

11th STD.

INSTANT SUPPLEMENTARY EXAM - JULY 2023

PART - III (ZOOLOGY)

Time Allowed : 3.00 Hours]

(with Answers)

[Maximum Marks : 70

Instructions: (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(2) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

PART - I

Note : (i) Answer **all** the questions: (15 × 1 = 15)

(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

- A group of organisms having similar traits of a rank is:
(a) Species (b) Taxon
(c) Genus (d) Family
- Four chambered heart is present in :
(a) Lizard (b) Snake
(c) Scorpion (d) Crocodile
- Which of the following is not correctly paired?
(a) Humans - Ureotelic
(b) Birds - Uricotelic
(c) Lizards - Uricotelic
(d) Whale - Ammonotelic
- The ciliated epithelium lines the :
(a) Skin (b) Digestive tract
(c) Gall bladder (d) Trachea
- Which of the following have an open circulatory system?
(a) Frog (b) Earthworm
(c) Pigeon (d) Cockroach
- First step in digestion of fat is :
(a) Emulsification
(b) Enzyme action
(c) Absorption by lacteals
(d) Storage in adipose tissue
- The respiratory structures of insects are :
(a) tracheal tubes (b) gills
(c) green glands (d) lungs
- Lymph is colourless because :
(a) WBCs are absent
(b) WBCs are present
(c) Heamoglobin is absent
(d) RBCs are absent
- Glomerular filtrate contains :
(a) Blood without blood cells and proteins
(b) Plasma without sugar
(c) Blood with proteins but withput cells
(d) Blood without urea
- The pigment present in the muscle fibre to store oxygen is :
(a) myoglobin (b) troponin
(c) myosin (d) actin
- Acetabulum is located in :
(a) collar bone
(b) hip bone
(c) shoulder bone
(d) thigh bone
- Which structure in the ear converts pressure waves to action potentials?
(a) Tympanic membrane
(b) Organ of Corti
(c) Oval window (d) Semicircular canals
- Iodinised salt is essential to prevent :
(a) rickets (b) scurvy
(c) goitre (d) acromegaly
- Normal diastolic pressure is :
(a) 80 mm Hg (b) 100 mm Hg
(c) 120 mm Hg (d) 140 mm Hg

15. Induced breeding technique is used in :
 (a) Marine fishery (b) Capture fishery
 (c) Culture fishery (d) Inland fishery

PART - II

Note : Answer **any six** questions. Question No 24 is **Compulsory.** (6 × 2 = 12)

16. Why mule is sterile in nature?
 17. What are flame cells?
 18. Some epithelia are pseudostratified. What does this mean?
 19. What are earthworm casts?
 20. Resistance in the airways is typically low in our respiratory system. Why? Give two reasons.
 21. Right ventricular wall is thinner than the left ventricular wall. Why?
 22. What is tubular secretion?
 23. Name the filaments present in the sarcomere.
 24. Cornea transplant in humans is almost never rejected. State the reason.

PART - III

Note : Answer **any six** questions. Question No. 33 is **Compulsory.** (6 × 3 = 18)

25. Compare Schizocoelom with Enterocoelom.
 26. Differentiate white adipose tissue from brown adipose tissue.
 27. Head of cockroach is called as hypognathous. Why?
 28. Bile juice contains no enzymes, yet it is important for digestion. Why?
 29. What are the heart sounds? When and how are these sounds produced?
 30. Name the three main hormones involved in the regulation of the renal function.
 31. Name the bones of skull.
 32. Enumerate the uses of stethoscope.
 33. Write the peculiar characters of duck.

PART - IV

Note: Answer **all** questions. (5 × 5 = 25)

34. (a) Write the classification of connective tissue and their functions.
 (OR)
 (b) Explain the male reproductive system of frog.
 35. (a) How do proteins differ from fats in their energy value and their role in the body?
 (OR)
 (b) Sketch a flow chart to show the pathway of air flow during respiration.
 36. (a) Distinguish between arteries and veins.
 (OR)
 (b) Explain the sliding filament theory of muscular contraction.
 37. (a) Comment of the functions of adrenalin.
 (OR)
 (b) Explain the principle involved in PET scan.
 38. (a) Discuss the various techniques adopted in cattle breeding.
 (OR)
 (b) Describe the sensory receptors present in the skin.



