

SECTION – I  
(Course Content)

**HISTOLOGY**  
(One hour lecture to be followed by two hour practicals\*)

**GENERAL HISTOLOGY**

Lecture : 13 hou  
Practicals: 13 X 2 : 26 hou

**TOPICS**

- |  |       |
|--|-------|
| 1. Introduction: relevance of Histology in Medicine; Tissue processing; Principles of microscopy; cells and cell organelles; EM picture of protein synthesizing, Steroid synthesizing, absorptive and ion transporting cells | 2 hrs |
| 2. Epithelial tissue I: Surface/ lining epithelium:<br>Simple squamous, cuboidal, columnar, pseudostratified.<br>Stratified: squamous- keratinized, non-keratinized; transitional  | 1 hr  |
| 3. Epithelial tissue II: Glandular epithelium<br>Glands: mucous, serous and mixed  |       |
| 4. Connective tissue I: Loose areolar, elastic, cartilaginous, reticular; adipose<br>Dense connective tissue: Irregular and Regular  | 1 hr  |
| 5. Connective tissue II: Cartilage- hyaline, elastic and fibro   | 1 hr  |
| 6. Connective tissue III: Bone- compact and cancellous   | 1 hr  |
| 7. Highly specialized connective tissue: Lymphoid tissue/ Immune system I:<br>Distribution: lymphatic follicles/ nodules- solitary, aggregates:<br>Lymph node and spleen.  | 2 hrs |
| 8. Lymphatic tissue II: Tonsil and thymus<br>Myeloid tissue  | 1 hr  |
| 9. Muscular tissue: Smooth muscle; Striated muscle- skeletal and cardiac   | 1 hr  |
| 10. Nerve tissue/ Neural tissue:<br>Neurons and neuroglia<br>Spinal and sympathetic ganglia<br>Cerebral cortex and cerebellar cortex<br>Nerve- peripheral nerve; optic nerve; nerve endings                                  | 2 hrs |

\* **Workbook also to be completed.**

**SYSTEMIC HISTOLOGY**

Lectures: 17 h  
Practicals: 17 X 2 = 34 h

**TOPICS**

- |  |      |
|--|------|
| 1. Digestive system I:<br>General plan of GIT- Oesophagus  | 1 hr |
| 1. Digestive system II:<br>Oral cavity, lip, tongue, taste buds, salivary glands,<br>Parotid (serous), sublingual (mucous) and submandibular (mixed) | 1 hr |

2. Digestive system III: Stomach: body, fundus and pylorus	1 hr
3. Digestive system IV: Small and large intestines: Duodenum, jejunum and ileum; appendix, colon	1 hr
4. Digestive system V: Liver, gall bladder, pancreas – exocrine (acinar); Pancreas- endocrine (Islets of Langerhans)	1 hr
5. Urinary system: Kidney- cortex, medulla; juxtamedullary apparatus (Demonstration) Kidney- medulla; ureters and urinary bladder	1 hr
6. Male reproductive system: Testis; epididymis; vas deferens; prostate; Seminal vesicle and penis	1 hr
7. Female reproductive system I: Ovary- Graffian follicle; corpus luteum; fallopian tube Uterus- different stages of functional activity (Demonstration); vagina	1 hr
8. Female reproductive system II: Mammary gland- lactating; non-lactating; placenta; umbilical cord	1 hr
9. Integumentary system: Skin- hairy, glabrous; appendages; cutaneous receptors (Demonstration)	1 hr
10. Respiratory system I: Upper respiratory tract- nasal cavity; olfactory mucosa; Respiratory mucosa; epiglottis and trachea	1 hr
11. Respiratory system II: Lower respiratory tract- extra and intra- pulmonary bronchi; Lung parenchyma	1 hr
12. Cardiovascular system: Elastic artery, muscular artery, medium-sized vein, Large veins, capillaries (Demonstration); conducting system of the heart (Demonstration)	1 hr
13. Endocrine system I: Pituitary, pineal; review of endocrine tissues in the pancreas, testis and ovary	1 hr
14. Endocrine system II: Thyroid, parathyroid and adrenal	1 hr
15. Special sense organs: Eye; eye-lid; cornea; sclero-corneal junction; retina	1 hr

