Structural Organization in Animals (Including Frog)

SHORT NOTES

Epithelial Tissue

- Has a free surface (faces either a body fluid or the outside environment).
- Compactly packed (with little intercellular matrix).

I. Simple Epithelium (Composed of a single layer of cells).

- Function: Diffusion, secretion and absorption.
- Simple epithelium can be of following types on the basis of structural modifications of cells:

Features	Squamous	Cuboidal	Columnar	Ciliated	Glandular
Cells	Flattened cells	Cube-like cells	Tall and slender cells	Cells bear cilia	Cells get specialised for secretion
Location	Walls of blood vessels and air sacs of lungs	In ducts of glands and tubular parts of nephrons in kidneys	In the lining of stomach and intestine	In the inner surface of hollow organs	Goblet cells of alimentary canal and salivary gland

II. Compound Epithelium (Composed of a multiple layer of cells)

- Function: Provide protection.
- Location: Dry surface of the skin, the moist surface of buccal cavity.

Connective Tissue

- The cells secrete fibres of structural proteins called collagen or elastin (except blood), also secrete modified polysaccharides (ground substance).

I. Loose connective tissue

- Cells and fibres loosely arranged in a semi-fluid ground substance

Areolar Tissue	Adipose Tissue
❖ Present beneath the skin. ❖ Contains fibroblasts (cells that produce and secrete fibres), macrophages and mast cells.	❖ Located mainly beneath the skin. ❖ Specialised to store fat.

II. Dense connective tissue

Dense Regular Tissues	Dense Irregular Tissues
❖ Regular pattern in orientation of fibres ❖ Tendons & Ligaments	❖ Irregular pattern in orientation of fibres ❖ Present in the skin

III. Specialised connective tissues

Cartilage	Bones	Blood
❖ Solid and pliable intercellular material ❖ Cells: Chondrocytes ❖ Functions: Tip of nose, outer ear joints, for protection, etc.	❖ Hard and non-pliable intercellular material ❖ Cells: Osteocytes ❖ Functions: Provides structural frame to the body, etc.	❖ Fluid connective tissue ❖ Cells WBC, RBC and platelets ❖ Functions: Circulating fluid that help in transportation of substances

Muscles Tissue

- Myofibrils (fine fibrils) → Fibres → Muscle.
- Muscles are of three types: skeletal, smooth, and cardiac.

Skeletal Muscle	Smooth Muscle	Cardiac Muscle
❖ Closely attached to the skeletal bones ❖ Striated and voluntary ❖ Location: Closely attached to skeletal bones	❖ Fibres taper at both ends (fusiform) ❖ Non-striated and involuntary ❖ Location: Wall of internal organs such as the blood vessels, stomach and intestine	❖ Contractile tissue ❖ Striated and involuntary ❖ Intercalated discs present at some fusion points ❖ Location: Present only in the heart

Neural Tissue

❖ Exerts the greatest control over the body's responsiveness to changing conditions.

	Neurons	Neuroglial Cells
Composition	Unit of neural system	Make more than one-half the volume of neural tissue
Excitability	Yes	No
Function	Respond to various stimuli	Protect and support neurons

COCKROACH

❖ Size - 1/4 inches to 3 inches (0.6-7.6 cm).

Classification

❖ Kingdom- Animalia, Phylum- Arthropoda, Class- Insecta, Genus- Periplaneta, Species- americana.

Morphology

❖ 34-53 mm long.

Exoskeleton

❖ Hardened plates called sclerites joined to each other by articular/arthrodial membrane.

Head	Thorax	Abdomen
❖ Triangular in shape ❖ Anteriorly at right angles to the longitudinal body axis ❖ Formed by the fusion of six segments ❖ Bears a pair of **compound eyes**, a pair of **antennae** (monitor environment) ❖ Mouthparts (**biting and chewing type**) - labrum, a pair of mandibles, a pair of maxillae, a labium, hypopharynx	❖ Three parts-prothorax, mesothorax and metathorax ❖ Each thoracic segment bears a pair of walking legs ❖ Two pairs of wings- **Mesothoracic Wings (Forewings/Tegmina)** ❖ Opaque dark and leathery ❖ Cover the hind wings when at rest **Metathoracic Wings (Hindwings)** ❖ Transparent and membranous ❖ Used in flight	❖ Consists of 10 segments ❖ 7^{th} (boat shaped), 8^{th} and 9^{th} sternum forms a brood or genital pouch in females ❖ 9^{th} and 10^{th} terga and 9^{th} sternum forms genital pouch in males ❖ Anal styles present in males only & anal cerci (on 10^{th} segment) present in both sexes

Anatomy

Digestive System

❖ Three regions: foregut, midgut and hindgut.

❖ Mouth → Pharynx → Oesophagus → Crop → Gizzard/ Proventriculus → Midgut → Ileum → Colon → Rectum

Circulatory System

❖ Open type

❖ Haemolymph = Colourless plasma and haemocytes

❖ Heart of cockroach = Elongated muscular tube

Respiratory System

❖ Takes place by a network of trachea & 10 pairs of small holes called spiracles (regulated by the sphincters).

Excretory System (Uricotelic)

❖ Performed by Malpighian tubules.

❖ The fat body, nephrocytes and urecose glands also help in excretion.

Nervous System

❖ Segmentally arranged ganglia and ventral nerve cord.

❖ Brain - represented by supra-oesophageal ganglion.

Sensory System

❖ Antennae, eyes, maxillary palps, labial palps, anal cerci

❖ Reproductive system

Male Reproductive System	Female Reproductive System
❖ A pair of testes (4^{th} -6^{th} abdominal segments) → vas deferens → seminal vesicle (stored and glued sperms) → ejaculatory duct → male gonopore ❖ Mushroom shaped gland (6^{th}-7^{th} segments) - An accessory reproductive gland ❖ External genitalia - Represented by male gonapophysis or phallomere	❖ Two large ovaries (2^{nd} – 6^{th} abdominal segments) → oviducts → vagina → genital chamber ❖ Produce 9-10 ootheca (containing 14-16 eggs each) ❖ Development - paurometabolous (through nymphal stage by moulting about 13 times)

FROG

Morphology

- ❖ Dorsal body is olive green and ventral side is pale yellow.
- ❖ Body is divisible in head and trunk.

Anatomy

1. Digestive System

- ❖ Mouth → Buccal cavity → Pharynx → Oesophagus → Stomach → Intestine → Cloaca
- ❖ Secretion from liver and pancreas help in digestion.
- ❖ Final digestion take place in the intestine.

2. Respiratory System

- ❖ On land it respire with the help of buccal cavity, skin and lungs.
- ❖ In water it respires through skin.

3. Circulatory System

- ❖ Well-developed closed type.
- ❖ It involves heart, blood vessels and blood.
- ❖ Heart consists of 3 chambers, two atria and one ventricle.

4. Excretory System

- ❖ It consists of a pair of kidney, ureters, urinary bladder and cloaca.
- ❖ Each kidney composed of numerous nephrons as a structural and functional unit.

5. Nervous System

- ❖ Nervous system consists of central nervous system (brain and spinal cord), peripheral nervous system (cranial and spinal nerves) and autonomic nervous system (sympathetic and parasympathetic).

6. Reproductive System

- ❖ Well organized male and female reproductive system.