Syllabus

Kerala University of Health Sciences

Thrissur- 680596

B.Sc. Dialysis Technology

Course Code: 023

(w.e.f. 2024-25 admission onwards)

2024

2. COURSE CONTENT

2.1 Title of course:

B.Sc. DIALYSIS TECHNOLOGY

2.2 Objectives of course

Knowledge:

At the end of the course, the student shall have obtained

1. Adequate theoretical knowledge of the various forms of dialysis.
2. Knowledge of the indications, contraindications and complications of the procedures
3. Knowledge of the equipment used for dialysis
4. Understanding about the common diseases causing kidney failure and the clinical manifestations
5. Knowledge of appropriate use about the commonly used investigations for patients with kidney diseases

Skills:

At the end of the course, the student shall be able to

1. Perform hemodialysis, peritoneal dialysis, continuous renal replacement therapies, plasmapharesis and other extra corporeal therapies.
2. Handle the equipments used for dialysis and water treatment plant and do their day to day maintenance.
3. Manage complications that may occur during the procedures mentioned above.

Attitudes:

1. To understand and express that the patient is not a mere collection of symptoms, signs, disordered function, damaged organs and disturbed emotions- He is human, fearful, hopeful, seeking relief, health and reassurance.
2. To maintain a human touch always, integrating human touch with the modern methods of healing.
3. Maintain good relationship with professional colleagues. Avoid criticism of the measures taken by the colleagues, as medical practice is always a team work.
4. Treat the patient as a whole considering social, economical and family back- ground, and not the organ or systems that are abnormal.
5. Communicate effectively with patients and their relatives

2.3 Medium of instruction:

Medium of Instruction and examination shall be in English

2.4 Course outline

First year

Theory classes and practicals of following subjects

Paper I- Basics of Anatomy

Paper II- Basics of Physiology

Paper III- Basics of Biochemistry

Paper IV- Basics of Microbiology

Paper V –Basics of pathology

Paper VI- Basics of Biostatistics &Principles of Nursing

Students should attend dialysis unit after their theory classes to get acquaintance with the various procedures.

Second year

Theory classes and posting in the clinical area

Paper I -Applied Anatomy and Physiology related to dialysis, Paper II – Applied Pharmacology related to dialysis

Paper III – Applied aspects of Pathology and Microbiology related to dialysis

Paper IV – Introduction to renal diseases and nutrition, Basics of Dialysis Technology

Third year

Theory class and posting in the clinical area (Dept. of Nephrology)

Paper I – Dialysis technology & Hemodialysis, Medical ethics, Bio medical waste management, Bio medical engineering

Paper II – Specialized extra corporeal therapies, Critical care nephrology including renal transplantation

Practical schedule in extra corporeal therapies

Fourth Year

Fourth year is internship in Dialysis unit.

<u>Ethics</u>

Ethics is defined as the moral principles that govern a person's behaviour or the conducting of an activity. The moral principles in a person is acquired by constant interaction of the person with

himself and his social and cultural surroundings. Ethics should be approached as an abstract thick- ening rather than a concrete reality. It is only area in medical field where science merges with philosophy of life. It is guided by four principles of bioethics such as patient autonomy, non-ma- leficence, beneficence and justice. Teaching medical ethics is all about enlightening students the basic concepts and providing a favorable platform for them to build up their own ethical standards. As a dialysis technician, the case provided may end up in situations like he/she has to decide upon giving proper treatment to the most deserved patients due to lack of sufficient medical resources in a developing country like India. So this course is designed in such a way that ethics is taught in the entire duration of course, but in various aspects.

I year:

1st six months: 1 hr/month Ethics- Basic concepts Approaches

Importance Guidelines

2nd six months: interacting with patients. Identifying the problems faced by patients Self reflections in patient care

II year- projects submission

Case wise study of critically ill patients and prepare a project submitting a report on atleast 10 different patients with a study about their illness, analyzing the care provided, critically evaluating short comings and formulating suggestions to improve.

III year

Problem solving on different hypothetical care scenarios

2.5 Duration

Duration shall be for a period of four years including one year of internship.