ANSWERS

PART - I

1. (a) Species
 2. (d) Crocodile
 3. (d) Whale - Ammonotelic
 4. (d) Trachea
 5. (d) Cockroach
 6. (a) Emulsification
 7. (a) tracheal tubes
 8. (c) Heamoglobin is absent

- 9. (a) Blood without blood cells and proteins
- 10. (a) myoglobin
- 11. (b) hip bone
- 12. (b) Organ of Corti
- 13. (c) goitre
- 14. (a) 80 mm Hg
- 15. (d) Inland fishery

PART - II

- 16. Mules are produced by mating of male donkey and female horse. Mules are sterile animals because they cannot produce gametes due to problems in pairing up of chromosomes. They have odd number of chromosomes.
- 17. Specialised excretory cells called flame cells are seen in Phylum platyhelminthes. These cells help in osmoregulation and excretion. They have flickering cilia or flagella for driving the absorbed excretory products.
- 18. 1. Epithelium is said to be pseudo - stratified when the cells are columnar but unequal in size.
2. Although the epithelium is single layered yet it appears to be multilayered because the nuclei lie at different levels in different cells.

19. Earthworm Casts :

- 1. In earthworm, the ingested organic rich soil passes through the digestive tract where digestive enzymes breakdown complex food into smaller absorbable units.
- 2. The simpler molecules are absorbed through the intestinal membrane and are utilized.
- 3. The undigested particles along with earth are passed out through the anus, as worm castings or vermicasts.

- 20. 1. The diameters of most airways is relatively large.
2. If airways are small, many parallel paths are found.
3. Air has a low viscosity.

- 21. 1. The right ventricle pumps deoxygenated blood into the pulmonary artery which carries blood to the lungs only whereas the left ventricle pumps blood into the aorta which distributes oxygenated blood to all parts of the body.
2. Hence the wall of the left ventricle is thicker and right ventricle has a thinner wall.

22. Tubular secretion is the passage of waste material from the blood to the filtrate in the Nephron. It is the last stage of Excretory process taking place in the Nephron.

- 23. 1. Thick filament - Myosin.
2. Thin filament - Actin.

24. The cornea is the only tissue in the body that can be transplanted from one person to another with little or no possibility of rejection. This is because cornea does not have blood vessels.

PART - III

25.

	Schizocoelomate	Enterocoelomate
1.	The body cavity is formed by splitting of mesoderm.	The body cavity is formed from the mesodermal pouches of archenteron.
2.	<ul style="list-style-type: none"> ✦ Annelids ✦ Arthropods ✦ Molluscs 	<ul style="list-style-type: none"> ✦ Echinoderms ✦ Hemichordates ✦ Chordates

26.

S.No	White adipose Tissue	Brown adipose Tissue
1.	The adipose tissue which is found in subcutaneous tissue surrounding the kidneys, eyeball, heart etc is called 'white fat' or white adipose tissue.	The adipose tissue which contains abundant mitochondria is called 'Brown fat' or Brown adipose tissue.
2.	It stores nutrients.	It is used to heat the blood stream to warm the body.

- 27.** 1. The head of cockroach is small, triangular lies at right angle to the longitudinal body axis.
2. The mouth parts are directed downward. So it is said to be hypognathous.
- 28.** 1. Bile is produced by the Liver. The Bile duct from the liver joins the pancreatic duct and pours its secretions into the duodenum.
2. The bile contains bile pigments (bilirubin and biliverdin) as the break down products of haemoglobin of dead RBCs, bile salts, cholesterol and phospholipids but has no enzymes.
3. Bile helps in emulsification of fats. Bile salts reduce the surface tension of fat droplets and break them into small globules. Bile also activates lipases to digest lipids.
4. Thus the bile is very important for digestion through it does not contain any enzyme.
- 29.** 1. Rhythmic contraction and expansion of heart is called heart beat.
2. The contraction of the heart is called systole and the relaxation of the heart is called diastole.
3. The heart normally beats 70-72 times per min in a human adult.
4. During each cardiac cycle two sounds are produced that can be heard through a stethoscope.
5. The first heart sound *lub* is associated with the closure of the tricuspid and bicuspid valves at the beginning of ventricular systole whereas second heart sound *dub* is associated with the closure of the semilunar valves at the end of ventricular systole. These sounds are of clinical diagnostic significance.
- 30.** Hormones involved in regulation of renal function are :
1. Vasopressin (Anti diuretic Hormone)
 2. Aldosterone
 3. Atrial natriuretic peptide hormone

