



Department of Paramedical Sciences

Faculty of Allied Health Sciences

SGT UNIVERSITY

Shree Guru Gobind Singh Tricentenary University

Gurgaon-122505

Syllabus

B.Sc. MEDICAL TECH. (RENAL DIALYSIS TECH)

Duration: 3 years (6 Semester)

W.e.f. Academic Session 2020-21

Semester – 1
Human Anatomy – I
Paper code -

Total Marks- 60

Hours- 50

S.No.	Topics To Be Covered	Teaching Hours	Domain
Chapter 1	Introduction: human body as a whole Definition of anatomy and its subdivisions Anatomical nomenclature and terminology (planes & positions) Surface Anatomy of main structures and vessels	4	Must Know Desirable to know
Chapter 2	Applied anatomy & Joints Musculoskeletal system Connective tissue & its modification, tendons, membranes, special connective tissue. Bone structure, blood supply, growth, ossification, and classification. Muscle classification, structure and functional aspect. Joints classification, structures of joints, movements, range, limiting factors, stability, blood supply Nerve supply, dislocations and applied anatomy	4	Must Know Desirable to know
Chapter 3	Upper extremity Bony architecture Joints – structure, range of movement Muscles – origin, insertion, actions, nerve supply Major nerves – course, branches and implications of nerve injuries Development of limb bones, muscles and anomalies Radiographic identification of bone and joints Applied anatomy	4	Must Know
Chapter 4	Lower extremity Bony architecture Joints – structure, range of movement Muscles – origin, insertion, actions, nerve supply Major nerves – course, branches and implications of nerve injuries Development of limb bones, muscles and anomalies Radiographic identification of bone and joints Applied anatomy	4	Must Know
Chapter 5	Spine and thorax Back muscles -Superficial layer Deep muscles of back, their origin, insertion, action and nerve supply. Vertebral column – Structure & Development, Structure & Joints of vertebra. Thoracic cage	4	Must Know
Chapter 6	Head and neck: Cranium Facial Muscles – origin, insertion, actions, nerve supply Temporal mandibular Joints – structure, types of movement	4	Must Know
Chapter 7	Cardiovascular system (with relevant applied anatomy) Heart-Size, location, chambers. Circulation -Systemic & pulmonary Great vessels of the heart, branches of aorta. Overview of blood vessels of upper extremity and lower extremity	4	Must Know Desirable to know

Chapter 8	Lymphatic system- (with relevant applied anatomy) Salient features of lymphatic organs (spleen, tonsil, thymus, lymph node)	4	Desirable to know
Chapter 9	Gastro-intestinal system (with relevant applied anatomy) Partsofthe gastrointestinal tract Gross anatomy of Tongue, stomach, small and large intestine, liver, gall bladder Pancreas and other digestive organ& related applied anatomy	4	Must Know Desirable to know
Chapter 10	Respiratory system (with relevant applied anatomy) Partsof respiratory system with salient gross features of lung Brief description of intercostal muscles andPara-nasal air sinuses	4	Must Know Desirable to know

ANATOMY PRACTICAL

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| <ol style="list-style-type: none"> 1) Identification and description of all anatomical structures. 2) Demonstration of dissected parts (upper extremity, lower extremity, thoracic & abdominal viscera, face and brain). 3) Demonstration of skeleton-articulated and disarticulated. 4) Surface anatomy: Surface land mark-bony, muscular and ligamentous. Surface anatomy of major nerves, arteries of the limbs. |
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BRIT 1st Year

**Semester – 1
Human Physiology– I
Paper code -**

Total Marks- 60

Hours- 50

Chapter 1	General Physiology Cell: morphology, Structure and function of cell organelles Structure of cell membrane	Must Know	2
	Transport across cell membrane Intercellular communication Homeostasis		2

Chapter 2	Blood Introduction-composition & function of blood	Must Know	2
	W.B.C., R.B.C., Platelets formation & functions, Immunity		1
	Plasma: composition, formation & functions, Plasma Proteins: - types & functions, Blood Groups-types, significance, determination.	Desirable to know	2
	Hemoglobin, Haemostasis	Nice to know	2
	Lymph-composition, formation, circulation & functions		2
Chapter 3	Cardiovascular system Conducting system-components, impulse conduction Heart valves Cardiac cycle-definition, phases of cardiac cycle,	Must Know	2
	Cardiac output-definition, normal value, determinants.		1
	Stroke volume and its regulation.	Nice to know	2
	Heart rate and its regulation: Arterial pulse, Blood pressure-definition, normal values, factors affecting blood pressure.	Must Know	2
	Shock-definition, classification, causes and features, Basic idea of ECG, Cardiovascular changes during exercise	Desirable to know	2
Chapter 4	Respiratory System Mechanics of respiration Lung volumes and capacities	Must Know	2
	Pulmonary circulation, transport of respiratory gases		2
	Factors affecting respiration, Regulation of respiration-neural regulation, voluntary control and chemical regulation	Desirable to know	2
	Hypoxia, Hypercapnoea, Hypocapnoea,	Nice to know	1
	Artificial respiration		1
	Disorders of respiration- dyspnoea, orthopnoea, hyperpnoea, hyperventilation, apnoea, Tachypnoea, Respiratory changes during exercise.	Must Know	2
Chapter 5	Digestive System Digestion & absorption of nutrients, Gastrointestinal secretions & their regulation Functions of Liver & Stomach	Must Know	2
Chapter 6	Nervous system Introduction, central and peripheral nervous system, functions of nervous system.	Must Know	1
	Reflexes-monosynaptic, polysynaptic, superficial, deep & withdrawal reflex Sense organ, receptors, electrical& chemical events in receptors.	Nice to know	2
	Sensory pathways for touch, temperature, pain, proprioception & others.		2
	Control of tone & posture: Integration at spinal, brain stem, cerebellar, basal ganglion levels, along with their functions.	Desirable to know	1
	Motor mechanism: motor cortex, motor pathway: the descending tracts -pyramidal & extrapyramidal tracts-origin, course, termination & functions. Upper motor neuron and lower motor neuron paralysis.		2
	Special senses-eye, ear, nose, mouth		
Water excretion, concentration of urine-regulation of Na⁺, Cl⁻, K⁺ excretion	Nice to know	1	