2.6 Syllabus

First Year B.Sc. Dialysis Technology

Paper I- Basics of Anatomy

1. **Introduction: Human body as a whole (2**

hour) Theory:

- Definition of anatomy and its divisions
- Terms of location, positions and planes
- Cell and its organelles
- Epithelium-definition, classification, describe with examples, function
- Glands- classification, describe serous & mucous glands with examples

2. **Locomotion and support**

Theory: (10 hours)

- Cartilage – types with example &histology
- Bone – Classification, names of bone cells, parts of long bone, microscopy of compact
- bone, names of all bones, vertebral column, inter vertebral disc, fontanelles of fetal skull
- Joints – Classification of joints with examples, synovial joint (in detail for radiology)
- Muscular system: Classification of muscular tissue &histology

3. **Cardiovascular system Theory: (10 hours)**

- Heart-size, location, chambers, exterior &interior
- Blood supply of heart
- Systemic & pulmonary circulation
- Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, radial artery ,ulnarartery.
- superficial palmar arch, femoral artery, internal iliac artery
- Peripheral pulse
- Inferior venacava, portal vein, porto systemic anastomosis
- Great saphenous vein
- Dural venoussinuses
- Lymphatic system- cisterna chyli & thoracicduct
- Names of regional lymphatics, axillary and inguinal lymph nodes in brief

Practicals: (5hours)

- Demonstration of surface features & interior of the heart Demonstration of aorta and its branches
- Histology of cardiac muscles and artery.

4. **Gastro-intestinal system Theory: (4 hours)**
    - Parts of GIT, Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary
    - glands, Waldeyer'sring
    - Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas
    - Radiographs of abdomen

Practicals: (2hours)

- Demonstrations of the parts and functions Normal x-rays

5. **Respiratory system : (8 hours)**
    - Parts of RS, nose, nasal cavity, larynx, trachea, lungs, broncho pulmonary segments
    - Names of paranasal air sinuses
    - CECT scans of normal chest and abdomen
    - Normal radiographs of chest

Practicals: (4 hours)

- Demonstration of the parts and function
- Demonstration of the different parts of the respiratory system with special emphasis On lungs
- Histology of lungs

6. **Peritoneum: (4 hours)**
    - Description in brief
7. **Excretory system and Reproductive system**

Excretory system theory: (12 hours)

- Kidney, ureter, urinary bladder, male and female urethra

- Histology of kidney, ureter and urinary bladder
- Histology of kidney, ureter, urinary bladder
- Radiographs of abdomen-IVP, retrograde cystogram

Reproductive system

Theory: **(4 hours)**

- Parts of male reproductive system, testis, vas deferens, epididymis, prostate
- Parts of female reproductive system, uterus, fallopian tubes, ovary and Mammary glands

Practicals: **(5hours)**

Demonstration of Kidneys, ureter, bladder Histology of kidney

8. **Endocrine glands Theory:** **(2 hours)**
   - Names of all endocrine glands in detail
   - Hormones and their functions
9. **Nervous system Theory:** **(8 hours)**
   - Neuron
   - Classification of NS
   - Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve
   - Meninges, Ventricles & cerebrospinal fluid
   - Names of basal nuclei
   - Blood supply of brain
   - Cranial nerves
   - Sympathetic trunk & names of parasympathetic ganglia

Practicals: **(2 hour)**

Demonstration of brain and spinal chord

10. **Sensory organs:**

Theory: **(3 hours)**

- Skin:Skin-histology
- Appendages of skin
- Eye: Parts of eye & lacrimal apparatus
- Extra-ocular muscles & nerves supply
- Ear: parts of ear- external, middle and inner ear and contents

11. **Embrylogy:**

Theory: **(3 hours)**

- Histology
- Excretory system

NO UNIVERSITY PRACTICAL EXAMINATION FOR BASICS OF ANATOMY

Reference books:

1. 1.Inderbir Singh'S Textbook Of Anatomy- 3 Volume Set - 7 th edition, Jaypee
2. Vishram Singh'S Textbook Of Anatomy- 3 Volume Set - 3rd Edition
3. Textbook of Anatomy and Physiology for Nurses - Dr Ashalatha PR - 4 th edition
4. Human Anatomy- Regional and Applied - B.D Chaurasia,

