartilage and contains two lobes, one on each side of trachea. These two lobes are connected by isthmus.

Structure: It contains cell known as follicles, which are filled with thyroid hormones (T₃ and T₄) and parafollicular cells, which release calcitonin.

Synthesis and release of thyroid hormone: It occurs in following ways:

- 1) Iodide uptake: Thyroid cells trap iodide ion by active transport system (Na⁺ I⁻ symporter or NIS).
- 2) Trapped iodide is oxidized to iodine by peroxidase enzymes.

- 3) Iodine combines with tyrosine to form MIT (mono iodo tyrosine) and DIT (di iodo tyrosine).
- 4) Two molecules of DIT combines to form T₄ (thyroxine) and one molecule of DIT and one molecule of MIT combines to form T₃ (tri-iodo thyronine).

Functions: Thyroid hormone performs following functions:

- 1) Required for normal growth of body.
- 2) Lipolysis is increased by T₄ and T₃.
- 3) Carbohydrate metabolism is also stimulated.
- 4) Increases protein synthesis.
- 5) Increases the BMR.
- 6) Heart rate and output increases.
- 7) Required for mental growth.

Ans. 12 (C) Pancreas gland: It consists of an exocrine and endocrine part. The islets of langerhans are the endocrine parts that consist of about 2 % of glandular tissue. Two polypeptides hormones are secreted by pancreas:

- 1) Insulin: secreted by beta cells.
- 2) Glucagon: secreted by alpha cells.

Functions of insulin:

- 1) It increases the permeability of cell membrane.
- 2) Insulin also promotes the entry of amino-acids & fatty acid in to the cell.
- 3) Insulin promotes synthesis of glycogen from glucose.
- 4) Insulin inhibits the synthesis of glucose from sources other than carbohydrate.
- 5) Insulin inhabits glycogenolysis.
- 6) It inhabits the formation of ketone bodies.

Functions of glucagons:

- 1) It raises the blood sugar level. This is done by enhancing liver glycogenolysis and gluconeogenesis.
- 2) It increases adipose tissue lipolysis.

Ans. 12. (D) Pineal gland: It is very small gland situated in the brain(below the corpus callosum and behind the third ventricle). It is reddish grey in colour and measures about 10mm in length. The shape is similar to pine cone. The exact functions of pineal gland are not known. Perhaps, it influences the release of gonadotrophic hormones from anterior pituitary.

Question No. 13. Write note on the followings:

(A) Physiology of respiration

(B) Functions of Liver.

(C) Enumerate different types of tissues with detail note on epithelial tissue.

(D) Digestion and absorption of carbohydrates, fats and proteins.

Ans. 13. (A) Physiology of respiration: Respiratory system consists of following parts:(i) Nasal cavity (ii) Pharynx (iii) Larynx (iv) Trachea (v) Bronchi (iv) Bronchioles (vii) Lungs

Mechanism of Respiration (Physiology): Average respiratory rate is 12 to 15 breaths per minute. Each breath consist of inspiration and expiration

Inspiration: When size of thoracic cavity increases by contraction of the intercostals muscles and the diaphragm, the parietal pleura move with the walls of the thorax and diaphragm. The visceral pleura follow the parietal pleura, pulling the lung with it. This expands the lungs therefore pressure within alveoli and in the air passage falls and airflows into the lungs.

Expiration: Relaxation of the intercostals muscles and diaphragm decreases size of thoracic cavity and therefore pressure inside the lungs increases more than atmospheric pressure and so air is forced out. After expiration there is a pause before the next cycle begins.

Functions of respiration or lungs:

- 1) Transport of oxygen to tissues and excretion of carbon dioxide.
- 2) Excretion of volatile substances like ammonia.
- 3) Regulation of temperature through loss of heat in the expired air.
- 4) Maintenance of pH of blood.
- 5) Regulation of water balance through excretion of water vapours.
- 6) It affects heart rate and cardiac output.

