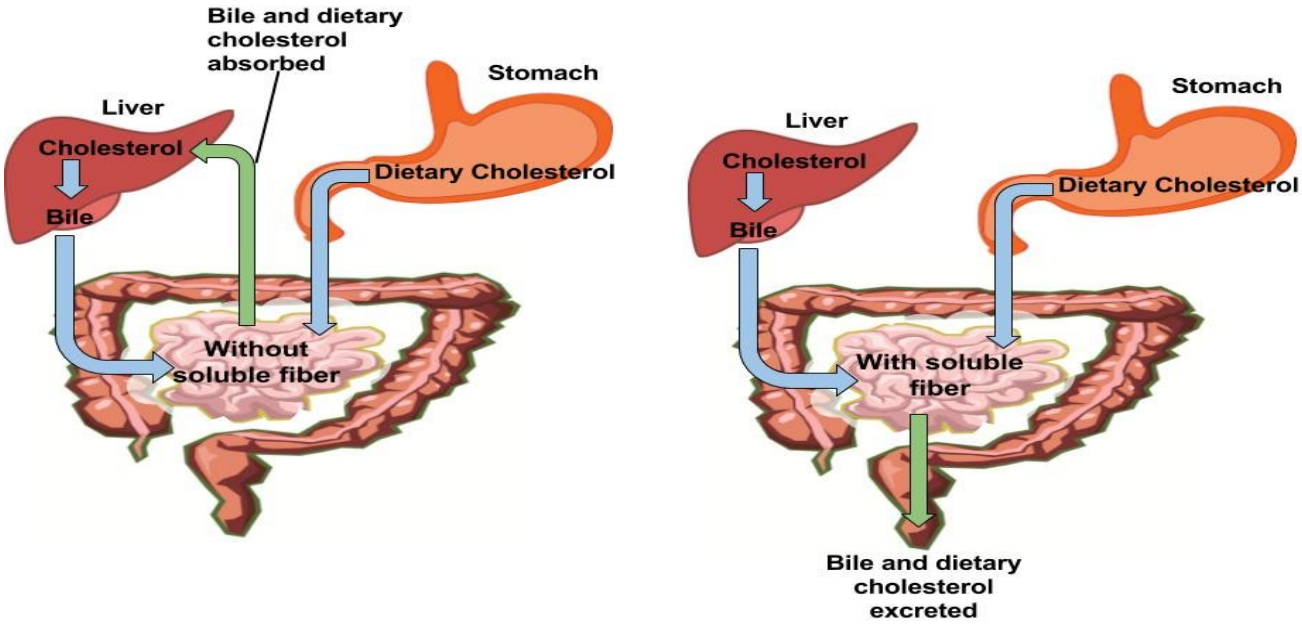
Faisalabad Medical University

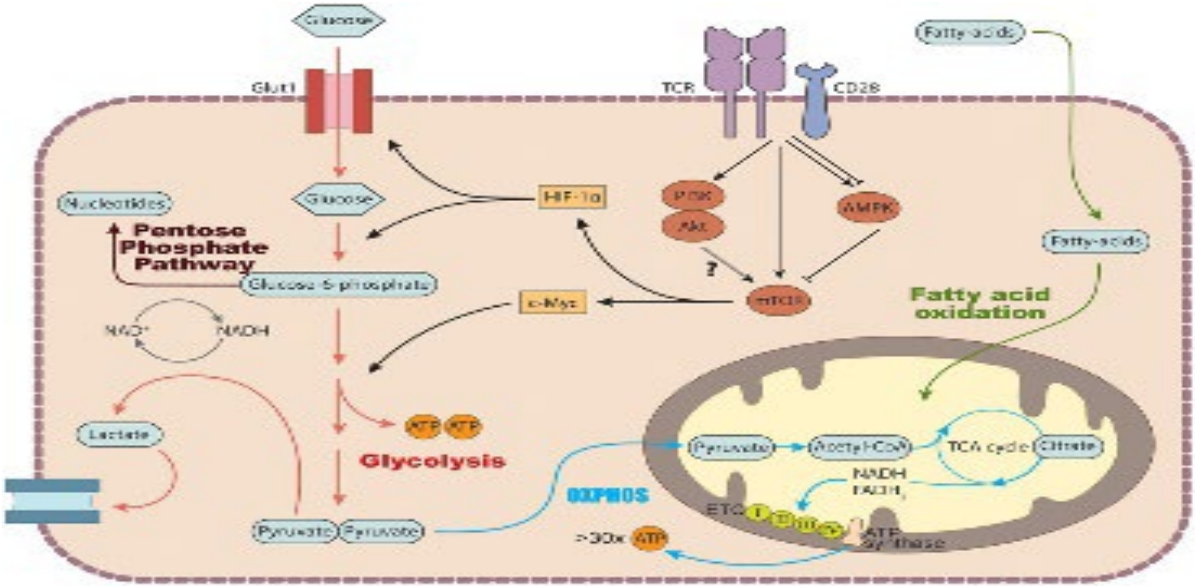
BLOCK E

2nd Year MBBS

Contents

GIT, HEPATOBILIARY AND METABOLISM I





Module Committee

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List of Themes		
Sr. No	**Themes**	**Duration**
1.	Painful Swallowing	01 Week
2.	Abdominal Pain	02 Week
3.	Jaundice	01 Week
4.	Diarrhea and Constipation	01 Week
5.	Bleeding Per Rectum	01 Week
6.	Hyperglycemia- (Carbohydrate metabolism)	01 Week
7.	Obesity (Lipid Metabolism)	04 Days
8.	Wasting (Protein Metabolism)	08 Days

General learning outcomes

At the end of this 6 weeks module, the 2nd year students will be able to:

1) Describe the anatomy of oral cavity with respect to GI functions
2) Elaborate the structure and functions of salivary glands
3) Describe the structure and development of esophagus, stomach, small intestine and large intestine
4) Describe the anatomy of peritoneum and mesentery
5) Explain the movements, functions and regulations of gastrointestinal functions
6) Describe the structure, development and functions of hepatobiliary system and pancreas
7) Discuss the mechanisms of digestion and absorptions of carbohydrates, proteins, fats and other nutrients
8) Describe different physiological reflexes occurring upon stimulation of gastrointestinal organs
9) Discuss the chemistry and functions of gastrointestinal hormones
10) Describe common pathological conditions like peptic ulcers, viral hepatitis, obstructive jaundice, carcinoma of esophagus and colorectal cancers
11) Explain the metabolic processes related to carbohydrates, fats and protein metabolism
12) Describe the components of medical ethics
13) Explain research ethics, research misconduct and plagiarism
14) Explain the psychosocial aspects of common psychiatric and functional bowel disorders

Sr. No	subject	Topic	Learning objectives	Teaching strategies	Duration	Assessment
Theme 1: Painful Swallowing						
	Anatomy	Oral cavity	▪ Identify the structure forming the boundaries of the oral cavity. ▪ Name the structure forming the boundaries of the vestibule. ▪ Describe the muscles of the tongue. ▪ Describe vascular, lymphatic drainage & nerve supply of the oral cavity and tongue. ▪ Describe the movement of the tongue.	Skill lab	2 hours	MCQS /OSPE
	Anatomy	Mandible	▪ Describe various parts of the mandible. ▪ Describe the attachment of the mandible	Skill Lab	2 hours	MCQS/OSPE
			▪ Describe age changes in the mandible.			
	Anatomy	Muscles of mastication & Mandibular nerve	▪ Describe the attachment, action & nerve supply of muscles of mastication. ▪ Describe the course & branches of the mandibular nerve.	SGD	2 hours	MCQS
	Anatomy	TMJ	▪ Enlist structures forming the joint.	Lecture	1hour	MCQS

			▪ Describe its stabilizing factors, vascular, nerve supply, and actions. ▪ Enlist clinical conditions related to it			
	Anatomy	Salivary glands	▪ Enlist major salivary glands. ▪ Describe the anatomy of salivary glands. ▪ Describe their relations & nerve supply. ▪ Enlist clinical conditions related to them	Lecture	1hour	MCQS
	Anatomy	Esophagus	▪ Describe the extent, course, relations, and gross structure of the esophagus.	Skill lab	2hours	MCQS/ OSPE
	Histology	Tongue	▪ Explain the histological structure of tongue. ▪ Describe structure of various types of papillae ▪ Describe structure of taste bud ▪ Describe histological differences between anterior 2/3rd & posterior 1/3	Lecture	1hour	MCQS
	Histology	Salivary glands	▪ Describe histological differences of major salivary glands.	Lecture	1hour	MCQS
	Histology	Esophagus	▪ Describe the histological differences of all three parts of the esophagus	Lecture	1hour	MCQS