**SECTION – II**  
**(Course Content under Level – I,II,III)**  
**HISTOLOGY**  
**GENERAL**

Lecture: 14 hrs; Practical: 28 hrs.  
(One hour lecture to be followed by two hours practical \*)  
\* Work book to be completed

					<b>SLIDES FOR</b>	<b>SLIDES FOR</b>
--	--	--	--	--	-------------------	-------------------

S.NO	TOPICS	LEVEL 1	LEVEL 2	LEVEL 3	STUDY AND DRAWING	DEMONSTRATION ONLY
1.	<b>INTRODUCTION AND MICROSCOPY</b>	<ul style="list-style-type: none"> <li>• Relevance of histology to Medicine</li> <li>• Light microscope</li> <li>• Magnification/ resolution</li> <li>• Setting up of a microscope</li> <li>• Steps in paraffin block making</li> <li>• H&amp;E staining</li> </ul>	<ul style="list-style-type: none"> <li>• Properties of light and electrons</li> <li>• Principles of microscopy</li> <li>• Factors influencing magnification &amp; resolution</li> <li>• Special stains for connective tissue, muscle and nerve tissue</li> </ul>	<ul style="list-style-type: none"> <li>• Wave theory of light</li> <li>• Various kinds of microscopes</li> <li>• Differences between light &amp; electron microscopes</li> <li>• Neuroanatomical stains</li> <li>• Golgi staining methods</li> </ul>		
2.	<b>MICROTOMY</b>	<ul style="list-style-type: none"> <li>• Parts of a rotary microtome</li> <li>• Steps in paraffin section cutting</li> </ul>	<ul style="list-style-type: none"> <li>• Freezing microtome</li> </ul>	<ul style="list-style-type: none"> <li>• Cryotome and cryostat methods</li> <li>• Sample preparations for biological specimens for transmission and electron microscopy</li> </ul>		
3.	<b>ANIMAL CELL</b>	<ul style="list-style-type: none"> <li>• Definition and classification</li> <li>• Permanent, stable and labile cells</li> <li>• Cell membrane</li> <li>• Cytoplasmic organelles (RER, SER, Golgi apparatus, Lysosome, mitochondria, Ribosomes)</li> <li>• Peroxisomes</li> <li>• Primary, secondary and tertiary lysosomes, residual bodies</li> <li>• Cell inclusions</li> <li>• Nucleus and nucleolus</li> <li>• Ultrastructure of nucleus</li> <li>• Cytoskeleton (microtubules and microfilaments)</li> <li>• Phases of cell cycle (G1 phase, S-phase and G2 phase)</li> <li>• Cell division (mitosis and meiosis)</li> <li>• Different models of cell membrane</li> <li>• Cell population</li> </ul>	<ul style="list-style-type: none"> <li>• Euchromatin and heterochromatin</li> <li>• Chemical nature of DNA and RNA</li> <li>• Nucleotides and nucleosides</li> <li>• Protein biosynthesis</li> <li>• Intracellular pigments</li> <li>• Differences between cell membrane, unit membrane and cell wall</li> <li>• Actin and myosin filaments in muscle cell</li> </ul> <p>Distribution of the primary tissues in the body systems</p>	<ul style="list-style-type: none"> <li>• Lysosomal storage diseases</li> <li>• Lipid peroxidation and free radicals in biological tissues</li> </ul>		

		<ul style="list-style-type: none"> <li>and Chalones</li> <li>• Basic/ Primary Tissues: Epithelial, Connective, Muscular and Neural tissue</li> </ul>				
4.	<b>EPITHELIAL TISSUES I</b>	<ul style="list-style-type: none"> <li>• Surface/ lining epithelium: Simple and stratified-squamous (keratinized and non-keratinised), cuboidal, columnar, pseudostratified transitional,.</li> <li>• Characteristics &amp; types</li> <li>• Basement membrane</li> <li>• Identification of epithelial types</li> </ul>	<ul style="list-style-type: none"> <li>• Cell junction</li> <li>• Junctional complexes</li> <li>• Nutrition of epithelial and connective tissues</li> <li>• Surface modification of cell membranes (Cilia and microvilli)</li> <li>• Cell types: Eg. Goblet cells, APUD cells</li> <li>• Renewal,</li> <li>• Nerve supply</li> </ul>	<ul style="list-style-type: none"> <li>• Ultrastructure</li> <li>• Metaplasia and hyperplasia</li> </ul>	<p>Simple epithelium:</p> <ol style="list-style-type: none"> <li>1. Squamous,</li> <li>2. Cuboidal</li> <li>3. Columnar</li> <li>4. Ciliated columnar</li> </ol> <p>Stratified epithelium:</p> <ol style="list-style-type: none"> <li>5. Squamous-keratinized and non-keratinised</li> <li>6. Cuboidal</li> <li>7. Columnar</li> <li>8. Pseudostratified columnar</li> <li>9. Transitional</li> <li>10. Goblet cells</li> <li>11. Cells with stereocilia</li> </ol>	