Ans. 13. (B) Functions of liver: Liver performs following functions:

- 1) Secretion of bile.
- 2) It synthesizes and store glycogen.
- 3) All monosaccharide are converted into glucose in the liver, thus help in glucose metabolism.
- 4) Liver regulates blood glucose level.
- 5) Synthesis of fat from carbohydrates takes place in the liver.
- 6) Formation of urea from amino acid occurs in liver.
- 7) Plasma proteins are synthesized in liver.
- 8) Conversion of unsaturated fats into saturated fats.
- 9) Liver store iron and vitamin B₁₂, which are required for RBC's synthesis.
- 10) Synthesis of prothrombin and fibrinogen, which are necessary for blood coagulation.
- 11) Synthesize heparin.

- 12) Inactivates drugs and toxic substances.
- 13) Store vitamin A, D, E, and K
- 14) Production of heat as a result of various metabolic reactions thus regulates heat of the body.
- 15) Heavy metals are excreted through bile.
- 16) Microbes and their toxins are excreted through bile.

Ans. 13. (C) Tissue: A group of cells having the same origin, similar shape and common function is known as tissue. Tissues are classified into following four groups:

- (1) Epithelial tissue or epithelium
- (2) Connective tissue
- (3) Muscular tissue
- (4) Nervous tissue

1) Epithelial tissue: This tissue consists of cells, which are held together by intercellular substances. They form external surface of body for example skin or covering of internal surface of hollow organs like mucous membrane of stomach or get specialized for secretory functions forming various glands of body. Epithelium is attached to basement membrane, which is composed of amorphous substances.

Types: Epithelial tissue is of two types

- (i) Simple epithelial tissue
- (ii) Stratified epithelial tissue

i) Simple epithelial tissue: It is composed of a single layer cell. It is further classified as-

a) Squamous epithelium: It is composed of a single layer of thin, scale-like flat cells arranged edge to edge like as in mosaic with flat nucleus e.g. alveoli of lungs, lining of heart chambers, lining of blood vessel and lymphatic tissue.

b) Cuboidal epithelium: It consists of single layer of cells which are cubical in side view. They are arranged over a basement membrane. It is found in follicles of thyroid gland, ducts and alveoli of many glands.

c) Columnar epithelium: In this cells are columnar that is their length is more than breadth. They are arranged over a basement membrane e.g stomach and large intestine, convoluted and distal tubules of nephron.

d) Ciliated epithelium: In this the cell are cuboidal or columnar in shape and bear cilia, a hair like structure on their surfaces e g. lining of trachea, lining of uterus.

e) Glandular epithelium: It consists of cylindrical or columnar cells. It is present in secretory glands like salivary glands and breast.

ii) Stratified epithelialium: It is composed of multilayer of cell attached to the basement membrane. It is further classified as -

a) Squamous keratinised epithelium: The cells of this layer contains derivative of keratohyalin. The outer most layers of cells of this epithelium are dead, example, epidermis of skin.

b) Squamous non-keratinised epithelium: Here the stratum corneum and the keratin are absent. Cell of the superficial layer of this epithelium are living and remain moist e.g. lines buccal cavity, oesophagus.

c) Transitional epithelium: There is a basal layer of columnar cells attached to the basement membrane. This epithelium allows stretching by flattening of its constituent cells e.g. urinary bladder and uterus.

Functions of epithelial tissue:

- 1) Receiving sensory stimuli.
- 2) Absorption of substances.
- 3) Secretion of different enzymes.
- 4) Excretion of waste products.
- 5) Provide protection to under laying structures.

Ans. 13. (D) Physiology of digestion and absorption: Food contains carbohydrates, proteins and fat. All these are digested in the alimentary canal as follows:

Carbohydrates: Ptyalin (salivary amylase) present in saliva converts cooked starch of food into a sugar called maltose. All sugars are converted into simple monosaccharides like glucose by enzyme (Sucrase, maltase, lactase) in the small intestine. Glucose is absorbed through the capillaries of villi in the small intestine. It is then carried to the liver where it is stored as glycogen.

Protein: Digestive enzymes (pepsin and trypsin) convert proteins into peptones and then into amino acids. Amino acids are absorbed through villi of small intestine and carried to liver.

Fats: Lipase an enzyme of pancreas converts fats into fatty acids and glycerol. These two products are absorbed through villi. Bile emulsifies the fats.

Question No. 14. (A) Give a short note on Male reproductive organ system.