	Embryology	Body cavity	▪ Describe the development of body cavities. ▪ Elaborate the development of diaphragm & its anomalies.	Lecture	1hour	MCQS
	Embryology	Tongue	▪ Describe the development of tongue according to its nerve supply. ▪ Enlist clinical conditions related to it	Lecture	1hour	MCQS
	Embryology	Introduction of GIT & Salivary glands	▪ Describe the formation of gut tube & its divisions. ▪ Describe the development of salivary glands.	Lecture	1hour	MCQS
	Embryology	Esophagus	▪ Describe the development of the esophagus. ▪ Describe the anomalies, especially TEF.	Lecture	1hour	MCQS
	Physiology	General principles of gastrointestinal motility	▪ Describe the electrical activity of gastrointestinal smooth muscle. ▪ Describe the mechanism of excitation of smooth muscle of gastrointestinal. ▪ Differentiate between slow wave and spike potential	Lecture	1hour	MCQS
	Physiology	Neural control of GIT function (Enteric Nervous system)	▪ Differentiate between mesenteric and submucosal plexus. ▪ Classify the following enteric nervous system neurotransmitters as excitatory or inhibitory:	Lecture	1hour	MCQS

			norepinephrine, acetylcholine, CCK, VIP, histamine, and somatostatin. ▪ Describe the role of autonomic nervous system in regulation of GIT's function. ▪ Differentiate between sympathetic and parasympathetic modulation of the enteric nervous system and the effector organs of the GI tract. ▪ Describe three types of gastrointestinal reflexes			
	Physiology	Hormonal control of Gastrointestinal motility	▪ Describe gastrointestinal hormone actions, stimuli for secretion, and site of secretion.	Lecture	1hour	MCQS
	Physiology	Functional types of movements in the gastrointestinal tract Gastrointestinal blood flow— Splanchnic circulation	▪ Describe the functional types of movements in the gastrointestinal tract. ▪ Describe law of the gut. ▪ Describe blood flow through the villus and its significance. ▪ Describe the anatomy of the gastrointestinal blood supply. ▪ Describe the effect of gut activity and metabolic factors on gastrointestinal blood flow.	Lecture	1hour	MCQS

			▪ Describe nervous control of gastrointestinal blood flow			
	Physiology	Ingestion of food	▪ Describe the mechanics of ingestion of food. ▪ Describe chewing and mastication. ▪ Describe different stages of swallowing. ▪ Describe the effects of the pharyngeal stage of swallowing on respiration	Lecture	1hour	MCQS
	Physiology	General principles of alimentary tract secretion	▪ Describe the basic mechanisms of stimulation of the alimentary tract glands. ▪ Describe the dual effect of sympathetic stimulation on alimentary tract glandular secretion	Lecture	1hour	MCQS
	Physiology	Role of mucus and saliva	▪ Describe the secretion of saliva and its nervous regulation. ▪ Describe the plasma and saliva concentrations of Na+, Cl-, and HCO3- at low secretion rates and at high secretion rates and the principal cell types involved in each secretion rate. ▪ State the substrates and digestion products of	Lecture	1hour	MCQS

			salivary amylase (ptyalin). ▪ Identify the stimuli and cell types involved in GI secretion of mucous and identify the function of salivary mucus. ▪ Describe three types of stimuli that increase salivary secretion. ▪ State the components of the saliva important in oral hygiene, and identify the role of salivary secretions in eliminating heavy metals			
	Physiology	Disorders of swallowing and esophagus	▪ Describe the clinical abnormalities of the swallowing mechanism. ▪ Describe Achalasia and Megaesophagus	Lecture	1hour	MCQS
	Biochemistry	saliva	▪ Explain the formation and chemical composition of saliva. ▪ Enumerate the organic and inorganic constituents in saliva. ▪ Describe the characteristics of salivary secretion. ▪ Describe the function of saliva.	Lecture	1hour	MCQS
	Biochemistry	Digestion and absorption	▪ Discuss digestion and absorption of	SGD (1)	2hours	MCQS

			carbohydrates, fats, and protein			
	ENT	Oral ulceration	▪ Enlist the causes of oral ulcerations. ▪ Describe Aphthous ulcer and its treatment. ▪ Describe the clinical features and drugs used to treat esophageal candidiasis.	Lecture	1hour	MCQS
Skills and affective domains						
	Anatomy	Tongue	▪ Able to identify under a microscope according to identification point. ▪ Able to make histological diagram	Skill lab	2hours	MCQS/ OSPE
	Anatomy	Salivary glands	▪ Able to identify under a microscope according to identification point. ▪ Abel to make the histological diagram	Skill lab	2hours	MCQS/ OSPE
	Anatomy	Esophagus	▪ Able to identify under microscope according to identification point. ▪ Abel to make a histological diagram	Skill lab	2hours	MCQS/ OSPE
	Biochemistry	Total bilirubin	▪ Able to estimate the concentration of total bilirubin	Skill lab	2hours	OSPE
Theme 2: Pain Epigastrium						
	Anatomy	Anterior abdominal wall	▪ Describe various abdominal planes& quadrants. ▪ Describe various skin incisions	Skill lab	2hours	MCQS

			▪ Describe superficial facia and its contents. ▪ Describe the clinical importance of the umbilicus. ▪ Describe attachment, action, nerve supply & various modifications of muscles of the anterior abdominal wall ▪ Describe the formation of rectus sheaths at various levels ▪ Enlist contents and applied aspects of rectus sheaths.			
	Anatomy	Inguinal canal	▪ Describe superficial and deep inguinal rings. ▪ Describe the boundaries of the inguinal canal. ▪ Enlist the contents of the inguinal canal in males and females. ▪ Differentiate between direct and indirect inguinal hernia	SGD	2hours	MCQS
	Anatomy	Peritoneum 1	▪ Describe the various layers of the peritoneum and its contents. ▪ Describe vertical & horizontal tracing of the peritoneum. ▪ Enlist its nerves and blood supply.	Skill lab	2hours	MCQS/ OSPE
	Anatomy	Peritoneum 2	▪ Describe greater and lesser momentum. ▪ Describe the anatomy of the lesser sac. ▪ Describe the boundaries of epiploic foramen.	Skill lab	2hours	MCQS/OSPE

			▪ Describe the various peritoneal pouches, recesses, and ligaments.			
	Anatomy	Stomach	▪ Describe the gross structure of the stomach with the help of a model. ▪ Describe the blood supply and lymphatic drainage of the stomach. ▪ Describe the anatomy of the stomach bed & its applied aspects.	Lecture	1hour	MCQS
	Anatomy	Duodenum	▪ Describe the relations of various parts of the duodenum with the help of the model. ▪ Enlist nerve, blood supply & applied aspects.	Lecture	1hour	MCQS
	Anatomy	Pancreas	▪ Enlist parts of the pancreas. ▪ Describe the relations of its various parts. ▪ Describe its ductal system & applied aspects.	Lecture	1hour	MCQS
	Histology	Stomach	▪ Discuss the histological structure of three parts of the stomach. ▪ Describe the structure and cells of gastric glands.	Lecture	1hour	MCQS
	Histology	Duodenum	▪ Describe the histology of duodenum. ▪ Describe the duodenal glands.	Lecture	1hour	MCQS
	Histology	Pancreas	▪ Describe the histological structure of the pancreas. ▪ Describe the ductal system of the pancreas.	Lecture	1hour	MCQS
	Embryology	Development of for gut I	▪ Describe esophagus.	Lecture	1hour	MCQS

		Development of for gut II	▪ Describe the development of the stomach and its rotation.	Lecture	1hour	MCQS
		Development of for gut III	▪ Describe the development duodenum & hepatobiliary apparatus.	Lecture	1hour	MCQS
		Development of for gut IV	▪ Describe the development of the pancreas along with its congenital anomalies. ▪ Describe the development of the spleen.	Lecture	1hour	MCQS
	physiology	Motor function of Stomach	▪ Enlist various anomalies of the pancreas. ▪ Describe the motor function of the stomach. ▪ Describe the basic electrical rhythm of the stomach wall. ▪ Describe the Pyloric pump. ▪ Describe the role of the pylorus in controlling stomach emptying. ▪ Describe the regulation of gastric emptying	Lecture	1hour	MCQS
	physiology	Gastric secretion	▪ Describe characteristics of the gastric secretions ▪ Describe the mechanism of secretion of different gastric glands. ▪ Describe the phases and regulation of gastric secretion. ▪ Enlist the hormones that inhibit and increase gastric secretions. ▪ Enumerate the reflexes that inhibit	Lecture	1hour	MCQS