Chapter 7	Nerve Muscle Physiology Muscles-classification, structure, properties, Excitation, contraction, coupling, Motor unit, EMG, factors affecting muscle tension, Muscle tone, fatigue, exercise .	Desirable to Know	2
	Nerve – structure and function of neurons, classification, properties Resting membrane potential & Action potential their ionic basis, All or None phenomenon Neuromuscular transmission Ionic basis of nerve conduction.	Nice to Know	2
	Concept of nerve injury & Wallerian degeneration Synapses. Electrical events in postsynaptic neurons Inhibition & facilitation at synapses .		2
	Chemical transmission of synaptic activity Principal neurotransmitters. Chemical transmission of synaptic activity Principal neurotransmitters.		1

**SEMESTER 1
PAPER 3**

BASIC BIOCHEMISTRY

50HRS

Basic concept of metabolism and their applied aspects

Unit-I

Carbohydrates: Definition, function and classification of carbohydrate. Monosaccharide, glycoside formation, oligosaccharides and polysaccharides. Glycolysis, catabolic fates of pyruvate, metabolic fate of Acetyl-CoA and Citric acid cycle, gluconeogenesis, glycogen metabolism, pentose phosphate pathway.

Unit-II

Amino acids and proteins: Definition, structure, classification, essential & non essential amino acids. Proteins definition and classification. Primary, secondary, tertiary and quaternary of proteins of proteins

Unit-III

Vitamins: Definition and classification of vitamins, difference between fat soluble and water soluble vitamins. Water soluble vitamins and fat soluble vitamins

Unit-IV

Lipids: Definition, classification and function of lipids. Fatty Acids, Triacylglycerols or Triacylgcerides or neutral fat. Fatty acid metabolism. Ketone body metabolism.

BASIC BIOCHEMISTRY-PRACTICAL

1. Identification of carbohydrates by Molisch's test.
2. Identification of reducing sugar by Benedict's test.
3. Identification of protein by Biuret's test.

SEMESTER 1

PAPER 4

Communication skill and personality development

Total Hours 50

S.NO	TOPIC	METHOD	HOURS
1	Listening Comprehension, Speeches, Interviews, audio-video clippings followed by exercises, Introduction to Communication, Importance of Communication, Barriers to Communication and ways to overcome them.		
2	Conversation Skills, Greetings and Introducing oneself, Framing questions and answers, Role play, Buying: asking details etc, Word formation strategies, Vocabulary building: Antonyms,		

	Synonyms, Affixation, Suffixation, One word substitution		
3	Reading Comprehension, Simple narration and Stories, Newspaper and articles clippings, Sentence types, Note Making, Paragraph Writing, Comprehension, Report Writing: types, characteristics.		
4	Pronunciation, Pronunciation, Syllable and Stress, Into nation and Modulation.		
5	Writing Comprehension, Letters: types, format, style, Précis Writing, Paragraph: Order, Topic sentence, consistency, coherence, Report and Proposal, Project Writing: Features, Structure.		

**B.SC PERFUSION TECH.
SEMESTER 2
PAPER 1**

PATHOLOGY

S.NO		METHOD	HOURS
1	<p>tion of pathology</p> <p>ry - types, etiology, morphology, Cell death- autolysis, necrosis, apoptosis, Cellular adaptations-atrophy, hypertrophy, hyperplasia, metaplasia.</p> <p>ation- acute inflammation-vascular events, cellular events, chemical mediators, chronic inflammation-general features, granulomatous inflammation, tuberculosis.</p> <p>and repair - Definition, different phases of healing, factors influencing wound healing, fracture healing.</p> <p>ynamic disorders-Oedema, hypermia, congestion, haemorrhage, embolism,</p>		

	<p>thrombosis, infarction. Neoplasia - definition, nomenclature, features of benign and malignant tumors, spread of tumors, dysplasia, carcinoma in situ, precancerous lesions. Environmental and nutritional pathology - smoking, radiation injury, malnutrition, obesity, vitamin deficiencies.</p>		
2	<p>logical Disorders, Introduction and Haematopoiesis, - introduction and classification (morphological and etiological), iron deficiency anemia: distribution of body iron, iron absorption, causes of iron deficiency , lab findings, megaloblastic anaemia: causes, lab findings, haemolytic anemias: definition. Causes, classification and lab findings.WBC disorders - quantitative disorders, leukemia - introduction and classification, acute leukemias, chronic leukemias. Bleeding disorders - introduction, physiology of hemostasis. Classification, causes of inherited and acquired bleeding disorders, thrombocytopenia, DIC, laboratory findings. Pancytopenia.</p>		
3	<p>ematological Techniques : Blood collection - methods (capillary blood, venipuncture, arterial puncture) complications,anticoagulants, transport of the specimen, preservation, effects of storage, separation of serum and plasma, universal precautions, complete hemogram - CBC, peripheral smear, BT, CT, PT, APTT, ESR, disposal of the waste in the laboratory.</p>		
4	<p>Transfusion Medicine Selection of donor, blood grouping, Rh typing, cross matching, storage, transfusion transmitted diseases, transfusion reactions, components - types, indications</p>		
5	<p>Pathology collection, transport, preservation,</p>		

	<p>and processing of various clinical specimens.</p> <p>s - collection. Preservatives, physical, chemical examination and microscopy. Physical examination; volume, color, odor, appearance, specific gravity and ph, Chemical examination; strip method-protein - heat and acetic acid test, sulfosalicylic acid method, reducing sugar-benedicts test, ketone bodies - rotheras test, bile salt - hays method, blood - benzidine test, urobilinogen and porphobilinogen - ehrlich aldehyde and schwartz test, bence jones protein.</p>		
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PRACTICAL PATHOLOGY