- 31.** 1. Cranial bones(8): Frontal(1), Parietals(2), Temporal(2), Occipitals(1), Sphenoid(1), Ethmoid(1)
2. Facial bones(14): Nasals(2), Maxillae(2), Zygomatics(2), Lachrymals(2), Palatines(2), Inferior nasals(2), Mandible(1), Vomer(1)
3. Hyoid bone(1): U-shaped bone found at the floor of buccal cavity.
4. Ear ossicles(6): Maleus(2), Incus(2), Stapes(2) (Left and Right ear)

- 32.** Stethoscope is a medical device used to hear the internal sounds of the human body such as heart beat, sounds due to inhalation and exhalation of air in the lungs, stomach, intestinal movements and also foetal movements.

Clinical significance of stethoscope:

1. Stethoscope helps to find the normal and abnormal heart beat sounds and also to diagnose valve functions.
2. It helps to diagnose lung diseases such as pneumonia, pulmonary edema, bronchitis and pleuritis.
3. Stethoscopes along with sphygmomanometer are used to read the blood pressure.
4. It outlines the status of cardiac, respiratory and intestinal disorders.

33. Peculiarity characters of ducks :

1. The body is fully covered with oily feathers.
2. They have a layer of fat under their skin which prevents it from getting wet.
3. They lay eggs at night or in the morning.
4. The ducks feed on rice bran, kitchen wastes, waste fish and snails.

PART - IV

34. (a) Connective tissues are classified into

- I. Loose connective tissue
- II. Dense connective tissue
- III. Specialized connective tissue

Connective tissues

Loose Connective tissues	Dense Connective tissues	Specialised Connective tissues
1. Areolar Tissue	1. Dense Regular	1. Cartilage
2. Adipose Tissue	2. Dense irregular	2. Bone
3. Reticular Tissue	3. Elastic	3. Blood

I. Loose connective tissues:

The cells and fibres are loosely arranged in a semi fluid ground substance. They are classified as

1. Areolar connective tissue:

It lies beneath the skin

Functions :

Acts as a support framework for epithelium. Acts as reservoir of water and salts for the surrounding body tissues. Hence it is called tissue fluid.

2. Adipose Tissue :

Found below the skin, 90% of the tissue contains Adipocytes or fat cells.

Functions:

Richly vascularised and supplies energy to the body while fasting.

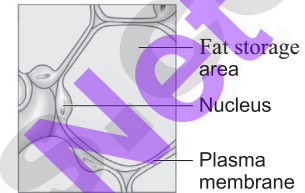
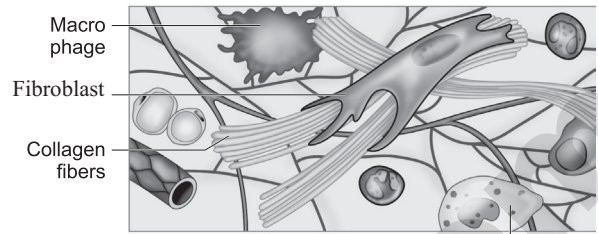
3. Reticular connective tissue :

Matrix is filled with fibroblasts called reticular cells.

Functions:

Forms an internal framework that supports the blood cells in the lymph nodes, spleen and bone marrow.

Loose connective tissues:



Adipose tissue

II. Dense connective tissues :

Fibres and fibroblasts are compactly packed based on orientation of fibres it is divided into:

1. Dense regular connective tissues :

Primarily collagen fibres are arranged in rows between parallel bundles of tissues and few elastic fibres.

Fibroblast is the major cell type.

Functions:

Present in tendons that attach skeletal muscles to bones and ligaments.

Bones are attached to one another by ligaments. The tissue withstands tensile strength when pulling force is applied in one direction.

2. Dense irregular connective tissues :

Have bundles of thick collagen fibres and fibroblasts arranged irregularly. Fibroblast is the major cell type.

Functions:

The tissue can withstand tension exerted in many directions. Some elastic fibres are also present. It is found in the skin as the leathery dermis and forms fibrous capsules of organs such as kidneys, bones, cartilages, muscles, nerves and joints.