			and increase gastric secretions			
	Biochemistry	Gastric juice	▪ Explain the chemical composition of gastric secretions. ▪ Describe the mechanism of synthesis and secretion of HCl from gastric mucosa. ▪ Explain the role of intrinsic factor.	Lecture	1hour	MCQS
	Biochemistry	Gastric disorders	▪ Explain different gastric disorders like achlorhydria, gastritis, peptic ulcer, stomach cancer, and Zollinger-Ellison Syndrome	Lecture	1hour	MCQS
	Biochemistry	Gastrointestinal hormones I	▪ Discuss GIT hormones like gastrin, CCK, GIP, VIP, motiline, enkephalins, substance P, neurotensin and enteroglucagone.	SGD	2hours	MCQS
	Pathology	Upper Gastrointestinal Pathology	• Describe Etiopathology of esophagitis • Describe Esophageal Obstruction and Achalasia • Briefly discuss the pathogenesis of acute and chronic Gastritis • Briefly discuss Complications of gastritis • Briefly discuss Peptic Ulcer Disease	Lecture	1hour	MCQS
	Pharmacology	Drugs used in Peptic ulcer	▪ Classify the drugs used in peptic ulcer disease. ▪ Describe the mechanism of	Lecture	1hour	MCQS

			action of drugs used in Peptic ulcer			
	Medicine	GERD and Peptic ulcer	▪ Enumerate the symptoms of GI diseases ▪ Discuss the approach to a patient with epigastric pain ▪ Enumerate the list of medical causes of pain epigastrium Describe the etiology, clinical features, complications and drug treatment of GERD and peptic ulcer disease	Interactive lecture	1hour	MCQS
	Surgery	Peptic ulcer	▪ Describe the complications of long-term peptic ulcer disease and its surgical management.	Lecture	1hour	MCQS
	Surgery	Lump in the abdomen	▪ Describe common causes of lump in abdomen and enlist the common surgical procedures for treatment of hernia.	Lecture	1hour	MCQS
	Surgery	Acute pancreatitis	▪ Describe the etiology, clinical features, complications, and management of acute pancreatitis	Lecture	1hour	MCQS

Skill and affective domain						
	Histology	Stomach	▪ Able to identify under a microscope according to identification point.	Skill lab	2hours	MCQS/ OSPE

			▪ Able to make histological diagram.			
	Histology	Duodenum	▪ Able to identify under a microscope according to identification point. ▪ Able to make a histological diagram.	Skill lab	2hours	MCQ S/ OSPE
	Histology	Pancreas	▪ Able to identify under a microscope according to identification point. ▪ Able to make histological diagram.	Skill lab	2hours	MCQ S/ OSPE
	Biochemistry	serum direct/ indirect bilirubin	▪ Able to estimate direct & indirect serum bilirubin.	Skill lab	2hours	OSPE
Theme 3 Jaundice						
	Anatomy	Liver	▪ Describe the lobes of the liver with the help of a model. ▪ Discuss relations of various lobes of the liver ▪ Enlist impressions on various lobes & segments of the liver. ▪ Discuss blood supply and ligaments of the liver. ▪ Discuss boundaries & clinical significance of hepatorenal pouch	Skill lab	2hours	MCQ S/ OSPE
	Anatomy	Extrahepatic biliary apparatus	▪ Describe the gross anatomy of the gall bladder.	Skill lab	2hours	MCQ S/ OSPE

			▪ Describe Calot's triangle. ▪ Describe the gross anatomy of the extrahepatic biliary tree. ▪ Discuss the relations of the bile duct.			
	Anatomy	Spleen	▪ Describe the gross anatomy of the spleen and the blood supply of the spleen. ▪ Describe relations with the help of a model.	Skill lab	2hours	MCQ S/ OSPE
	Anatomy	Hepatic portal venous system	▪ Describe the formation and tributaries/branches of the hepatic portal venous System. ▪ Discuss the relations of the portal vein. ▪ Explain the clinical significance of the hepatic portal system	SGD	2hours	MCQ S
	Embryology	Development of distal foregut	▪ Describe the development of the liver. ▪ Describe the development of the gall bladder and biliary tree. ▪ Describe the developmental anomalies of the liver and biliary tree	Lecture	1hour	MCQ S
	Histology	Liver	▪ Discuss the histological features of the liver. ▪ Describe the structure of different types of hepatic lobules and their significance. ▪ Describe the stroma &	Lecture	1hour	MCQ S

			parenchyma of the liver. ▪ Describe the structures of portal triade.			
	Physiology	Pancreatic secretion	▪ Describe the role of pancreatic secretions in digestion. ▪ Describe the phases and regulation of pancreatic secretion	Interactive Lecture	1 hour	MCQS
	Physiology	Physiology of liver	▪ Describe the Physiological Anatomy of the Liver ▪ Describe blood flow through the liver. ▪ Describe the metabolic functions of the liver. ▪ Describe Regulation of Liver Mass—Regeneration ▪ Describe Bilirubin formation and excretion	Interactive Lecture	1 hour	MCQS
	Physiology	Secretion of bile by liver	▪ Describe the mechanism of secretion of bile by the liver. ▪ Describe the function of bile salts in fat digestion and absorption. ▪ Describe the functions of the biliary tree in digestion	Interactive Lecture	1 hour	MCQS
	Biochemistry	Bile	▪ Describe the composition, secretion, and regulation of bile	Lecture	1hour	MCQS
	Biochemistry	Bile disorders	▪ Explain cholecystitis and cholelithiasis.	Lecture	1hour	MCQS
	Pathology	Etiopathology of viral Hepatitis	▪ Enlist various types of viral hepatitis ▪ Briefly describe the pathogenesis of	Interactive Lecture	1 hour	MCQS

			different types of viral hepatitis ▪ Briefly discuss morphological changes in viral hepatitis ▪ Briefly discuss temporal changes in viral markers of Hepatitis A, B and C			
	Pharmacology	First pass hepatic metabolism of drugs	▪ Describe the mechanism of drug detoxification and metabolism in the liver	Lecture	1hour	MCQS
	Pharmacology	Biotransformation	▪ Enlist the drugs that act as inducers and inhibitors of metabolism	Lecture	1hour	MCQS
	Forensic Medicine	Hepatotoxic poisons	▪ Enlist the poisons which cause hepatotoxicity. ▪ Diagnose poisoning through routine toxicological sampling	Lecture	1hour	MCQS
	Community Medicine	Hepatitis B and C virus infection	• Describe the epidemiology of hepatitis B and C virus infection • Discuss the control measures of hepatitis B and C virus infection	Lecture	1hour	MCQS
	Medicine	Approach to a patient of acute and chronic liver disease	▪ Describe the etiology, clinical features, complications and treatment options of liver cirrhosis ▪ Describe the etiology, clinical features, complications and treatment	Lecture	1hour	MCQS

			options of acute liver failure ▪ Discuss viral hepatitis A, B, C, D, E			
	Surgery	Obstructive jaundice	▪ Describe the etiology, clinical features, biochemical investigations, and treatment options of obstructive jaundice	Lecture	1hour	MCQ S
Skills and affective domain						
	Histology	Liver	▪ Able to identify under a microscope according to identification point. ▪ Able to make histological diagram.	Skill lab	2hours	MCQs / OSPE
	Biochemistry	Serum SGOT	▪ Able to estimate serum SGOT	Skill lab	2hours	OSPE
Theme 4: Diarrhea and Constipation						
	Anatomy	Jejunum and ileum	▪ Describe the gross features of jejunum and ileum. ▪ Tabulate differences in gross features and blood supply of jejunum and ileum ▪ Describe the mesentery of the small intestine	Skill lab	2hours	MCQ S/ OSPE
	Anatomy	Appendix	▪ Describe the gross features, blood supply, and mesentery of the appendix. ▪ Describe the clinical correlates of the appendix	SGD	2hour	MCQ S
	Anatomy	Abdominal aorta I	▪ Enumerate the branches of the abdominal aorta.	Skill lab	2hour	MCQ S/ OSPE

			▪ Describe the course and distribution of celiac trunk.			
	Anatomy	Abdominal aorta II	▪ Describe the course and distribution of the superior mesenteric artery.	Skill lab	2hours	MCQS/ OSPE
	Anatomy	Inferior vena cava & Lymphatic drainage of head and neck	▪ Describe the origin, course, tributaries, and relations of inferior vena cava. ▪ Describe the origin, course, and relations of Cisterna chili. ▪ Describe the lymphatic drainage of abdominal organs	Lecture	1hour	MCQS
	Embryology	Development of midgut I	▪ Describe the formation and rotation of the midgut loop. ▪ Describe the physiological herniation of the midgut loop. ▪ Enlist the derivatives of midgut.	Lecture	1hour	MCQS
	Embryology	Development of midgut III	▪ Describe the development of mesenteries. ▪ Describe the various anomalies of midgut development	Lecture	1hour	MCQS
	Histology	Jejunum and ileum	▪ Discuss histological features of jejunum and describe plica circulares. ▪ Discuss histological features of ileum and describe Payers patches. ▪ Discuss the various structural specializations meant for increasing the	Lecture	1hour	MCQS

			surface area of small intestine (plica circulares, crypts of Lieberkühn, villi and microvilli)			
	Histology	Appendix	▪ Discuss histological features of the appendix.	Lecture	1hour	MCQ S
	Physiology	Movements of the small intestine Secretion of small intestine	▪ Describe different types of movements of the small intestine. ▪ Describe the control of peristalsis by nervous and hormonal signals. ▪ Describe the secretion of mucus by Brunner's glands in the duodenum.	Lecture	1hour	MCQ S
	Physiology	Pancreatic enzymes Intestinal digestive enzymes Gastrointestinal hormones	▪ Describe the chemistry, secretion, functions, and regulation of pancreatic enzymes. ▪ Describe the chemistry, secretion, functions, and regulation of small intestinal digestive enzymes. ▪ Describe the secretion of intestinal digestive juices by the crypts of Lieberkühn. ▪ Describe the secretion, structure, functions and regulation of Gastrin, Secretin, Cholecystokinin, and other GI hormones	Lecture	1 hour	MCQ S