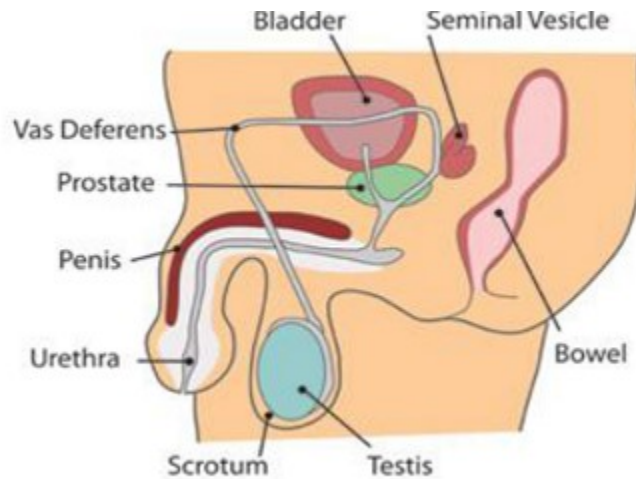
(B) Give a short note on Female reproductive organ system.

Ans. 14. (A) Male reproductive system:- It consist of scrotum, 2 testes, 2 epididymis, 2 vas deferens, 2 spermatic cords, 2 seminal vesicles, 2 ejaculatory ducts, 1 prostate glands, 1 penis.

Scrotum:- It is lies below the symphysis pubis, in front of the part of thighs and behind the penis. It is cutaneous pouch, consisting of loose skin and divided into two components each of which contains one testes, suspended by spermatic cord.

Testes: The testes are reproductive organ of males which is one of the endocrine gland. These are surrounded by three layer of tissue. The outermost is serous membrane called tunica vaginalis. Internal to tunica vaginalis is dense layer of white fibrous tissue tunica albuginea. The innermost layer of testes is tunica vasculosa which consists of a network of capillaries supported by delicate connective tissue. A group of 200-300 cells combine

and form seminiferous tubules lined by a germinal epithelial cells. Seminiferous tubules produce sperm by spermatogenesis.



Structure of Male reproductive system

Epididymis: The sperm are transported out of testes into a tube called epididymis. It is a comma shaped organ that lies along the posterior border of testes. Functionally it is a site of sperm maturation.

Vas deferens: This is a continuation of epididymis. They get dilated to form ampulla. These are lined by pseudostratified epithelium and its function is storage of sperm and also conveys sperms from epididymis to urethra.

Spermatic cords: It is a supportive structure of male reproductive system.

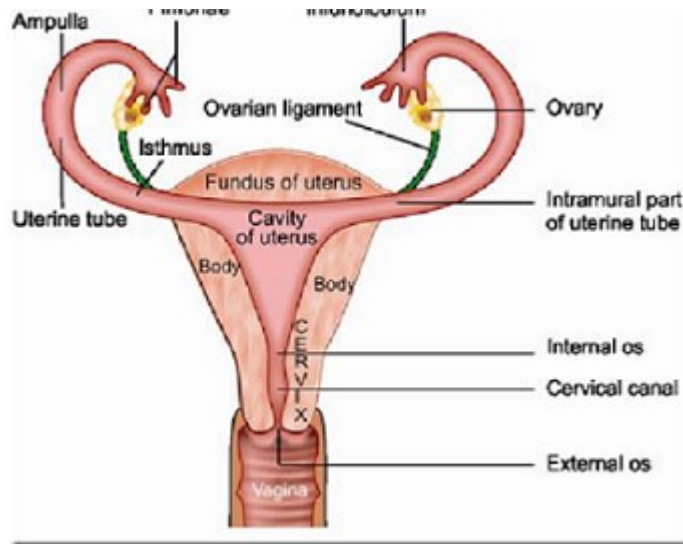
Seminal vesicles: These are two small fibromuscular pouches lined with columnar epithelium. At lower end, each seminal vesicles open into a short duct which joins with corresponding duct to form an ejaculatory duct

Ejaculatory ducts: They lie posterior to urinary bladder and formed by the union of duct from seminal vesicles and vas deference. These ducts eject spermatozoa into prostatic urethra.

Prostate gland: Lies in pelvic cavity. It secret an alkaline milky fluid which neutralises the acidity of semen and vaginal secretion thereby greatly increases motility and fertility of spermatozoa. **Penis:** It consists of root and body. It is used to introduce spermatozoa to vagina.