3. Elastic connective tissue:

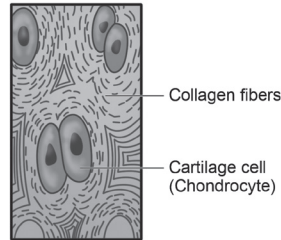
It contains high proportion of elastic fibres and allows recoil of tissues following stretching.

Eg: Walls of arteries. It is found in the walls of large arteries; ligaments associated with vertebral column and within the walls of the bronchial tubes.

III. Specialised connective tissues : Classified as cartilage, bones and blood.

1. Cartilage :

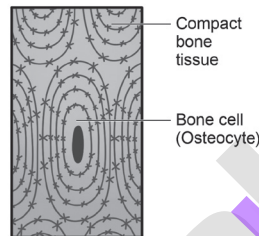
Intercellular material is solid and pliable and resists compression. Cells of this tissue (Chondrocytes) are enclosed in small cavities within the matrix secreted by them.



Eg: Cartilage in ear pinna, Tip of nose etc.

2. Bones :

Hard and non pliable ground substance rich in calcium salts and collagen fibres which gives strength.

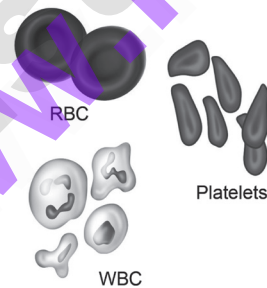


Functions:

Bones support and protect softer tissues and organs. **Bone marrow** is site of production of blood cells.

3. Blood :

Fluid connective tissue containing plasma, RBC, WBC and platelets.



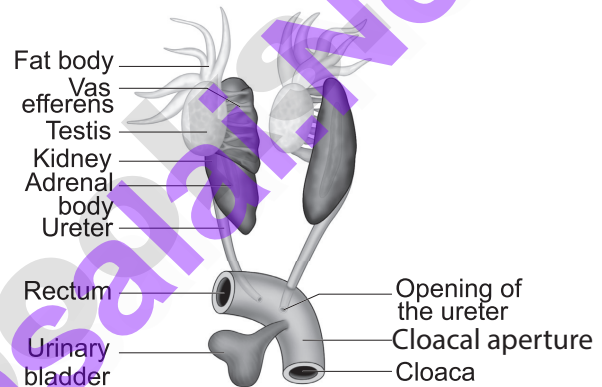
Functions:

Transport medium for the cardiovascular system carrying nutrients, wastes, respiratory gases throughout the body.

(OR)

(b) Male reproductive system of frog:

1. The male frog has a pair of testes which are attached to the kidney and the dorsal body wall by folds of peritonium called mesorchium.
2. Vasa efferentia arise from each testis.
3. They enter the kidneys on both side and open into the bladder canal.
4. Finally, it communicates with the urinogenital duct that comes out of kidneys and opens into the cloaca.



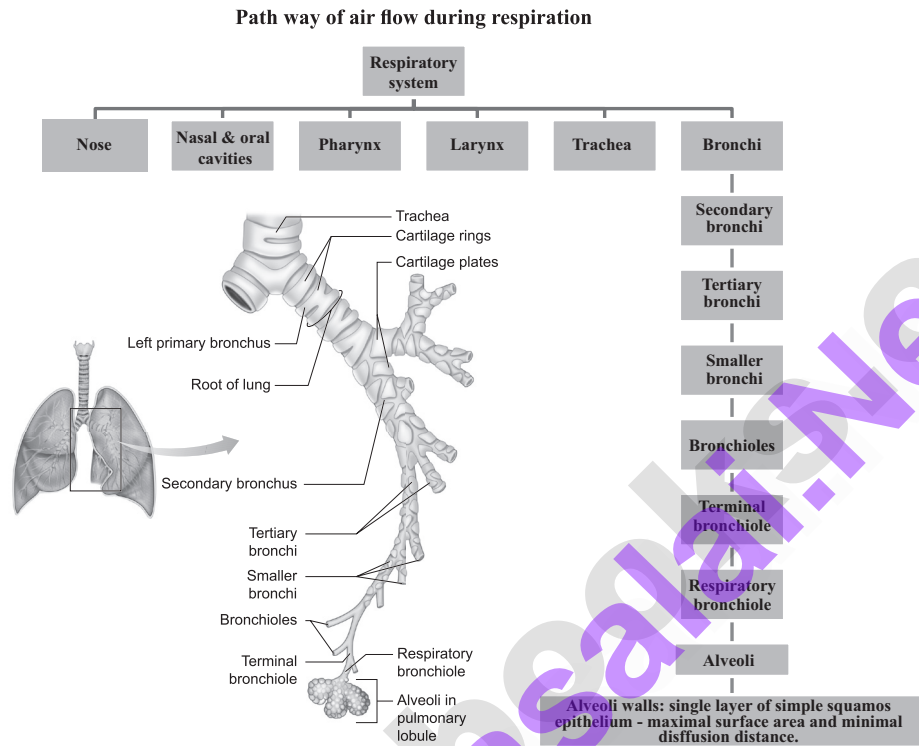
Male Reproductive System of Frog

35. (a)