	Physiology	Disorders of the small intestine	▪ Describe malabsorption by the small intestinal mucosa in Sprue.	Lecture	1hour	MCQS
	Biochemistry	Pancreatic secretions	▪ Describe the composition of pancreatic juice. ▪ Enumerate enzymes in pancreatic juice. ▪ Describe the mechanism of secretion and action of pancreatic enzymes.	Lecture	1hour	MCQS
	Biochemistry	GIT disorders	▪ Describe different disorders like cystic fibrosis and celiac disease	Lecture	1 hour	MCQS
	Community Medicine	Foodborne infection	• Define food borne infection • Classify food borne infection • Describe the epidemiology of food borne infections • Discuss the control measure of foodborne diseases	Lecture	1hour	MCQS
	Pediatrics	Acute gastroenteritis	▪ Describe the etiology, clinical features, complications, and treatment of acute gastroenteritis.	Lecture	1 hour	MCQS
Skills and affective domains						
	Histology	Jejunum and ileum	▪ Able to identify under a microscope according to identification point. ▪ Able to make histological diagram.	Skill lab	2 hours	MCQS/ OSPE
	Histology	Appendix	▪ Abel to identify under microscope according to identification point.	Skill lab	2 hours	MCQS/ OSPE

			▪ Abel to make a histological diagram.			
	Biochemistry	Serum SGPT	▪ Able to estimate serum SGPT.	Skill lab	2 hours	OSPE

Theme 5: Bleeding Per Rectum

	Anatomy	Large intestine	▪ Describe the gross features of the cecum, ascending, transverse and descending, and sigmoid colon. ▪ Describe the mesentery of large intestine.	Skill lab	2 hours	MCQS/ OSPE
	Anatomy	Rectum	▪ Describe the gross structure of the rectum. ▪ Discuss relations of rectum ▪ Discuss its blood supply & nerve supply.	Skill lab	2 hours	MCQS/ OSPE
	Anatomy	Anal canal	▪ Describe the gross anatomy of the anal canal. ▪ Describe the blood supply & nerve supply of the anal canal and its clinical correlates.	Skill lab	2 hours	MCQS/ OSPE
	Anatomy	Ischiorectal fossa	▪ Describe the boundaries and contents of the Ischiorectal (anal) fossa ▪ Describe different spaces present in it. ▪ Discuss its clinical conditions	SGD	2 hours	MCQS
	Embryology	Development of hindgut	▪ Describe the partitioning of the cloaca. ▪ Enlist derivatives of hindgut ▪ Enlist the developmental anomalies of hindgut.	Lecture	1hour	MCQS
	Histology	Colon	▪ Discuss the histological features of colon. ▪ Describe the characteristic features of intestinal glands.	Lecture	1hour	MCQS
	Physiology	Movements of the Colon Secretion of Large Intestine	▪ Describe different types of movements of colon. ▪ Describe gastro-colic reflex and duodeno-colic reflexes. ▪ Describe the mechanism of defecation reflex.	Lecture	1hour	MCQS

			▪ Describe secretion of mucus by the large intestine			
	Physiology	Disorders of Large intestine	▪ Describe constipation and megacolon. ▪ Explain the mechanism of diarrhea and its causes. ▪ Explain paralysis of defection in spinal cord injuries	Lecture	1hour	MCQS
	Physiology	General Disorders of the gastrointestinal tract	▪ Describe the mechanisms of Vomiting and Nausea ▪ Describe Vomiting Act ▪ Describe Gastrointestinal Obstruction ▪ Describe gases in the gastrointestinal tract (flatus)	Lecture	1hour	MCQS
	Biochemistry	Intestinal juices.	▪ Describe the composition of intestinal juice	Lecture	1hour	MCQS
	Surgery	Colorectal malignancies	▪ Describe the etiology, clinical features, investigations, and management of colorectal cancers	Lecture	1hour	MCQS

Skills and affective domain

	Histology	Colon	▪ Able to identify under a microscope according to identification point. ▪ Able to make histological diagram.	Skill lab	2 hours	MCQS/ OSPE
	Biochemistry	Serum Glucose	▪ Able to estimate serum glucose concentration.	Skill lab	2 hours	OSPE

Theme-6: Glucose control (Carbohydrate metabolism)

	Biochemistry	Bioenergetics	▪ Explain endergonic and exergonic reactions. ▪ Explain high-energy compounds as carriers of energy.	Lecture	1hour	MCQS
	Biochemistry	Redox potential	▪ Explain free energy changes in terms of redox potential. ▪ Describe types of oxidoreductases ▪ Describe the role of oxidoreductases	Lecture	1hour	MCQS
	Biochemistry	Oxidative phosphorylation	▪ Explain the components of the electron transport chain. ▪ Describe the generation of proton gradient &motive	Lecture	1hour	MCQS

			force across the inner mitochondrial membrane. ▪ Explain the mechanism of ATP generation through ATP synthase.			
	Biochemistry	Oxidative phosphorylation II	▪ Discuss chemiosmotic theory & role of reducing equivalents in different pathways	SGD	2 hours	MCQS
	Biochemistry	Oxidative phosphorylation III	▪ Describe oxidative phosphorylation with chemiosmotic theory. ▪ Explain poisons to block the respiratory chain. ▪ Explain uncouplers & their action with the electron transport chain	Lecture	1 hour	MCQS
	Biochemistry	Shuttles	▪ Describe inner mitochondrial membrane transporters. ▪ Explain different shuttles for oxidation of reducing equivalents.	SGD	2hours	MCQS
	Biochemistry	Glycolysis	▪ Define glycolysis. ▪ Describe various GLUT transporters. ▪ Describe glucose phosphorylation & its fate in cells	Lecture	1hour	MCQS
	Biochemistry	Glycolysis II	▪ Describe aerobic and anaerobic reactions. Explain the significance of these reactions.	Lecture	1hour	MCQS
	Biochemistry	Glycolytic pathway regulation	▪ Explain allosteric regulation. ▪ Explain hormonal regulation. ▪ Explain covalent modification regulation.	Lecture	1hour	MCQS
	Biochemistry	Energetics of glycolysis	▪ Describe the energy yield of aerobic and anaerobic glycolysis. ▪ Describe substrate-level phosphorylation. ▪ Describe clinical disorders of glycolysis.	Lecture	1hour	MCQS
	Biochemistry	Oxidation of pyruvate.	▪ Describe the fate of pyruvate. ▪ Explain the pyruvate dehydrogenase complex & its genetic deficiency. ▪ Describe the regulation of PDH complex.	SGD	2hours	MCQS
	Biochemistry	TCA cycle	▪ Describe the reactions & regulation of TCA cycle.	Lecture	1hour	MCQS
	Biochemistry	Tricarboxylic acid cycle II	▪ Describe the energetics of the TCA cycle.	Lecture	1hour	MCQS

			▪ Explain the vitamins that play in the TCA cycle. ▪ Describe the amphibolic nature of the TCA cycle.			
	Biochemistry	Amphibolic pathway	▪ Discuss the anaplerotic reactions & its role in different pathways	SGD	2hours	MCQS
	Biochemistry	Gluconeogenesis I	▪ Describe the importance of gluconeogenic precursors. ▪ Describe the organ and sub-cellular location for the reactions. ▪ Describe gluconeogenic reactions.	Lecture	1hour	MCQS
	Biochemistry	Gluconeogenesis II	▪ Describe the key regulatory enzymes in gluconeogenesis& their regulation.	Lecture	1hour	MCQS
	Biochemistry	Blood glucose level regulation	▪ Discuss the glucose-alanine cycle, Cori cycle & significance of gluconeogenesis.	SGD	2hours	MCQS
	Biochemistry	Hexose Monophosphate shunt I.	▪ Explain reactions of oxidative &non-oxidative phase.	Lecture	1hour	MCQS
	Biochemistry	Hexose Monophosphate shunt II	▪ Describe the importance of HMP shunt (NADPH, G-6-P dehydrogenase deficiency) ▪ Explain its regulation.	Lecture	1hour	MCQS
	Biochemistry	glycogenesis	▪ Describe glycogenesis. ▪ Explain the importance of UDP glucose.	Lecture	1hour	MCQS
	Biochemistry	glycogenolysis	▪ Explain glycogenolysis. ▪ Describe the difference between muscle and liver glycogen.	Lecture	1hour	MCQS
	Biochemistry	Glycogen metabolism regulation	▪ Explain glycogen metabolism regulation & glycogen storage diseases.	Lecture	1hour	MCQS
	Biochemistry	Uronic acid pathway	▪ Describe the uronic acid pathway & its biological significance.	Lecture	1hour	MCQS
	Biochemistry	Metabolism of fructose and galactose	▪ Discuss fructose and galactose metabolism & their metabolic disorders	SGD	2hours	MCQS