5.	<b>EPITHELIAL TISSUE II</b>	<ul style="list-style-type: none"> <li>• Glandular epithelium: mucous, serous, and mixed glands</li> </ul>		<ul style="list-style-type: none"> <li>• Ultrastructure</li> </ul>	Salivary glands: <ol style="list-style-type: none"> <li>1. Serous</li> <li>2. Mucous</li> <li>3. Mixed</li> </ol>	
6.	<b>CONNECTIVE TISSUE I</b>	<ul style="list-style-type: none"> <li>• Components: Matrix/ ground substance, cells and fibres</li> <li>• Loose areolar, elastic, collagenous, reticular</li> <li>• (Cell types &amp; varieties of fibres)</li> <li>• Identification of connective tissue types</li> </ul>	<ul style="list-style-type: none"> <li>• Nutrition of generalised connective tissue</li> </ul>		Tendon: L.S	Loose areolar White fibrous Yellow elastic Collagen and elastic fibres-teased Adipose tissue
7.	<b>CONNECTIVE TISSUE II</b>	<ul style="list-style-type: none"> <li>• Cartilage: Hyaline, Elastic and Fibro</li> <li>• Cell types and distribution</li> </ul>	<ul style="list-style-type: none"> <li>• Nutrition of cartilage</li> </ul>	<ul style="list-style-type: none"> <li>• Chondromas</li> <li>• Chondrosarcomas</li> <li>• Ultra structure</li> </ul>	Cartilage <ol style="list-style-type: none"> <li>1. Hyaline</li> <li>2. Elastic</li> <li>3. Fibro-</li> </ol>	
8.	<b>CONNECTIVE TISSUE III</b>	<ul style="list-style-type: none"> <li>• Bone: compact and cancellous</li> </ul>	<ul style="list-style-type: none"> <li>• Growth: interstitial and appositional</li> </ul>	<ul style="list-style-type: none"> <li>• Osteomalacia, osteoporosis, osteoma and</li> </ul>	Bone <ol style="list-style-type: none"> <li>1. Compact</li> </ol>	