S.NO	TOPIC	METHOD	HOURS
1	<p>I. HAEMATOLOGY</p> <p>Estimation-Sahli's method & Cyanmethhaemoglobin method</p> <p>PC Count</p> <p>Microscopic count</p> <p>Preparation of blood smears and staining with Leishman stain</p> <p>BC Count</p> <p>BC-Differential Count</p> <p>Platelet Count</p> <p>Absolute Eosinophil Count</p> <p>R-Westergrens & Wintrobe's method</p> <p>Wintrobe's method</p> <p>Clotting test-Demonstration</p> <p>Bone Marrow Smear Preparation & staining procedure</p> <p>Demonstration of Malarial Parasite</p>		
2	<p>I. CLINICAL PATHOLOGY</p> <p>Urine Examination (Physical, Chemical, Microscopic)</p>		

**SEMESTER 2
PAPER 2**

MICROBIOLOGY

50 HOURS

S.NO	TOPIC	METHOD	HOURS
	<p>Principles of Microbiology:</p> <p>Microscope- Different types including electron microscope.</p>		

	<ul style="list-style-type: none"> - General introduction, and History of Microbiology - Classification of Microbes - Bacteria Cell - Bacterial Growth and Variation - Antibacterial Agents, and Anti-septics & Disinfection (Chemical Sterilization) - Sterilization (Physical)-Heat, Filters, Radiation. - Equipments of sterilization namely hot air oven, autoclave and serum inspissator, pasteurization - Antibiotics, Chemotherapy and Drug Resistance <p style="text-align: center;">Immunology - antigen, Antibodies, Immunity, vaccines, types of vaccine and immunization schedule. Hospital acquired infection - Causative agents, transmission methods, investigation, prevention and control of hospital Acquired infections.</p> <ul style="list-style-type: none"> - Collection & Transportations of specimens. 		
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PRACTICAL MICROBIOLOGY

S.NO	TOPIC	METHOD	HOURS
1	microscope and its application in microbiology.		
2	tion of sterilization equipments: hot air oven, autoclave, bacterial		
3	staining. ast staining.		
4	ples and practice of Biomedical waste management.		

PAPER 3

APPLIED ANATOMY & PHYSIOLOGY THEORY
HOURS

25

S.NO	TOPIC	METHOD	HOURS
1	<p>EXCRETORY SYSTEM PARTS OF EXCRETORY SYSTEM SHAPE OF KIDNEY, BLOOD SUPPLY COMPONENTS OF KIDNEY , NEPHRON ,NERVE SUPPLY. URINE FORMATION (FILTRATION , ABSORPTION & SECRETION) ACID , BASE MANAGEMENT . RENAL DISEASE (AKI, CKD & STONES)</p>		
2	<p>Male & female reproductive system Parts of male and female reproductive system with salient gross features of testis & uterus, ovary and fallopian tube Male -Functions of testes, pubertal changes in males, Testosterone -action & regulations of secretion.Female -Functions of ovaries and uterus, pubertal changes, Menstrual cycle, estrogens and progesteron - action and regulation Embryology Spermatogenesis & oogenesis Ovulation,fertilization, Placenta, Fetalcirculation.</p>		
3	<p>Endocrinology Physiology of the endocrine glands – Hormones secreted by these glands Their classifications and functions Adrenal, Gonads Thymus, Pancreas. Pituitary Thyroid, Parathyroid</p>		
4	<p>Nervous system Classification of the nervous system, Definitions of central, peripheral and autonomic nervous system Neuron- structure and classification, neuroglia Names of lobes of Cerebrum and cerebellum, Parts of brainstem (salient features only) .Cerebrospinal fluid and its circulation, names of cranial nerves, spinal nerve, meninges, ventricles (salient features</p>		

	<p>only)</p> <p>Sensory organs</p> <p>Skin: Its appendages and functions</p> <p>Eye: Parts of eye and its structure</p> <p>Ear: Parts of ear- external, middle and inner ear and contents</p>		
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ANATOMY PRACTICAL

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| <p>5) Identification and description of all anatomical structures.</p> <p>6) Demonstration of dissected parts</p> <p>7) Demonstration of skeleton-articulated and disarticulated.</p> <p>8) Surface anatomy: Surface land mark-bony, muscular and ligamentous. Surface anatomy of major nerves, arteries of the limbs.</p> |
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**SEMESTER 2
PAPER 4**

PHARMACOLOGY

50 HOURS

S.NO	TOPIC	METHOD	HOURS
1	<p>GENERAL PHARMACOLOGY :</p> <p>Principles of drug administration and routes of administration and routes of administration, Pharmacokinetics : absorption, distribution, metabolism, excretion of drugs, factors influencing drug action, dosage and factors modifying it. Pharmacodynamics Drug allergy , poisoning & toxicity, synergetic antagonistic effect of drugs plasma half life , drug efficacy & potency , mechanism of drug action, adverse drug reaction</p>		
2	<p>ANS : Cholinergic & anticholinergic drugs , skeletal muscle relaxant, Sympathomimetics drugs(adrenergic drugs) , alpha & beta blockers</p>		
3	<p>CNS : Sedative & hypnotics , local &</p>		

	general anesthetics , Antiepileptic & Antipsychotics, Antidepressant & Analgesics		
4	CVS : Antihypertensive drugs , Anti- anginal drugs , Anti arrhythmic drugs, Cardiac glycosides, plasma expanders		
5	Antiemetic & Diuretics , UTI DRUGS		

**SEMESTER 2
PAPER 5**

BIOCHEMISTRY

50HRS

S.NO.	TOPIC	METHO	HOUR
1	Collection Of Specimen Types of specimen(blood plasma, serum , urine , body fluid , CSF), there variables and normal range use of anticoagulant & types of vial		
2	Introduction to lab apparatus Pipettes, biurettes & beakers Flasks types and uses Reagent bottles, funnels types & uses Chemical balance		
3	Concepts of Acid Base & salt reaction and hydrogen ion concentration, pH meter & buffer.		
4	Chemistry of Carbohydrates		
5	Chemistry of Lipids		
6	of Proteins- classification and examples		
7	Liver function tests and their assessment Renal function tests and their assessmen		
8	Cardiac profile- biochemical markers of myocardial infarction, basic principles, evaluation and applicatio		
9	Enzymes- Definition, general classification, clinical and therapeutic significance of enzymes		
10	Basic principles and estimation of blood gases and ph Basic principles and estimation of electrolytes.		