Skill and affective domain

	Biochemistry	Glucose tolerance test	Able to analyze blood glucose regulation.	Skill lab	2hours	MCQS

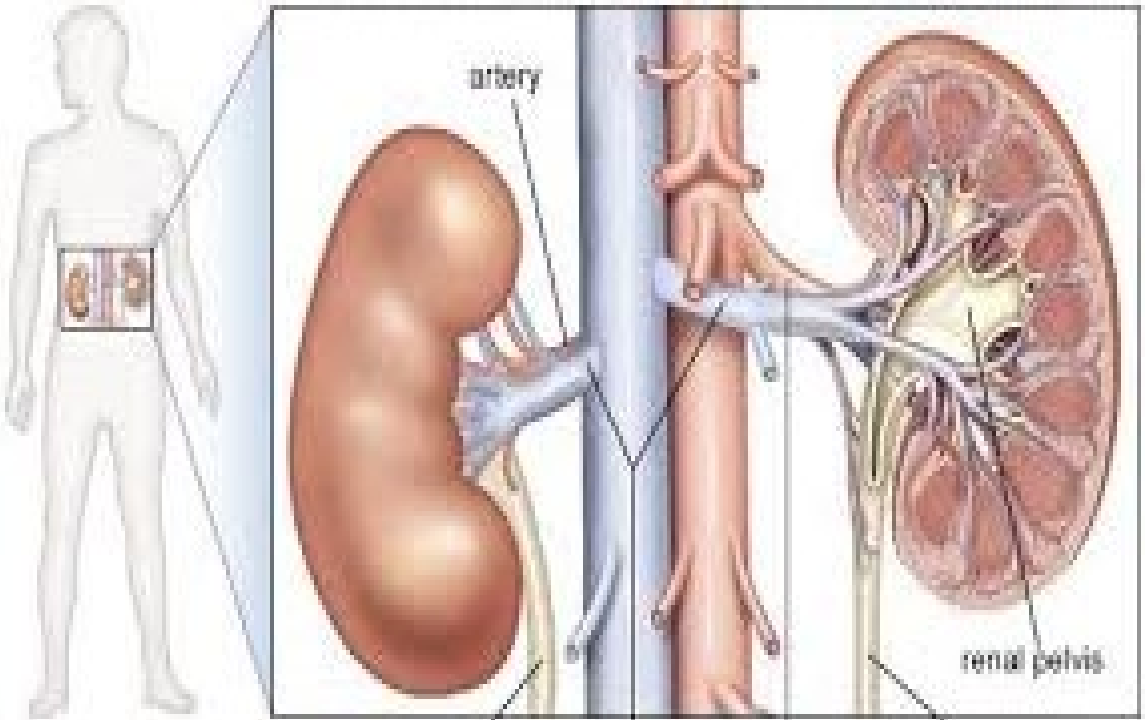
Theme 7: Obesity (Fat metabolism)

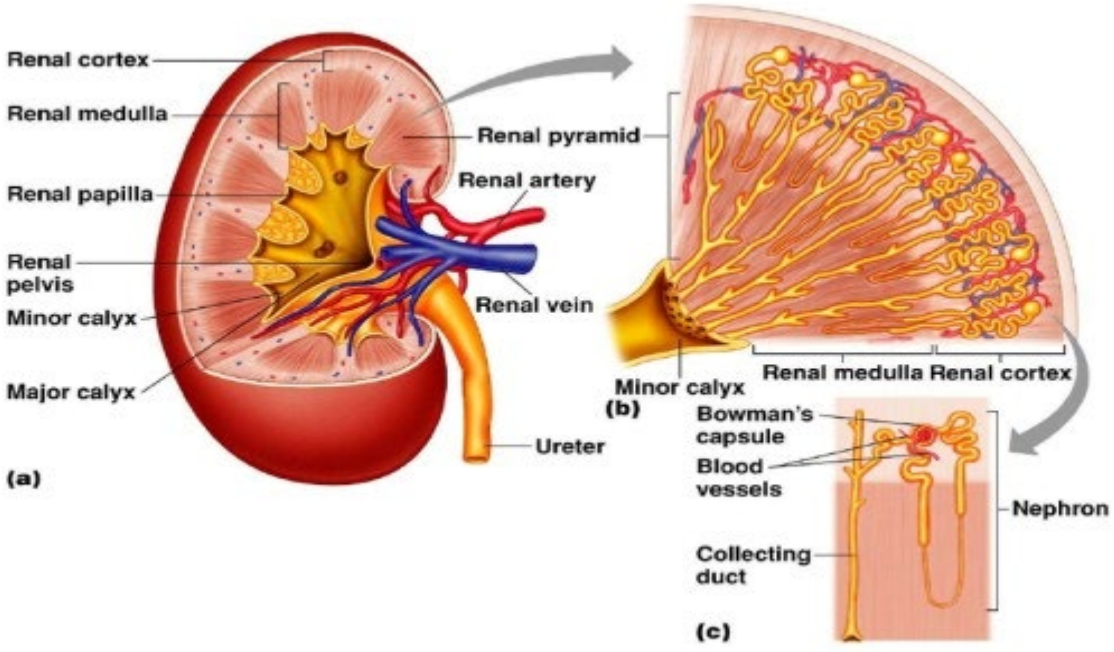
	Biochemistry	Fatty acid (FA) synthesis (*De Novo*)	▪ Enumerate the organs where fatty acid synthesis occurs with sub-cellular sites. ▪ Explain sources of acetyl CO A used in fatty acid synthesis. ▪ Describe fatty acid synthase complex with its structure & function.	Lecture	1hour	MCQS
	Biochemistry	Fatty acid synthesis I (denovo)	▪ Describe the steps of fatty acid synthesis with enzymes.	Lecture	1hour	MCQS
	Biochemistry	Fatty acid synthesis II (de-novo)	▪ Describe the regulation of de-novo synthesis of fatty acid. ▪ Explain elongation & desaturation of fatty acid & its regulation.	Lecture	1hour	MCQS
	Biochemistry	Triacylglycerol synthesis.	▪ Explain the synthesis & storage of triacylglycerol.	Lecture	1hour	MCQS
	Biochemistry	Mobilization of triacylglycerol	▪ Discuss the mobilization of triacylglycerol & its regulation.	Lecture	1hour	MCQS
	Biochemistry	Fatty acid oxidation I	▪ Explain activation & its translocation of fatty acid into the mitochondrial matrix. ▪ Explain the steps of β-oxidation of saturated & unsaturated fatty acid.	Lecture	1hour	MCQS
	Biochemistry	Fatty acid oxidation II	▪ Explain the regulation of β-oxidation. ▪ Describe the energetics of fatty acid oxidation.	Lecture	1hour	MCQS
	Biochemistry	types of fatty acid oxidation.	▪ Discuss other types of fatty acid oxidation (α-oxidation, omega oxidation, oxidation of odd carbon fatty acids.	SGD	2hours	MCQS
	Biochemistry	ketogenesis	▪ Explain the steps in ketogenesis.	Lecture	1hour	MCQS
	Medicine	Hyperlipidemia	▪ Describe the epidemiology, preventive strategies, and diseases associated with hyperlipidemia.	Lecture	1hour	MCQS
	Biochemistry	Regulation of ketogenesis	▪ Explain the regulation of ketogenesis. ▪ Explain the energetics of ketogenesis.	Lecture	1hour	MCQS
	Biochemistry	Degradation of sphingophospholipids	▪ Explain the degradation of sphingolipids. ▪ Describe sphingolipidoses.	Lecture	1hour	MCQS
	Biochemistry	Metabolism of cholesterol I	▪ explain the role of cholesterol in the body. ▪ Explain the biosynthesis of cholesterol	Lecture	1hour	MCQS