S. No.	Proteins Energy value	Fats Energy value
1.	The caloric value and physiological fuel value of 1 gram of protein is 5.65 Kcal and 4 Kcal respectively.	Fat has a caloric value of 9.45 Kcal and a physiological fuel value of 9 Kcal per gram.
	Role in the body	Role in the body
1.	Proteins are required for growth and repair of body cells.	Fats are their derivatives are the best reserve food stored in our body which is used for production of energy.
2.	They are stored in the body only to a certain extent. The body requires 65 - 75 gm of proteins per day.	The body requires 60 - 70 gm of fats per day.

(OR)

(b)



36. (a)

Sl. No.	Arteries	Veins
1.	The wall of arteries is thick and non-collapsible.	The wall of the vein is thin and have a larger lumen. They can be easily stretched.
2.	Arteries carry blood away from the heart.	Veins bring blood from different parts of the body to the heart.
3.	All arteries carry oxygenated blood except the pulmonary artery.	All veins carry de oxygenated blood except the pulmonary veins.
4.	Arteries have no valves.	Veins have valves to prevent back flow of blood.
5.	The blood flows in arteries with great pressure.	The flow of blood in the veins is under low pressure.

(OR)

(b) **The Sliding Filament Theory of Muscle - contraction :**

Rolf Niedergerke Andrew F. Huxley proposed the sliding-filament theory to explain muscle contraction. According to this theory overlapping actin and myosin filaments of fixed length slide past one another is an energy requiring process resulting in muscle contraction.

1. Contraction is the creation of tension in the muscle and relaxation is the release of tension created by contraction.

2. Muscle contraction is initiated by a nerve impulse sent by the central nervous system (CNS) through a motor neuron.
3. The junction between the motor neuron and sarcolemma of the muscle fibre is called the neuromuscular junction or motor end plate. When nerve impulse reaches this junction acetylcholine is released.
4. An action potential is generated which initiates opening of multiple gated channels of sarcolemma.
5. This causes the flow of large quantities of calcium ions from sarcoplasmic reticulum. The Ca^{+} ions bind to the troponin of thin filaments. The active sites are exposed to the heads of myosin to form a cross bridge and phosphate ion is released.
6. Hydrolysis of ATP occurs and energy released helps the myosin head to rotate (90° angle with long axis of filament). In this position myosin binds to an actin and activates contraction - relaxation cycle which is followed by a power stroke.
7. Power stroke (cross - bridge tilting) begins after rest of myosin binding sites are uncovered. Myosin head and hinge region tilt from 90° angle to 45° angle. Cross bridges are transformed into high - force bonds as myosin releases phosphate ions allowing myosin head to swivel.
8. At the end of power stroke, the myosin head releases actin and swivels back to bind to a new actin molecule to start another contraction cycle. The power stroke repeats many times until a muscle fibre contracts. The process continues as long as muscle receives stimuli and there is steady flow of calcium ions.
9. Myosin returns back to relaxed state and releases ADP. A new ATP then binds to the head of myosin and cross-bridge is broken. The cycle of cross-bridge formation and breakage repeatedly causes sliding of the filaments. similar to motion of oar on a boat.
10. Relaxation :
 - i) Motor impulses stop.
 - ii) Calcium ions are pumped back into sarcoplasm.
 - iii) Masking of active sites of actin filament.
 - iv) Failure of binding of myosin head with active sites of actin.
 - v) The thin filaments assume their normal position and muscle is released.