	<p>Evolution of computer from 1st generation to fourth generation. Some description about fifth generation.</p> <p>Data representation in memory</p>		
2	<p>Hardware:</p> <p>To study the various input devices used: Keyboard, mouse, OMR, OCR, MICR, BCR, Scanner etc.</p> <p>To study the internal structure of CPU: Registers, ALU, Motherboard, HD, Memory, Cache, and Virtual Memory. TO study the various Secondary storage devices: Magnetic Disk, Optical Disk, Flash memory, To cover what are Monitor, Its types, Printer: Dot matrix, Daisy wheel. Line printer, Laser printer, Thermal Printer, Ink Jet printers etc.</p>		
3	<p>To cover the types of Software, Languages and their types (High level and low level language.) To cover the definition of operating system, its types and what are the various functions and types of operating system.</p> <p>Basic introduction about Interfaces: its types character user and graphical user interface (DOS and Windows)</p> <p>Basic introduction about linux,Unix operating system</p> <p>To study the various HTML tags (Bold tags, Italic, Underline, Marquee, Img, anchor etc.)</p>		
4	<p>Network:</p> <p>Data Communication, Structure of Universal Resource Locator, Domains (.com, .in, .country specific, .org and rationale behind them), HTTP Practicals: TO</p>		

	<p>cover the various MS Excel Formulas and preparation of spreadsheets.</p> <p>Basics of E-mail, Web browsers (IE, Google Chrome, Mozilla), LAN, LAN topologies, WAN, MAN, Internet: Introduction, Internet, extranet and Intranet.</p> <p>Network devices (Hub, Switches, Modems, Routers etc), DNS, Network Security and Search Engine</p> <p>IP address, Structure of IP Address</p> <p>Backbone network, Network connecting devices</p>		
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**B.Sc RENAL DIALYSIS TECH.
SEMESTER 3
PAPER 1**

APPLIED PATHOLOGY (THEORY)

50 HOURS

S.NO	TOPIC	METHOD	HOURS
1	<p>Atherosclerosis-definition, risk factors, pathogenesis, morphology and complications, Ischemic heart disease: Myocardial infarction-definition, pathogenesis, morphology and complications, Hypertension- Benign and malignant hypertension: pathogenesis, pathology and complications</p>		
2	<p>Heart failure-Right and left heart failure: causes, pathophysiology and morphology, Rheumatic heart disease and infectious endocarditis- definition, etiopathogenesis, morphology and complications, Congenital heart</p>		

	<p>disease- Types and atrial septal defect; aneurysms- types and morphology; cardiomyopathies in brief.</p>		
3	<p>Atelectasis - types, Adult respiratory distress syndrome - causes , pathogenesis and morphology; pulmonary edema- classification, causes and morphology, Chronic obstructive pulmonary disease- Chronic bronchitis, emphysema, asthma, bronchiectasis: Definition, etiopathogenesis and morphology, Restrictive pulmonary diseases- Definition, categories, pathogenesis and morphology</p>		
4	<p>Pneumoconiosis-types, asbestosis, coal workers pneumoconiosis- etiopathogenesis and morphology, Pulmonary embolism, infarction, pulmonary hypertension- Definition, etiopathogenesis and morphology, Pneumonia- Classification of pneumonias; Lobar pneumonia and bronchopneumonia - etiology, pathology and complications</p>		
5	<p>Clinical manifestations of renal diseases, Glomerular lesions in systemic diseases- diabetes, amyloidosis and systemic lupus</p>		

	erythematosus, Pericardial and pleural effusions- causes and microscopy.		
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PRACTICAL

25 HOURS

S.NO	TOPIC	METHOD	HOURS
1	Urine examination: physical, chemical, microscopy		
2	Blood grouping & Rh typing		
3	Hemoglobin estimation, packed cell volume (PCV), erythrocyte sedimentation rate (ESR)		
4	Specimens : HEART & GREAT VESSELS SPECIMENS, LUNGS SPECIMENS , KIDNEY SPECIMEN , LIVER SPECIMENS		

B.Sc RENAL DIALYSIS TECHNOLOGY

SEMESTER 3

PAPER 2

PHARMACOLOGY (PART 2)

50 HOURS

S.NO	TOPIC	METHOD	HOURS
1	CHEMOTHERAPY OF INFECTIONS : BACTERIOSTATIC & BACTERIOCIDAL DRUGS , SULPHONAMIDES , PENICILLIN, CEPHALOSPORINS MACROLIDES, AMINOGLYCOSIDES, ANTITUBERCULER DRUGS , ANTIVIRAL , ANTIRETROVIRAL , ANTIFUNGAL , ANTIMALARIAL, ANTIAMOEBIAC , ANTI- CANCER DRUGS		
2	ANTICOAGULANT AGENTS. HEPARIN WARFARIN , ANTIPLATELET AGENTS, ANTIFIBRINOLYTICS ,		

	THROMBOLYTICS		
3	ANTIHISTAMINIC AGENTS , RESPIRATORY DRUGS : Introduction- modulators of bronchial smooth muscle tone and pulmonary vascular smooth muscle tone a. Mucokinetic and mucolytic agents b. Use of bland aerosols in respiratory care Pharmacotherapy of bronchial asthma PROSTAGLANDINS, NSAIDS		
4	Endocrine pharmacology: Thyroid harmones, glucocorticoids, anabolic steroids, calcitonin, insulin and oral hypoglycemic agents.		
5	GIT DRUGS : ANTIDIARRHOEAL DRUGS, LAXATIVES , PHARMAVOTHERAPY OF PEPTIC ULCER		

B.Sc. Renal Dialysis Technology

Semester III

Paper 3-

Introduction to Renal Dialysis Technology Total Hours 50

Unit I-

Epidemiology of kidney disease/ magnitude of the problem in community/ Demographics of ESRD population/ global epidemiology of RRT options

UniII-

Applied renal anatomy and physiology, applied anatomy of neck, upper limb& lower limb vessels.