		<ul style="list-style-type: none"> <li>Cell types</li> </ul>	<ul style="list-style-type: none"> <li>Support and protection of bone</li> <li>Plasticity and Ca<sup>++</sup> reserves</li> <li>Nutrition</li> <li>Developing bone</li> <li>Callus formation and fracture repair</li> </ul>	<ul style="list-style-type: none"> <li>osteosarcoma</li> <li>Ultra structure</li> </ul>	2. Spongy	
9.	<b>CONNECTIVE TISSUE IV- LYMPHOID / IMMUNE SYSTEM</b>	<ul style="list-style-type: none"> <li>Distribution:</li> <li>Lymphatic nodule: solitary and aggregate</li> <li>Lymph node</li> <li>Spleen</li> </ul>	<ul style="list-style-type: none"> <li>'Open' &amp; 'Closed' circulation in the spleen</li> </ul>		1.Lymph node 2. Spleen	Lymphatic nodule a. Solitary b. Aggregates
10.	<b>CONNECTIVE TISSUE IV (Contd). LYMPHOID / IMMUNE SYSTEM</b>	<ul style="list-style-type: none"> <li>'T' and 'B' Lymphocytes</li> <li>Thymus</li> <li>Tonsil</li> </ul>	<ul style="list-style-type: none"> <li>Blood- Thymus barrier</li> <li>Tonsillitis</li> </ul>	<ul style="list-style-type: none"> <li>Organ transplantation</li> <li>Graft rejection</li> <li>Autoimmune disease</li> </ul>	1.Thymus 2.Tonsil	
11.	<b>CONNECTIVE TISSUE V BONE MARROW</b>	<ul style="list-style-type: none"> <li>Reticulin framework</li> <li>Developing blood cells</li> <li>Blood sinusoids</li> </ul>	<ul style="list-style-type: none"> <li>Bone marrow transplants</li> </ul>			<ul style="list-style-type: none"> <li>Normal bone marrow, showing typical cell types.</li> </ul>
12.	<b>MUSCLE TISSUE</b>	<ul style="list-style-type: none"> <li>Smooth, skeletal and cardiac muscles</li> <li>Sarcomere-unit of muscular contraction</li> <li>Myofibrils and myofilaments</li> <li>Structure of Actin, Myosin, Tryponin and Tropomyosin</li> <li>Sarcoplasmic reticulum</li> <li>'t' tubules and muscle triads</li> <li>Motor end-plate</li> <li>Myoneural junction</li> </ul>	<ul style="list-style-type: none"> <li>Red, white and intermediate muscle fibres</li> <li>Nutrition</li> </ul>	<ul style="list-style-type: none"> <li>Hyperplasia and hypertrophy</li> <li>Rigor mortis and myasthenia gravis</li> <li>Ultra structure</li> </ul>	1.Smooth Muscle 2. Skeletal muscle 3. Cardiac muscle	1. Intercalated disc 2. Purkinje cells
13.	<b>NERVE TISSUE</b>	<ul style="list-style-type: none"> <li>Structure of neuron and neuroglia</li> <li>Identification of neurons and neuroglia</li> <li>Peripheral nerve</li> <li>Structure of myelin and myelin sheath</li> </ul>	<ul style="list-style-type: none"> <li>Meissner's Pacinnian corpuscles</li> <li>Types and ultrastructure of synapses</li> </ul>	<ul style="list-style-type: none"> <li>Ultrastructure</li> <li>Age changes in neurons</li> </ul>	1.Peripheral nerve 2.Sensory ganglia 3. Motor ganglia	1.Myelin sheath 2. Peripheral nerve endings 3. EM picture of nerve 4. EM picture of Schwann cell

		<ul style="list-style-type: none"> <li>• Nodes of Ranvier</li> <li>• Ganglia: Sensory (DRG); Motor (Systemic)</li> </ul>				
14.	<b>BLOOD VESSELS</b>	<ul style="list-style-type: none"> <li>• Basic structure of blood vessel: tunica intima, media and adventia</li> <li>• Arteries (Large, Medium and Small) and Capillaries</li> <li>• Veins &amp; Sinusoids</li> </ul>	<ul style="list-style-type: none"> <li>• Types of capillaries</li> <li>• Diapedesis</li> <li>• Blood-Brain Barrier</li> <li>• Thermoregulation</li> </ul>	<ul style="list-style-type: none"> <li>• Atherosclerosis</li> <li>• Aneurysms &amp; Infarcts</li> <li>• Disorders of Clotting and Bleeding mechanisms</li> </ul>	Artery: <ol style="list-style-type: none"> <li>1. Large</li> <li>2. Medium</li> </ol> Vein <ol style="list-style-type: none"> <li>1. Large</li> </ol>	<ol style="list-style-type: none"> <li>1. Capillaries</li> <li>2. Sinusoids</li> <li>3. Glomus tissue</li> </ol>
15.	<b>SKIN</b>	<ul style="list-style-type: none"> <li>• Skin types: Hairy and glabrous</li> <li>• Parts: Dermis &amp; Epidermis- layers and cell types</li> <li>• Melanocytes, Langerhan cells, Merkel cells</li> <li>• Cutaneous receptors</li> <li>• Appendages of the skin (hair follicles, sebaceous and sweat glands, nails)</li> </ul>	<ul style="list-style-type: none"> <li>• Renewal of the epidermis</li> <li>• Keratinisation</li> </ul>	<ul style="list-style-type: none"> <li>• Psoriasis</li> <li>• Vitiligo</li> <li>• Albinism</li> <li>• Malignant melanoma</li> <li>• Acne</li> <li>• Lichen planus</li> </ul>	Skin: <ul style="list-style-type: none"> <li>• Glabrous (Thick)</li> <li>• Hairy (Thin)</li> </ul>	Nerve endings Nail Hair