Ans. 14. (B) Female reproductive organs: The organs of female reproductive system can be classified into:

- 1) Secondary organs: Breast
- 2) External genital organs: Mons veneris, labia majora, labia minora, clitoris and hymen.
- 3) Internal Genital organs: Vagina, uterus, ovaries and fallopian tubes.



Structure of Female reproductive system

Vagina: It is the canal made up muscular walls. It extends from the vaginal orifice below to the cervix of uterus above. The vagina is lined by a thin skin which is highly folded. A small projection of vagina above the outer surface of cervix of uterus is called as fornix.

Uterus: uterus or womb is a hollow muscular organ situated in the pelvis. It is covered by peritoneum and lies between the bladder in front and rectum behind. Uterus can be divided into three parts fundus, body and cervix. Fundus is upper part which lies above the two opening of fallopian tubes. Body is the part lies between the fundus and cervix. The cervix is lower constricted part.

Ovaries: The ovaries are two in number. They lie on the either side of the uterus. A fold of peritoneum attaches the ovaries to posterior aspect of broad ligament. The ovaries lie below the fallopian tube of each side. A central soft tissue is called stroma and outer surface is called germinal epithelium.

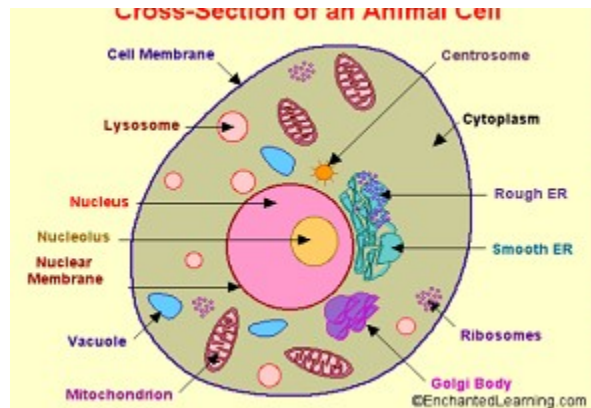
Fallopian Tubes: The fallopian tubes are two in numbers. They arise one on each side from the upper angles of uterus. They lie in upper margin of broad ligaments of uterus. The fallopian tubes consist of three layers outer peritoneal, middle muscular and inner mucous layer. They act as a passage for ova from the ovary to the uterus. Usually, the fertilization by spermatozoa occurs in fallopian tubes.

Question No. 15. Draw a well labeled diagram of a typical cell and enumerate its various components.

Ans. Cell: The cell is the smallest unit of living tissues. Cells of different tissues perform different functions. A cell consists of the following parts:

1) Cell wall: It is the external boundary of the living cell. It is a three layered structure made up of lipids and proteins. It measures approximately 70 \AA^0 in thickness. The cell wall allows the diffusion of substances into and out of the cell.

- 2) Nucleus:** It is the largest part present almost in the centre of a cell. It is more or less spherical in shape. It is bounded by nuclear membrane. The nucleus contains nucleolus and chromatin.
- 3) Cytoplasm:** It is the region lying between the cell membrane and nucleus. The cytoplasm contains cell organelles like endoplasmic reticulum, golgi apparatus, mitochondria, lysosomes and centrosomes.
- 4) Microsomes:** They are extremely small bodies present in the cytoplasm. They can be separated by centrifuging a tissue homogenate at very high speed (10000rpm). Microsomes contain 1) Ribosomes 2) Granular matrix. Ribosomes are concerned with protein synthesis. Granular matrix contains:
- A Oxidase which generate hydrogen peroxide
 - B Catalase which convert hydrogen peroxide into water.