Unit III

Clinical presentation of renal disease & history taking.

Unit IV

Investigations in Nephrology- Urine examination, hemogram, serology, biochemical tests, radioimaging in nephrology, renal biopsy (indications, prerequisites, complications), Investigations required before starting of dialysis.

Unit V

Screening for chronic kidney disease and preventive nephrology.

Practicals:

Case discussion - Nephrotic syndrome, nephritic syndrome, Acute renal failure, chronic renal failure.

University practical examinations:

1. History taking -20 marks
2. General physical examination -20 marks (demonstration of pulse, BP, temperature, pallor, icterus, edema)

Recommended Books Recent edition

1. Dialysis therapy- Nissenson & Fine
2. Handbook of dialysis- Daugirdas ,Blake & Todd
3. Principles and practice of dialysis- Heinrich
4. Primer to kidney disease
5. CKD, Dialysis and transplant- A companion to Brenner & Rectors- TheKidney
6. Comprehensive Clinical nephrology -John Feehaly
7. Handbook of nutrition and kidney- Lippincott Williams & Wilkin

SEMESTER 3

PAPER 4

ENVIRONMENTAL SCIENCE

50 HOURS

S.NO	TOPIC	METHOD	HOURS
1	<p>The Multidisciplinary nature of environmental studies</p> <ul style="list-style-type: none">• Definition, scope and importance. <p>Need for public awareness</p> <p>Natural Resources</p> <p>Renewable and non-renewable resources:</p> <p>Natural resources and associated problems</p> <p>Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people</p> <p>Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems</p> <p>Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.</p> <p>Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy</p>		

	<p>sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification</p>		
	<p>Ecosystems Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Biodiversity and its conservation Hot-spots of biodiversity. Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity</p>		
	<p>Environmental Pollution Definition, causes, effects and control measures of:-</p> <ol style="list-style-type: none"> a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards <p>Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Fireworks, their impacts and hazards Pollution case studies Disaster management: floods, earthquake, cyclone and landslides.</p>		
	<p>Social Issues and the Environment From Unsustainable to Sustainable development Urban problems related to energy Water conservation, rain water harvesting, watershed management Resettlement and rehabilitation of people; its problems and concerns. Case studies Environmental ethics: Issues and possible solutions.</p>		

	<p>Consumerism and waste products. Environmental Legislation (Acts and Laws) Issues involved in enforcement of environmental legislation Human Population and the Environment Population growth, variation among nations with case studies Population explosion – Family Welfare Programmes and Family Planning Programmes</p> <p>Human Rights. Value Education Women and Child Welfare.</p>		
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B.Sc PERFUSION TECH.

SEMESTER 3

PAPER 5

Medical Emergencies & Patient Care

S.NO	TOPIC	METHOD	HOURS
1	<p>Introduction to Emergency Services</p> <p>Organization of Emergency Department, Guidelines in Emergency, Clinical Monitoring, Fluid Therapy and Blood Transfusion, Airway Management, Cardiopulmonary Resuscitation, Principal of Mechanical Ventilation, Injection – An Infusion Method, Acid Base and Electrolyte Imbalance</p>		
2	<p>Handling of Different Emergencies</p> <p>Cardiogenic Shock, Congestive Cardiac Failure, Myocardial Infarction, Head Injuries, Vasovagal Syncope, Seizer, Epilepsy, Conjunctival and Corneal Foreign Body, Foreign Body in Nose & in Ear, Epistaxis, Asthma, COPD, Haemoptysis, Rib Fracture, Tear Gas Exposure, Food Poisoning, Diarrhea, Urine Retention, Blunt</p>		

	Scrotal Trauma, Hypo & Hyperthermia		
3	Concept of health & Illness, Health Determinants, Concept of Patients & Their Types, Patient Centred Care & Fundamentals of Communications, Reporting & Recording of Patients, Rights of Patients , Concepts of Disease & Its Types, General Concept, Care & Prevention of Accident, Trauma & Infections		
4	Patient Care, Associated Units & Departments		

**B.Sc RENAL DIALYSIS TECH.
SEMESTER 4
PAPER 1**

Basic Intensive care

Hours 50

S.NO	TOPIC	METHOD	HOURS
1	Introduction, Communication and Documentation - Introduction to Patient Care: Principles of patient care. Types of patients (gender, age, diseases, severity of illness, triage). Communication & Documentation: Communication with doctors, colleagues and other staffs. Non-verbal communication, Inter-personnel relationships. patient contact techniques, communication with patients and their relatives, Documentation: Importance of documentation, initial and follow up notes; documentation of therapy, procedures and		