	Biochemistry	Metabolism of Cholesterol II	▪ Describe cholesterol regulation.	Lecture	1 hour	MCQS
	Biochemistry	Bile acids I	▪ Explain the degradation & excretion of cholesterol with the synthesis of bile acids, their conjugation & bile salts formation.	Lecture	1hour	MCQS
	Biochemistry	Bile acids II	▪ Explain the regulation of bile acids.	Lecture	1hour	MCQS
	Biochemistry	Metabolism of lipoproteins I	▪ Explain synthesis, transport & fate of plasma lipoprotein.	Lecture	1hour	MCQS
	Biochemistry	Metabolism of lipoproteins II	▪ Explain disorders associated with impairment of lipoprotein metabolism. ▪ Explain the Atherogenic effect of oxidized LDL.	Lecture	1hour	MCQS
	Biochemistry	Fatty liver	▪ Describe biomedical defect leading to fatty liver.	Lecture	1hour	MCQS
Skills and affective domain						
	Biochemistry	Estimation of serum cholesterol level	▪ Able to estimate the serum cholesterol level	Skill lab	2hours	OSPE
Theme 8: Wasting (protein metabolism)						
	Biochemistry	Protein turn over	▪ Describe ATP- ATP-independent degradation. ▪ Explain ATP & Ubiquitin-Dependent Degradation. ▪ Explain Nitrogen balance	Lecture	1hour	MCQS
	Biochemistry	Ammonia transportation & its effect	▪ Explain the role of transamination, deamination & transamination. ▪ Describe ammonia formation in various tissues & transport to liver.	Lecture	1hour	MCQS
	Biochemistry	Urea cycle	▪ Describe the steps of the urea cycle & its regulation.	Lecture	1hour	MCQS
	Biochemistry	Ammonia toxicity	▪ Describe metabolic disorders of urea cycle. ▪ Describe the effect of ammonia toxicity on the brain.	Lecture	1hour	MCQS
	Biochemistry	Metabolism of aromatic amino acids.	▪ Describe biosynthesis, fate, metabolic functions & related inherited disorders of aromatic amino acids.	Lecture	1hour	MCQS
	Biochemistry	Metabolism of amino acids I	▪ Describe biosynthesis, fate, and metabolic functions of amino acids (aromatic)	Lecture	1hour	MCQS
	Biochemistry	Metabolism of amino acids II	▪ Describe biosynthesis, fate, metabolic functions & related inherited disorders of amino acids (branched-chain)	Lecture	1hour	MCQS

	Biochemistry	Metabolism of amino acids III	▪ Describe biosynthesis, fate, metabolic functions & related inherited disorders of individual amino acids	Lecture	1hour	MCQS
	Biochemistry	Metabolism of different specialized products	▪ Metabolism of creatine, histamine, gamma-aminobutyric acid	Lecture	1hour	MCQS
Skill and affective domain						
	Biochemistry	Estimation of serum urea	▪ Able to estimate the blood urea level	Skill lab	2hours	OSPE
	Biochemistry	Estimation of serum creatinine	▪ Able to estimate serum creatinine level	Skill lab	2hours	OSPE

RENAL I MODULE





Module Committee

Chairperson Curriculum Committee	Prof. Dr. Humaira Gulnaz	Professor of Anatomy
Curriculum Coordinator	Dr. Ayesha Ayub	Incharge HPERD
Module Coordinator	Dr. Tahira Bashir	Biochemist, Biochemistry Department
Academic Team Members		
Biochemistry	Dr. Tahira Bashir	Biochemist, Biochemistry Department
Anatomy	Dr. Uzma Ali	Assistant Professor Anatomy
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Pharmacology	Dr. Akfish Zaheer	Assistant Professor Pharmacology
Community Medicine	Dr. Fozia Zahoor Malik	Demonstrator Community Medicine Department
Behavioral Sciences	Dr. Sinha	PGR Psychiatry Department
Surgery	Dr. Sana Akhtar	Senior Registrar Surgery
Medicine	Dr Zaheer Ahmad	Senior Registrar Medicine
Radiology	Dr. Abdul Roauf	Assistant Professor Radiology Department

List of Themes

Theme No.	Theme Name	Duration
1	Flank Pain /Loin Pain	1 week
2	Scanty Urine /Urinary retention and Edema	1 week
3	Urinary Incontinence	1 week

Sr.No.	Subject	Topic	Learning objectives	Teaching strategies	Duration	Assessment
Theme-1 Loin pain/ Flank Pain						
	Gross Anatomy	Overview of the urinary system and details of kidney	▪ List and describe the main components of the urinary system ▪ Describe the anatomical structure & location of kidney ▪ Describe its various coverings ▪ Discuss its various relations ▪ Enlist structures entering or leaving hilum ▪ Describe its blood supply, nerve supply & lymphatics ▪ Enlist clinical significance	SGD	2 hours	MCQS & OSPE
	Gross Anatomy	Lumber vertebra	▪ Describe bony features of lumber vertebra ▪ Describe its attachments ▪ Enlist its differences from thoracic and cervical vertebras	Skill lab	2 hours	MCQS & OSPE
	Gross Anatomy	Abdominal aorta & inferior vena cava	▪ Explain the course and relations of the Abdominal Aorta ▪ Enumerate and elaborate the paired & unpaired branches of abdominal aorta ▪ Describe the formation of inferior vena cava ▪ Enlist its various tributaries	Skill lab	2 hours	MCQS & OSPE
	Gross Anatomy	Muscles and facia of the posterior abdominal wall	▪ Describe attachments, action & nerve supply of muscles of posterior abdominal wall ▪ Describe attachment of lumber facia	Skill lab	2 hours	MCQS & OSPE
	Embryology	Development of urinary system	▪ Trace the embryological origins and development of the urinary system	Interactive Lecture	1 hour	MCQS & OSPE

			▪ Discuss various congenital anomalies related to it			
	Histology	Kidney 1	▪ Describe Stroma and parenchyma of kidney Describe renal corpuscle ▪ Describe filtration barrier	Interactive Lecture	1 hour	MCQS & OSPE
	Histology	Kidney 2	▪ Describe the histological structure of various parts of nephron ▪ Describe the components of JG apparatus	Interactive Lecture	1 hour	MCQS & OSPE
	Physiology	Physiological Anatomy Of the kidneys and Overview of its Functions	▪ States major functions of the kidneys & brief physiological anatomy of kidney. ▪ Define the components of the nephron and their interrelationships: renal corpuscle, glomerulus, nephron, and collecting-duct system. ▪ Draw the relationship between glomerulus, Bowman's capsule, and the proximal tubule. ▪ Describe the 3 layers separating the lumen of the glomerular capillaries and Bowman's space; defines podocytes, foot processes, and slit diaphragms. ▪ Define glomerular mesangial cells and states their functions and location within the glomerulus. Detail of renal vessels & Pressure within them. ▪ Describe, in general terms, the differences among superficial cortical, mid cortical, and juxtamedullary nephrons. ▪ List the individual tubular segments in order; states the	Interactive Lecture	1 hour	MCQS

			segments that comprise the proximal tubule, Henle's loop, and the collecting-duct system; defines principal cells and intercalated cells. ▪ Define juxtaglomerular apparatus and describes its 3 cell types; states the function of the granular cells. ▪ Define the basic renal processes: glomerular filtration, tubular reabsorption, and tubular secretion			
	Physiology	Glomerular Filtration: Determinants and Equation	▪ Describe how molecular size and electrical charge determine filterability of plasma solutes; states how protein binding of a low molecular-weight substance influences its filterability. ▪ State the formula for the determinants of glomerular filtration rate, and states, in qualitative terms why the net filtration pressure is positive. ▪ Define filtration coefficient and states how mesangial cells might alter the filtration coefficient; ▪ states the reason glomerular filtration rate is so large relative to filtration across other capillaries in the body. ▪ Describe how arterial pressure, afferent arteriolar resistance, and efferent arteriolar resistance influence glomerular capillary pressure. ▪ Describe how changes in renal plasma flow influence average glomerular capillary oncotic pressure.	Interactive Lecture	1 hour	MCQS

			▪ State the Starling forces involved in capillary filtration. ▪ State how changes in each Starling force affect glomerular filtration rate			
	Physiology	Nervous & Hormonal Control of Renal Circulation	▪ Define renal blood flow, renal plasma flow, glomerular filtration rate, and filtration fraction, and gives normal values. ▪ State the formula relating flow, pressure, and resistance in an organ. ▪ Describe sympathetic nerve supply of renal vessels & hormones affecting renal vessels. ▪ Describe the effects of changes in afferent and efferent arteriolar resistances on renal blood flow	Interactive Lecture	1 hour	MCQS
	Physiology	Auto regulation of GFR and renal blood flow	▪ Define and state the major characteristics of diffusion, facilitated diffusion, primary active transport, secondary active transport (including symport and antiport) and endocytosis. ▪ Define osmolality and osmolarity, and states why osmolarity is commonly used to approximate osmolality. ▪ Describe what is meant by the expression "water follows the osmoles." ▪ Describe qualitatively the forces that determine movement of reabsorbed fluid from the interstitium	Interactive Lecture	1 hour	MCQS

			into peritubular capillaries. ▪ Compare the Starling forces governing glomerular filtration with those governing peritubular capillary absorption. ▪ Compare and contrasts the concepts of Tm and gradient-limited transport. ▪ Describe 3 processes that can produce bidirectional transport of a substance in a single tubular segment; states the consequences of pump-leak systems. ▪ Contrast "tight" and "leaky" epithelia.			
	Biochemistry	Acid-base imbalance	▪ Describe Disorders of Acid Base balance ▪ Explain causes, mechanisms ▪ and compensations of Respiratory Acidosis & metabolic acidosis ▪ Describe metabolic & respiratory alkalosis ▪ Explain the role of kidney and lungs.	Interactive Lecture	1 hour	MCQS
	Biochemistry	The systemic compensation of acid base imbalance	▪ Discuss role of respiratory & renal mechanism for compensation of acid base imbalance	SGD	2hours	MCQS
	Pathology	Basic terminologies related to pathology of renal system	• Define terms Nephrotic, Nephritic Syndrome, • Azotemia and Pyelonephritis	Interactive Lecture	1hour	MCQS
Skill and affective domain						
	Histology	Kidney	▪ Able to identify under microscope with points of identification	Demonstration	2 hours	OSPE