- 5. Endoplasmic reticulum:** It is the most extensive cell organelles present in the cytoplasm. It consists of two membranes which are separated by a space. It is of two types:
- a) **Granular:** It is also called rough endoplasmic reticulum containing ribosomes. The ribosomes are the sites of protein synthesis.
 - b) **Agranular:** It is also called smooth endoplasmic reticulum. This does not contain ribosomes. This type of endoplasmic reticulum is concerned with fatty acid and steroid synthesis. Also, they store and release calcium.
- 5) Golgi apparatus:** It is a cup shaped structure contains vesicles. It is situated between the nucleus and the apex of the cell. It is concerned with the concentration proteins prior to their secretion.
- 6) Mitochondria:** They occur in the cytoplasm at variable numbers e.g. few hundreds to few thousands. The mitochondrion is composed of two layers of membranes. They are an outer layer which is smooth and an inner layer folded into sheets of tubules called cristae. Both these layers enclose a central cavity called matrix.
- 7) Lysosomes:** They are spherical or oval bodies surrounded by a single membrane. They vary in number and contain a variety of hydrolytic enzymes. The lysosomes breakdown the bacteria and the cell debris is engulfed by the cell. The damaged intracellular organelles are broken down and digested.
- 8) Centrosomes:** It is a small, rod shaped body found near the nucleus. It plays an important role during cell division. The centrosomes are surrounded by radiating thread like structure. It contains two centrioles.

10) Microtubules: They are straight, hollow cylindrical with a diameter of about 200\AA . They are concerned with the maintenance of cell shape. They are also associated with movements of cilia, flagella and mitotic spindles.

Question No. 16. Name the parts of conduction system of heart.

The cardiac conduction system is a group of specialized cardiac muscle cells in the walls of the heart that send signals to the heart muscle causing it to contract. The main components of the cardiac conduction system are the SA node, AV node, bundle of His, bundle branches, and Purkinje fibers.

Question No. 17. Name the smallest functional unit of human excretory system.

It is nephron which is also the functional unit of the kidney and the excretory system of human beings. It is also called the filtering and the excretory unit of the kidney which consists of the glomerulus and tubules.

Q1 Attempt any eight of the following:

- (a) Define blood pressure. Why systolic blood pressure is higher than diastolic.
- (b) What is difference between mitosis and meiosis?
- (c) What is normal range of blood sugar level in human?
- (d) What is normal value of Hb in human?
- (e) Which cell organelle is known as power house of cell?
- (f) Name the parts of conduction system of heart.

(g) What is the function of platelets in blood?

(h) Name the smallest functional unit of human excretory system.

I) which hormone is responsible for production of milk in mammary glands?

G) Name the enzyme present in saliva. Discuss structure and function of liver with diagram.

Q2 Draw a well labeled diagram of heart. Give a detailed note on blood composition and function.

Q3 Explain the mechanism involved in blood clotting.

Q4 Give a detailed note on gas exchange during breathing in respiratory system with the help of diagram.

Q5 Discuss physiology of urine formation with the help of diagram

Q6 Write short notes on any four of the following: (a) Blood group (d) Cardiovascular disorders (b) Spermatogenesis (e) Cell division (c) Diabetes

Q 7 Give classification tissues. Give a complete note on connective tissues with diagram and examples.

Q8 (a) Give classification of joints and discuss in detail about synovial joints with the help of diagram and example.

(b) Discuss the mechanism of muscle contraction.

Q 9 Discuss in detail about Male or Female reproductive system.

Q 10 Discuss LABELLED DIAGRAM OF nephron.

Q 11 Classify tissues. Write note on nervous tissue Write composition and function of lymph.

Q 12 Draw and labeled diagram of eye ball. Write note on physiology of vision.

Q13 Discuss salivary gland and its function, give physiological action of glucocorticoid.

Q 14 Describe composition and function of blood.

Q 15 Draw and label diagram of male reproductive system and write functions of testosterone.

Q 16 Describe methods for measurements of blood pressure

Q 17 Explain digestion of food in stomach and intestine

Q 18 Write the functions of hypothalamus AND MEDULLA OBLONGATA

- Q 19 Classify types of joints and write note on synovial joint
- Q 20 Differentiate (a) sympathetic and parasympathetic nervous system
(b) Skeletal muscle and cardiac muscle
- Q 21 Write the note on ECG and its significance
- Q 22 Write a note on physiology of muscle contraction and cardiac cycle
- Q 23 Write the structure and function of skin
- Q 24 Draw diagram of cell and write note on mitochondria.
- Q 25 Describe mechanism of respiration
- Q 26 Name four disorders of each of followings:
- Q 27 Name different part of lymphatic system and explain it.
- Q 28 Describe physiology of urine formation and their function.