	communication		
2	<p>cautions and Infection Control - Universal Precautions and Infection Control: Hand washing and hygiene, Injuries and Personal protection, Insulation and safety procedures, Aseptic techniques, sterilization and disinfection, Disinfection and Sterilization of devices and equipment, Central sterilization and supply department, Biomedical Medical waste management</p>		
3	<p>ministration and Transport of patient -Medication Administration: Oral/Parenteral route, Parenteral medication administration: Intra venous, intra muscular, sub-cutaneous, intra dermal routes, Intra venous Infusion, Aerosol medication administration, Oxygen therapy, Intravenous fluids, Blood and blood component transfusion. Position and Transport of patient: Patient position, prone, lateral, dorsal, dorsal recumbent, Fowler's positions, comfort measures, bed making, rest and sleep. Lifting and transporting patients: lifting patients up in the bed, transferring from bed to wheel chair, transferring from bed to stretcher. Transport of ill patients (inotropes, intubated / ventilated patients)</p>		
4	<p>nd monitoring-Bedside care: Methods of giving nourishment: feeding, tube feeding, drips, transfusion. Recording of pulse, blood pressure, respiration, saturation and temperature. Bed side management: giving and taking bed pan, urine container. Observation of stools, urine, sputum, drains. Use and care of catheters and rubber goods. Care of immobile/bed ridden patients, bed sore and aspiration prevention</p> <p>Patient: Pulse, ECG (Cardiac Monitor), Oxygen Saturation, Blood Pressure, Respiration, Multi parameter monitors, Capnography and End Tidal CO2 (ETCO2),Hydration, intake and output monitoring Monitoring ventilator parameters: Respiratory Rate, Volumes, Pressures, Compliance, Resistance.</p>		
5	<p>wound care: Bandaging: basic turns, bandaging extremities, triangular bandages and their application. Surgical dressing: observation of dressing procedures. Suture materials and suturing techniques, Splinting. Basic care of patient with burns</p>		

PRACTICALS**25 HOURS**

S.NO	TOPIC	METHOD	HOURS
1	Demonstration of Patient care Procedures: Positioning of patient, transport of the patient, Dressing and Bandaging, Care of chest drain tube, Insertion of naso-gastric tube and feeding Venipuncture and obtaining blood samples, Arterial Blood sampling for ABG Injections: intra muscular, intra venous, sub cutaneous, intra dermal Insertion of intra venous catheter and infusion of medications, blood transfusion e) Recording of ECG and monitoring of patient Oxygen therapy: oxygen cannula, masks. Aerosol therapy: nebulization, inhalers g) Suctioning and care of artificial airway h) Insertion of urinary bladder catheter		
2	Uses, principles, advantages and disadvantages of instruments and Devices in patient care		
3	First aid and Basic Life Support (BLS)		
4	Spotters, Drugs, Instruments and devices - identification and usage, demonstration of patient care procedures		

B.Sc Renal Dialysis Technology

Semester IV

Paper 2-

Basic Concepts of Renal Disease Total Hours 50

Unit I:

Fluid and electrolyte disorders-

Hyponatremia, hypernatremia, hypokalemia & hyperkalemia: Etiology, clinical presentation and management

Disorders of calcium, phosphorous & magnesium ions. Acid-base disorders : Basics of ABG

Metabolic acidosis & metabolic alkalosis: pathophysiology, etiology, clinical features and management.

Unit II:

Urinary tract infections: Definition, types of UTI, risk factors, diagnosis, treatment

Unit III:

Renal stone diseases, inherited and cystic renal diseases

Composition of kidney stones, risk factors for recurrent stones, clinical presentation, prevention of recurrent stones & treatment

Unit IV

Hypertension- normal BP control, definition, evaluation, primary & secondary HTN, complications, antihypertensive drugs

Unit V:

Nephrotic syndromes- definition, clinical features, causes(MCNS, FSGS, MGN...), Primary & secondary NS, complications, management

Acute glomerulonephritis/RPGN- definition, causes(PSGN,vasculitis, anti GBM, SLE, HSP....), clinical features, management.

PRACTICALS: Priming of dialysis apparatus Or Charts /spotters : nephrotic syndrome, nephritic, AKI, CKD, BP apparatus, stethoscope, pulse oximeter, cardiac monitor, thermometer

Recommended Books Recent edition

- 1. Dialysis therapy- Nissenson & Fine**
- 2. Handbook of dialysis- Daugirdas, Blake & Todd**
- 3. Principles and practice of dialysis- Heinrich**
- 4. Primer to kidney disease**
- 5. CKD, Dialysis and transplant- A companion to Brenner & Rectors- The Kidney**
- 6. Comprehensive Clinical nephrology -John Feehaly**
- 7. Handbook of nutrition and kidney- Lippincott Williams & Wilkins**

B.Sc Renal Dialysis Technology

Semester IV

Paper 3-

Acute and chronic kidney diseases and nutrition Total Hours 50

Unit I:

AKI- definition, classification, etiology, strategies of reducing risk for AKI, complications, Non dialysis management of AKI dialysis therapy for AKI , Dialysis in ICU setting

Unit II:

Chronic kidney diseases- definition, staging , GFR calculation, causes for CKD, steps to retard progression of CKD, complications of CKD(cardiovascular, hematologic, mineral bone disorders, dermatologic, neuropsychiatric...), evaluation of CKD, management and RRT options

Unit III:

Nutritional requirements of healthy adults, RDA, effects of renal failure on nutrient metabolism, lipid abnormalities, overview of calcium phosphorous metabolism, trace elements and vitamins

Unit IV:

Sources and types of proteins, fats, carbohydrates and planning balanced diet

Unit V:

Diet in nephrotic syndrome, AKI, predialysis CKD, Nutrition in dialysis patients, foods to be avoided in CKD, fluid restriction.