			▪ Able to make histological diagram of kidney			
	physiology	specific gravity of urine	▪ Determine specific gravity of urine.	Skill lab	2 hours	OSPE
Theme-2 Edema and Urinary retention/ Scanty Urine						
	Gross Anatomy	Ureter	▪ Describe the gross anatomy of ureter ▪ Describe the relations of right ureter in male and female ▪ Describe the relations of left ureter in male and female ▪ Enlist its various constrictions ▪ Highlight the clinical significance of relations of right and left ureters in both sexes	SGD	2 hours	MCQS
	Gross anatomy	Urinary bladder	▪ Describe the gross structure of urinary bladder ▪ Discuss the Ligaments/supports and relations in both males and females ▪ Describe its blood supply & nerve supply ▪ Describe its clinical significance in both males and females	Skill lab	2 hours	MCQS&OSPE
	Gross anatomy	Prostate	▪ Describe the structure of prostate gland ▪ Describe Lobes, capsule, relations and structures within prostate ▪ Discuss clinical problems related to it	Skill lab	2 hours	MCQS&OSPE
	Gross anatomy	Urethra	▪ Describe the gross anatomy of urethra ▪ Enlist the differences between male and female urethra	Skill lab	2 hours	MCQS & OSPE

	Embryology	Bladder and urethra	▪ Describe the development of urinary bladder ▪ Discuss the developmental anomalies of bladder ▪ Describe the development of male urethra ▪ Describe the development of female urethra. ▪ Discuss the developmental anomalies of male and female urethra	Interactive Lecture	1 hour	MCQS & OSPE
	Embryology	Development of prostate	▪ Describe the development of prostate and bulbourethral glands	Interactive Lecture	1 hour	MCQS & OSPE
	Histology	Ureter, Bladder & urethra	▪ Describe the microscopic structure of ureter ▪ Describe the histological features of bladder ▪ Describe the histological features of male and female urethra	Interactive Lecture	1 hour	MCQS & OSPE
	Histology	Prostate	▪ Describe histological structure of prostate gland	Interactive Lecture	1 hour	MCQS & OSPE
	Physiology	Body fluid compartments	▪ List the body fluid compartments. ▪ Recall the volumes of body fluid compartments. ▪ Discuss the interplay in fluid volumes between different fluid compartments. ▪ Describes principles of osmosis and osmotic pressure ▪ Discuss the interplay between various pressures. ▪ Discuss principles of edema, Intracellular fluid compartment ▪ Extracellular fluid compartment, Intravascular fluids,	Interactive Lecture	1 hour	MCQS

			blood, Plasma, Interstitial fluid, Constituents of intra- and extracellular fluid compartments ▪ Calculating fluid volumes, osmosis and osmotic fluid regulation			
	Physiology	Reabsorption /Secretion along Different Parts of the Nephron	▪ List approximate percentages of sodium reabsorbed in major tubular segments. ▪ List approximate percentages of water reabsorbed in major tubular segments. ▪ Define the term iso-osmotic volume reabsorption. ▪ Describe proximal tubule sodium reabsorption, including the functions of the apical membrane sodium entry mechanisms and the basolateral sodium-potassium-adenosine triphosphatase. ▪ Explain why chloride reabsorption is coupled with sodium reabsorption and lists the major pathways of proximal tubule chloride reabsorption. ▪ State the maximum and minimum values of urine osmolality. ▪ Define osmotic diuresis and water diuresis. Explain why there is an obligatory water loss. ▪ Describe the handling of sodium by the descending and ascending limbs, distal tubule, and collecting-duct system. ▪ Describe the role of sodium-potassium-2 chloride symporters in the thick ascending limb.	Interactive Lecture	1 hour	MCQS

			▪ Describe the handling of water by descending and ascending limbs, distal tubule, and collecting duct system			
	Physiology	Mechanisms of regulation of tubular reabsorption	▪ Discuss the mechanisms of regulation of tubular reabsorption. ▪ Reabsorption and secretion by the renal tubules •Active and passive transport mechanisms ▪ Mechanism of reabsorption of specific substances (e.g., Water, electrolytes) ▪ Reabsorption and secretion in different parts of the tubules ▪ Glomerular balance ▪ Peritubular and renal interstitial fluid physical forces ▪ Effect of arterial pressure on urine output ▪ Hormonal control of tubular reabsorption Aldosterone ▪ Angiotensin-II ▪ ADH ▪ Parathyroid hormone ▪ Nervous regulation of tubular reabsorption	Interactive Lecture	1 hour	MCQS
	Physiology	Concept Of Renal Clearance	▪ Define the terms clearance and metabolic clearance rate and differentiates between general clearance and renal clearance. ▪ List the information required for clearance calculation. ▪ State the criteria that must be met for a substance so that its clearance can be used as a measure of glomerular filtration rate; states which substances are used to measure glomerular filtration rate and effective renal plasma flow.	Interactive Lecture	1 hour	MCQS

			▪ Predict whether a substance undergoes net reabsorption or net secretion by comparing its clearance with that of inulin or by comparing its rate of filtration with its rate of excretion. ▪ Calculate net rate of reabsorption or secretion for any substance. ▪ Calculate fractional excretion of any substance. ▪ Describe how to estimate glomerular filtration rate from CCr and describes the limitations. ▪ Describe how to use plasma concentrations of urea and creatinine as indicators of changes in glomerular filtration rate.			
	Physiology	Mechanism of diluted urine formation	▪ Describe the process of "separating salt from water" and how this permits excretion of either concentrated or dilute urine. ▪ Describe how antidiuretic hormone affects water reabsorption. ▪ Describe the characteristics of the medullary osmotic gradient. ▪ Explain the role of the thick ascending limb, urea recycling, and medullary blood flow in generating the medullary osmotic gradient. ▪ State why the medullary osmotic gradient is partially "washed out" during a water diuresis. ▪ Describe the origin of antidiuretic hormone and the 2 major reflex	Interactive Lecture	1 hour	MCQS

			controls of its secretion; define diabetes insipidus; state the effect of antidiuretic hormone on arterioles. ▪ Distinguish between the reflex changes that occur when an individual has suffered iso-osmotic fluid loss because of diarrhea as opposed to a pure water loss (i.e., solute-water loss as opposed to pure water loss). ▪ Describe the control of thirst. ▪ Describe the pathways by which sodium and water excretion are altered in response to sweating, diarrhea, hemorrhage, high-salt diet, and low-salt diet.			
	Physiology	Mechanism of concentrated urine formation	▪ Discuss the mechanism of concentrated urine formation.	Interactive Lecture	1 hour	MCQS
	Physiology	Renal regulation of Potassium	▪ State the normal balance and distribution of potassium within different body compartments, including cells and extracellular fluid. ▪ Describe how potassium moves between cells and the extracellular fluid, and how, on a short-term basis, the movement protects the extracellular fluid from large changes in potassium concentration. ▪ Describe how plasma levels of potassium do not always reflect the status of total-body potassium. ▪ State generalizations about renal potassium handling for persons	Interactive Lecture	1 hour	MCQS

			on high- or low-potassium diets. ▪ State the relative amounts of potassium reabsorbed by the proximal tubule and thick ascending limb of Henle's loop regardless of the state of potassium intake. ▪ Describe how the cortical collecting duct can manifest net secretion or reabsorption; describes the role of principal cells and intercalated cells in these processes. ▪ List the 3 inputs that control the rate of potassium secretion by the cortical collecting duct. ▪ Describe the mechanism by which changes in potassium balance influence aldosterone secretion. ▪ State the effects of most diuretic drugs and osmotic diuretics on potassium excretion. ▪ Describe the association between perturbations in acid-base status and the plasma potassium level			
	Physiology	Physiochemical aspects	▪ Discuss the physiochemical aspects (Diffusion, Adsorption, Viscosity, Colloid Osmotic pressure, and role of Albumin in regulation of Osmotic pressure)	Interactive Lecture	1 hour	MCQS
	Physiology	Regulation of extracellular fluid osmolality and sodium concentration	▪ Discuss the homeostatic function of the kidneys. ▪ Explain the mechanism by which kidneys are able to	Interactive Lecture	1 hour	MCQS