37. (a) Functions of adrenalin :

1. The adrenal medulla secretes the hormones adrenalin (epinephrine) and noradrenalin (norepinephrine) and are referred as “3F hormone” (fight, flight and fright hormone).
2. Adrenalin increases liver glycogen breakdown into glucose and increases the release of fatty acids from fat cells.
3. During emergency it increases heart beat rate and blood pressure.
4. It stimulates the smooth muscles of cutaneous and visceral arteries to decrease blood flow.
5. It increases blood flow to the skeletal muscles thereby increases the metabolic rate of skeletal muscles, cardiac muscles and nervous tissue.

(OR)

(b) Positron Emission Tomographic Scanning (PET):

1. PET is also computerized imaging technique unlike CT.
2. Positron emission tomography (PET) is a nuclear medicine procedure based on the measurement of positron emission from radiolabelled tracer molecules.
3. These radiotracers allow biologic processes to be measured and whole body images to be obtained which demonstrates sites of radiotracer accumulation.
4. A PET image gives quantitative regional information on the metabolic and physiological processes.
5. PET uses positron emitting radio isotopes (^{11}C ^{13}N ^{15}O ^{18}F) which are generated by the cyclotron.
6. The most common radiotracer in use today is ^{18}F -fluorodeoxyglucose (^{18}F -FDG) which is a radio labelled sugar (glucose) molecule.
7. These atoms are then incorporated by chemical methods into biological molecules like glucose, amino acids and ammonia.
8. These positron emitting compounds are then injected in very small amounts into or inhaled by experimental animals or human subjects.
9. The three dimensional distribution of the labeled trace is then probed by powerful PET cameras and the images are reconstructed by a computer.
10. The quantitative interpretation of the image is done by varying mathematical models.
11. They deal with the process of uptake and metabolism of the radioisotope.

38. (a) Methods of Animal breeding :

There are two methods of animal breeding :

1. Inbreeding :

- i. Breeding between animals of the same breed for 4-6 generations is called inbreeding. Increases homozygosity and exposes the harmful recessive genes.
- ii. Continuous inbreeding reduces fertility and even productivity, resulting in "inbreeding depression".
- iii. This can be avoided by breeding selected animals of the breeding population and they should be mated with superior animals of the same breed but unrelated to the breeding population.
- iv. It helps to restore fertility and yield.

2. Outbreeding :

The breeding between unrelated animals is called outbreeding. Individuals produced do not have common ancestors for 4-6 generations. It helps to produce new and favourable traits, to produce hybrids with superior qualities and helps to create new breeds. New and favourable genes can be introduced into a population through outbreeding.

- i. **Out crossing :** It is the breeding between unrelated animals of the same breed but having no common ancestry. The offspring of such a cross is called outcross. This method is suitable for breeding animals below average in productivity.
- ii. **Cross breeding :** Breeding between a superior male of one breed with a superior female of another breed. The cross breed progeny has superior traits (hybrid vigour or heterosis).

iii. **Interspecific hybridization :**

Method of breeding between male and female of two different species. Eg: **Mule** (male donkey and a female horse). The progeny obtained from such crosses are different from their parents, and may possess the desirable traits of the parents. It was produced by the process of interspecific hybridization between a male donkey and a female horse.

3. **Artificial insemination :**

- i. It is a technique in which the semen collected from the male is injected to the reproductive tract of the selected female.
- ii. Artificial insemination is economical measure where fewer bulls are required and maximum use can be made of the best sire.

Multiple ovulation embryo transfer technology (MOET)

- i. It is another method of propagation of animals with desirable traits. This method is applied when the success rate of crossing is low even after artificial insemination.
- ii. Instead of one egg per cycle, 6-8 eggs can be produced by this technology. The eggs are carefully recovered non-surgically from the genetic mother and fertilized artificially.
- iii. The embryos at 8-32 celled stages are recovered and transferred to a surrogate mother.

(OR)

(b) Some of the sensory receptors present in the skin are:

- 1. Tactile merkel disc is light touch receptor lying in the deeper layer of epidermis.
- 2. Hair follicle receptors are light touch receptors lying around the hair follicles.
- 3. Meissner's corpuscles are small light pressure receptors found just beneath the epidermis in the dermal papillae. They are numerous in hairless skin areas such as finger tips and soles of the feet.
- 4. Pacinian corpuscles are the large egg shaped receptors found scattered deep in the dermis and monitoring vibration due to pressure. It allows to detect different textures, temperature, hardness and pain.
- 5. Ruffini endings which lie in the dermis responds to continuous pressure.
- 6. Krause end bulbs are thermoreceptors that sense temperature.