Practicals

- 1. Priming of dialysis apparatus, Demonstration of dialyser reuse**
- 2. Spotters- HD catheters, dialysers, AV needle, tubings, dialysis machine, PD set, perm catheters, dialysis solutions, chemicals used in hemodialysis. 20 marks**

Recommended Books Recent edition

- 1. Dialysis therapy- Nissenson & Fine**
- 2. Handbook of dialysis- Daugirdas ,Blake & Todd**
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- 4. Primer to kidney disease**
- 5. CKD, Dialysis and transplant- A companion to Brenner & Rectors- TheKidney**
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B.Sc. Renal Dialysis Technology
Semester IV
Paper 4-

Hemodialysis part 1 Total Hours 50

Unit I:

Treatment options of RRT, decision to start dialysis and withdrawal of dialysis, predialysis patient education, choosing the RRT option , home hemodialysis

Unit II:

Basics of hemodialysis and urea kinetic modelling. Mechanisms of solute transport, dialyser clearance, kt/v and urea reduction ratio, adequacy in hemodialysis

Unit III

Vascular access for hemodialysis- venous catheters (type, design, location of insertion and methods used, complications of CVC, maintenance of dialysis catheters)

Arteriovenous access AVF/AVG (presurgical evaluation, advantages, complications and their management, cannulation techniques, measuring access flow, general measures to reduce infection)

Unit IV:

HD apparatus- blood circuit, dialysate circuit, monitors and alarms, pumps.
Dialysers -types /structure/membrane/clearance/ high flux & low flux

Unit V:

Product water and hemodialysis solution preparation- Contaminants in raw water, water and dialysis solution quality standards , dialysis solution composition, Preparation of RO water and distribution.

Practicals:

1. Demonstrate priming of dialysis apparatus-10 M
2. Demonstrate reuse of dialysers- 10 M
3. Spotters- HD catheters, dialysers, AV needle, tubings, dialysis machine, PD set, perm catheters, dialysis solutions, chemicals used in hemodialysis.

Recommended Books Recent edition

1. Dialysis therapy- Nissenson & Fine
2. Handbook of dialysis- Daugirdas ,Blake & Todd
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B.Sc. Renal Dialysis Technology
Semester V
Paper 1-
Hemodialysis part 2 Total Hours 50

Unit I:

Disinfection of HD machines and maintenance of RO plant- chemicals used and technique of disinfection, advantages

Unit II:

10hrs

Dialyser reuse- definition, methods, advantages and disadvantages of reuse

Unit III:

Hemodialysis for acute renal failure- indications, vascular access, HD prescription, common problems encountered, dialysis for critically ill patients.

Unit IV:

Chronic hemodialysis- indications, residual renal function, clearance targets and adequacy, chronic HD prescription, dry weight, complications, access recirculation, dialysis disequilibrium.

Unit V:

Anticoagulation- factors influencing clotting of extracorporeal circuit, signs of circuit clotting, drugs used for anticoagulation, various protocols, monitoring of anticoagulation, regional anticoagulation

Practicals:

1. Demonstrate priming of dialysis apparatus-10 marks
2. Demonstrate reuse of dialysers- 10 marks
3. Spotters- HD catheters, dialysers, AV needle, tubings, dialysis machine, PD set, perm catheters, dialysis solutions, chemicals used in hemodialysis. 20 marks

Recommended Books Recent edition

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2. Handbook of dialysis- Daugirdas, Blake & Todd
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B.Sc. Renal Dialysis Technology
Semester V
Paper 2-
Hemodialysis part 3 Total Hours 50

Unit I:

Complications of HD- Hypotension(causes and management) , Headaches, Chest pain and back pain, Leg cramps, Dialyser reactions , itching, nausea, Dialysis Disequilibrium(etiology and management) , seizures, cardiac arrhythmias, air embolism.

Unit II:

Renal anemia and its management- etiology, symptoms, treatment, indications for ESA and target Hb levels, dosing of erythropoietin and its side effects.

Unit III:

Hemofiltration/ Hemodiafiltration/ SCUF

Unit IV:

SLED/SLED-f: advantages of SLED, protocols, anticoagulation.

CRRT- about CRRT machine and tubings, schematic description of circuit, advantages and disadvantages, indications for CRRT, anticoagulation, replacement fluid(dose, pre Vs post filter)

Unit V:

Plasmapheresis- rationale, methods of plasma separation, indications, common diseases for which used, protocols, complications, anticoagulation for PP.

Practicals:

1. Setting up dialysis machine for dialysis
2. AVF/ AVG cannulation
3. Packing and sterilisation of dialysis trays
4. Preparation of concentrates
5. First assistant in central line insertions, PD catheter insertion and renal biopsy
6. Performance of PD exchanges
7. Setting up of APD machine
8. Performing isolated ultrafiltration
9. Priming of dialysis apparatus
10. Reuse of dialyser

Recommended Books Recent edition

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B.Sc. Renal Dialysis Technology
Semester V
Paper 3-
Hands on training in Continuous ambulatory peritoneal dialysis
Total Hours 50

- 1. Setting up Acute PD- catheter insertion, connections , performing and monitoring of PD**
- 2. Setting up CAPD, performing and monitoring of CAPD, seeing CAPD catheter insertion.**
- 3. Technical aspects of APD machine and performing and monitoring of APD**
- 4. Introduction to PD solutions**
- 5. Performing PET test**

B.Sc. Renal Dialysis Technology
Semester V
Paper 4-
Skill Enhancement-2 Research
Methodology and Biostatistics Total Hours 50

Unit I.

Introduction and Presentation of data

Meaning , Branches of Statistics, Uses of statistics in medicine, Basic concepts, Scales of measurement, Collection of data, Presentation of data; Tabulation, Frequency Distribution, Diagrammatic and Graphical Representation of Data.

Unit II.

Measures of central tendency and Measures of Variation

Arithmetic Mean (Mean), Median, Mode, Partition values, Range, Interquartile range , Mean Deviation, Standard Deviation, Coefficient of Variation.

Unit III.

Probability and standard distributions

Definition of some terms commonly encountered in probability, Probability distributions; Binomial distribution, Poisson distribution, Normal distribution, Divergence from normality; Skewness and kurtosis

Unit IV.

Census and Sampling Methods

Census and sample survey, Common terms used in sampling theory, Non-probability (Non random) Sampling Methods; Convenience sampling, Consecutive Sampling, Quota sampling, Snowball sampling, Judgmental sampling or Purposive sampling, Volunteer sampling, Probability (Random) Sampling methods; Simple random sampling, Systematic Sampling, Stratified Sampling, Cluster sampling, Multi-stage sampling, Sampling error, Non-sampling error.