			form diluted or concentrated urine. ▪ Describe Mechanism of formation of dilute urine ▪ Describe Mechanism of formation of concentrated urine ▪ Describe requirements for excreting a concentrated urine. ▪ Describe the counter-current mechanism. ▪ Describe Role of distal tubules and collecting ducts ▪ Describe Quantifying urine concentration and dilution. ▪ Describe Disorders of urine concentration			
	Physiology	Regulation of extracellular fluid osmolarity and sodium concentration 2	▪ Discuss the homeostatic function of the kidneys. ▪ Discuss the principles of osmoregulation by the kidneys. ▪ Explain how the body regulated the osmolarity of fluid comparts. ▪ Describe Control of extracellular fluid osmolarity and sodium concentration ▪ Describe Osmoreceptor-ADH feedback system. ▪ Describe Role of thirst in controlling extracellular fluid osmolarity and concentration ▪ Describe Salt-appetite mechanism and Integrated response to sodium intake	Interactive Lecture	1 hour	MCQS
	Physiology	Regulation of concentration of potassium, calcium, phosphate, and magnesium	▪ Discuss the mechanisms of regulation of concentrations of various ions in the body.	Interactive Lecture	1 hour	MCQS

			▪ Describe the processes occurring at cellular level to maintain/excrete various ions in the kidneys -Regulation of potassium -- Regulation of calcium -Regulation of phosphate - Regulation of magnesium			
	Physiology	Short- and Long-term control of Blood pressure by Kidneys	▪ Describe the 3 temporal domains of blood pressure control and the major mechanisms associated with them. ▪ Describe the relationship between renin and angiotensin II. ▪ Describe the 3 detectors that can alter renin secretion. ▪ Define pressure natriuresis and diuresis. ▪ Define tubule glomerular feedback and describe the mechanism for tubule glomerular feedback and auto regulation of glomerular filtration rate	Interactive Lecture	1 hour	MCQS
	Biochemistry	Metabolism of xenobiotics	▪ Describe the importance of xenobiotics of medical relevance ▪ Explain phases of metabolism& clinical significance ▪ Explain the type of phase-II reactions	Interactive Lecture	1 hour	MCQS
	Pathology	Urolithiasis	• Describe the pathophysiology of urinary stones and enlist its types	Interactive Lecture	1 hour	MCQS
	General Surgery	Urinary retention	▪ Describe the etiology, and management of urinary retention	Interactive Lecture	1 hour	MCQS

			▪ Describe the etiology, clinical features and treatment of Benign prostatic hyperplasia			
	Pharmacology	Drug excretion and the role of diuretics in renal pharmacology	▪ Describe the mechanism of drug excretion ▪ Describe the mechanism of action and site of action of diuretics	Interactive Lecture	1 hour	MCQS
	Community Medicine/ Public Health	Quality of life in problems of prostate	▪ Discuss quality of life issues in patients with ▪ prostate problems ▪ Overview of the concept of quality of life (QoL) ▪ Discuss the significance of quality of life in disease and treatment settings ▪ Discuss quality of life issues in geriatric	Interactive Lecture	1 hour	MCQS
Skill and affective domain						
	Histology	Ureter, Bladder & urethra	▪ Able to identify under microscope ▪ Able to make histological diagram	Demonstration	2 hour	OSPE
	Histology	Prostate	▪ Able to identify under microscope ▪ Able to make histological diagram	Demonstration	2 hour	OSPE
Theme-3 Urinary incontinence						
	Gross anatomy	Pelvis	▪ Describe the boundaries of bony pelvis ▪ Describe boundaries of inlet and outlet ▪ Describe different types of pelvis.	Skill lab	2 hour	MCQS & OSPE
	Gross anatomy	Perineum	▪ Define perineum ▪ Describe boundaries of its division ▪ Describe perennial body ▪ Describe blood supply, nerve supply and lymphatics	Skill lab	2 hour	MCQS & OSPE

	Gross anatomy	Superficial & deep perineal pouches	▪ Describe boundaries of pouches ▪ Enlist communication of spaces ▪ Enlist contents of spaces	SGD	2 hour	MCQS& OSPE
	Gross anatomy	Pudendal canal	▪ Describe boundaries of pudendal canal ▪ Describe course & branches of pudendal nerve and internal pudendal artery	Skill lab	2 hour	MCQS
	Physiology	Urinary bladder and micturition	▪ Describe the functional anatomy of urinary bladder. ▪ Explain the mechanism of micturition. ▪ Explain the micturition reflex and relate structures of the bladder with function. ▪ Explain basal cystometrogram. ▪ Describe the nervous control of bladder functions	Interactive Lecture	1 hour	MCQS
	Physiology	Urinary incontinence	▪ Discuss the causes, symptoms and management of patients with urinary incontinence, urgency, frequency, burning micturition etc. ▪ Causes of urinary incontinence, urgency, frequency, burning micturition ▪ Terms related to urinary obstruction and incontinence. ▪ Describe Clinical presentation of continence disorders. ▪ Explain General management of incontinence	Interactive Lecture	1 hour	MCQS
	Radiology	Radiological diagnosis of urinary pathologies	▪ Identify and describe the various anatomic landmarks of the renal system on radiographs ▪ Discuss special radiological tests to	Interactive Lecture	1 hour	MCQS

			▪ determine renal function and pathologies Describe normal radiographs of abdomen and pelvis ▪ Describe special radiological tests to ▪ show renal pathology and function ▪ Abdominal ultrasound			

	Medicine	Approach to patient of renal failure	▪ Define acute kidney injury and chronic renal failure ▪ Discuss differences between AKI and CKD ▪ Describe causes, clinical features, investigations and management options of acute kidney injury ▪ Describe causes, clinical features, investigations and management options of chronic renal failure			
	Medicine	Renal replacement therapy (Dialysis/Renal transplant)	• Discuss the indications of renal transplant • Describe the prerequisites and preparations for renal transplant • Describe the posttransplant medication and follow up of renal transplant patient • Describe the types, indications and the process of dialysis for kidney disease • Describe Types of dialysis • -Peritoneal dialysis • -Hemodialysis • -Hemofiltration • -Haemodiafiltration • Discuss Indications for dialysis • Discuss disorders of acid-base balance, electrolyte abnormalities uremia or fluid overload resulting from acute and chronic renal failure, and intoxication	Interactive Lecture	1 hour	MCQS

			• Describe The process of hemodialysis and peritoneal dialysis • Describe Dialyzable substances			

	Medicine	Approach to a patient with renal stones and obstructive uropathy	▪ Define nephrolithiasis ▪ Discuss different types of renal stones Discuss the differences between radio-opaque vs radiolucent stones ▪ Discuss clinical features of renal stones, ureteric colic, Relevant investigations and management ▪ Define benign prostatic hyperplasia ▪ Describe clinical features, investigations and management disorders ▪ Describe red flags of prostate enlargement for risk of malignancy	Interactive Lecture	1 hour	MCQS

ASSESSMENT PLAN

SUBJECT	GIT ,Hepatobiliary and Metabolism I	Renal I	VIVA STATIONS	TOTAL STATIONS
Anatomy	**4**	**3**	**2**	**9**
Histology				
Embryology				
Physiology	**0**	**1**	**2**	**3**
Biochemistry	**3**	**1**	**2**	**6**
TOTAL	**7**	**5**	**6**	**18**

PAPER Blueprint

Subject	GIT	Renal	Total
Anatomy	16	7	23
Embryology	4	3	7
Histology	9	4	13
Physiology	15	14	29
Biochemistry	22	8	30
PRIME	3	2	5
Pathology	3	1	4
Pharmacology	1	1	2
Community Medicine	1	0	1
Forensic Medicine	1	0	1
Medicine	1	1	2
Surgery	2	1	3
TOTAL	**78**	**42**	**120**

Internal Assessment

Sr. No.	Criteria	Numbers
Theory:		
1.	Attendance (>90%=3,80-89%=2,70-79%=1,<70%=0)	**3**
2.	Creative work/assignments/Task	**1**
3.	Continuous Assessment throughout block	**2**
4.	Block examination theory	**3**
5.	Pre prof Examination of block	**4**
	Total	**13**
Sr. No.	Criteria	**Numbers**
OSPE:		
1.	Attendance (>90%=3,80-89%=2,70-79%=1,<70%=0)	**3**
2.	Log Book	**3**
3.	Discipline, Responsibility and team work	**1**
4.	Block examination OSPE	**3**
	Total	**10**