Unit V.

Inferential statistics

Parameter and statistic, Estimation of parameters; Point estimation, Interval Estimation, Testing of hypothesis; Null and alternative hypotheses, Type-I and Type-II Errors.

Hospital Management & medical ethics (Theory)

Semester V

PAPER 5

UNIT-1 Introduction to hospital staffing- Hospital staffing, administration, PACS, HIS, RIS, DICOM. Medical records and documentation.

UNIT-2 Legal & medical issues- Legal and Ethical issues towards patient rights, patient responsibility, legal concerns, History taking, patient monitoring, inform consent, mal-practice, patient privacy issues. Professional ethics and Code of conduct of radiographer. Medical legal issues (MLC).

UNIT-3 Handling of patients Seriously ill and traumatized patients, visually impaired, hearing and speech impaired patients, mentally impaired patients/ psychologically issues, infectious patients, critical/trauma patients, pregnant patient, patient with implant. Handling of patient with life threatening diseases like HIV, STD, HBsAG, etc.

UNIT-4 Departmental Safety & Infection Control Safety and hazards from material and electricity etc. Biomedical waste management and control. Infection control Skin care, donning of gowns, gloves, face masks, head caps, shoe covers. Vitals signs- Vital signs. How to measure vital signs. Body mechanics and transferring & shifting of patient Draw sheet lift, use of slide boards, wheelchair to couch, couch to wheelchair, couch to table, three men lift and four men lift Orthodox & Austrian method etc. First aid- Artificial respiration, hemostasis, first aid techniques, ABCD management.

UNIT-5 Anesthesia-Local anesthesia and general anesthesia, uses in hospital, Facilities regarding general Anesthesia in different department of hospital. Management of adverse.

B.Sc. Renal Dialysis Technology

Semester VI

Paper 1-

Peritoneal dialysis & Dialysis in Special Situations

Total Hours 50

Unit I:

Functional anatomy of peritoneum, models of peritoneal transport, physiology of peritoneal transport, PET test, peritoneal clearance and clearance targets.

Dialysis in children - choice between Peritoneal dialysis and Hemodialysis, problems with vascular access, HD prescription in children ,nutrition and growth related issues

Dialysis in pregnancy-causes for AKI in pregnancy, dialysis regimen during pregnancy, indications for dialysis in pregnancy

Dialysis in HIV/ HBsAg/ HCV positive patients - Guidelines, infection control practices in HD units, dedicated machines, vaccination for dialysis patients.

Dialysis in patients with congestive cardiac failure- special precautions

Unit II:

Apparatus for PD, peritoneal Dialysis solutions, PD catheter designs and placement, catheter break in procedures, complications of PD catheters(leaks, outflow failure, catheter infections, hernias)

Unit III:

Common APD and CAPD prescriptions, advantages of cyclers, hybrid forms of PD, how to improve peritoneal kt/v, nutrition in CAPD.

Unit IV:

Causes of fluid overload in CAPD, ultrafiltration failure, preserving residual renal function, Peritonitis and exit site infections -potential routes of infection,diagnosis, common organisms, drugs used and drug delivery methods. Use of hemoperfusion and dialysis for poisoning cases- common indications for HP/HD, drugs which can be removed (acetaminophen, salicylates, digoxin, barbiturates, toxic alcohols, lithium, anticonvulsants)

Unit V:

Mechanical complications (hernias, abdominal wall edema,hydrothorax,) metabolic complications (glucotoxicity, lipid abnormalities, electrolyte abnormalities, protein loss)

Practical

1. Starting / Termination of dialysis
2. AV cannulation
3. Initiating dialysis through central lines
4. Packing of dialysis trays
5. Preparation of concentrates for dialysis purpose
6. Performing PD exchanges manually/cycler
7. CPR demonstration
8. Assisting minor procedures like central line insertions, renal biopsies
9. Performing isolated ultrafiltration
10. Priming and dialyser reuse

. Case discussion (a patient on peritoneal dialysis)

Spotters- cycler device, transfer sets, adaptor, minicaps, drain bags, PD solutions, catheters. 20 marks

Text books and reference books: Recent edition

1. Dialysis therapy- Nissenon & Fine
2. Handbook of dialysis- Daugirdas ,Blake & Todd

3. Principles and practice of dialysis- Heinrich
4. Primer to kidney disease
5. CKD, Dialysis and transplant- A companion to Brenner & Rectors- The Kidney
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B.Sc. Renal Dialysis Technology
Semester VI
Paper 2

Recent Advances in Dialysis Technology Total Hours 50

Unit I

MARS dialysis/dialysis in advanced liver disease- indication, technique, anticoagulation.

Unit II

Nocturnal hemodialysis/ short daily dialysis -advantages

Unit III

Newer peritoneal dialysis solutions- advantages and disadvantages

Unit IV

Online dialysis

Unit V

Home Hemodialysis

UNIT 6

Renal Transplantation : Options for patient with ESRD, basics in transplant immunology, donor selection, recipient evaluation

Science of deceased donor and living donor renal transplant- ischemia times and its impact on kidney function, brief introduction to immunosuppression used in transplant.

Problems encountered in transplant recipient- rejection, infection, drug toxicity, dyslipidemias, diabetes, cosmetic changes, impaired graft function.

Monitoring of patient on the waiting list for transplant.

Watching transplant inside the operation theatre

Practical:

1. Starting and Termination of dialysis
2. AVF/AVG cannulation
3. Initiating dialysis through central lines
4. Packing of dialysis trays
5. Preparation of concentrates for dialysis purpose
6. Performing PD exchanges manually/cycler device
7. CPR demonstration
8. Assisting minor procedures like central line insertions, renal biopsies, PD catheter insertion

9. Performing isolated ultrafiltration

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Recommended Books Recent edition

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