Paper II- Basics of Physiology

1. **Introduction to Physiology and General physiology:** **(1 Hour)**
2. **Hematology:** **(9 hours)**

- Introduction– composition and function of blood Body fluid compartments
- Red blood cells – Erythropoiesis, stages of differentiation function, count physiological Variation.
- Haemoglobin– structure, functions, concentration physiological variation Methods of Estimation of Hb
- White blood cells –Production, function, life span, count, differential count
- Platelets– Origin, normal count, morphology functions.
- Plasma Proteins – Production, concentration, types, albumin, globulin, Fibrinogen, Prothrombin functions. Haemostasis & Blood coagulation
- Haemostasis –Definition, normal haemostasis, clotting factors, mechanism of clotting, disorders of clotting factors,
- Immunity

3. **Blood Bank:** **(8 hours)**

- Bloodgroups – ABO system,
  Rh system
- Blood grouping &typing
- Cross matching
- Rh system– Rh factor, Rh incompatibility.
- Blood transfusion– Indication, universal donor and recipient concept Selection
- criteria of a blood donor. Transfusion reactions
- Anticoagulants– Classification, examples and uses
- Anaemias: Classification – morphological and etilogical effects of anemia on body
- Bloodindices– Colour index , MCH, MCV, MCHC
- Erythrocyte sedimentation Rate (ESR) and Paced cell volume Normal values, Definition .determination,
- Blood Volume - Normal value, determination of blood volume and regulation of blood Volume
- Body fluid – pH, normal value, regulation and variation, electrolytes and common problems related to dialysis.
- Lymph– lymphoid tissue formation, circulation, composition and function of lymph

4. **Cardiovascular system:** **(10 hours)**

- Heart – Physiological Anatomy, Nerve supply Properties of Cardiac muscle, Cardiac cycle- Systole, diastole. Intraventricular pressure curves.
- Cardiac Output– definition, factors affecting and measurement, regulation
- Heart sounds: Normal heart sounds, Areas of auscultation.
- Blood Pressure – Definition, normal value, clinical measurement of blood pressure, factors affecting, measurement, short term regulation, intermediate and long term regulation of BP, shock.
- Physiological variations, regulation of heart rate, cardiac shock, hypotension, hypertension.
- Pulse– Jugular, radial pulse, Triple response, Other peripheral pulses and visible veins in upper, lower extremity and in neck
- Heart sounds– Normal heart sounds, cause characteristics and signification. Heart rate Electrocardiogram (ECG)–significance.

5. **Digestive System:** **(7 hours)**

- Physiological anatomy of Gastro intestinal tract, Functions of digestive system Salivary glands Structure and functions.
- Deglutination– stages and regulation
- Stomach– structure and functions.
- Gastric secretion– Composition function regulation of gastric juice secretion Pancreas– structure, function, composition, regulation of pancreatic juice
- Liver– functions of liver Bile secretion, composition, function regulation of bile secretion. Bilirubin metabolism types of bilirubin, Vandernberg reaction,
- Jaundice- types, significance.
- Gallbladder– functions
- Intestine– small intestine and large intestine
- Small intestine– Functions- Digestive, absorption, movements.
- Large intestine– Functions, Digestion and absorption of Carbohydrates, Proteins, Fats, Lipids. Defecation

6. **Respiratory system:** **(8 hours)**

Functions of Respiratory system, Physiological Anatomy of Respiratory system, Respiratory tract, Respiratory Muscles, Respiratory organ-lungs, Alveoli, Respiratory membrane, stages of respiration. Mechanism of normal and rigorous respiration. Forces opposing and favouring expansion of the lungs. Intra pulmonary pleural pressure, surface tension, recoil tendency of the wall.

Transportation of Respiratory gases :

- Transportation of Oxygen: Direction, pressure gradient, Forms of transportation, Oxygenation of Hb. Quantity of Oxygen transported. Lung volumes and capacities Regulation of respiration what? Why? How? Mechanisms of Regulation, nervous and chemical regulation.
- Respiratory centre. Applied Physiology and Respiration: Hypoxia, Cyanosis, Asphyxia, Dyspnea, Dysbarism, Artificial Respiration, Apnoea.

7. **Endocrine System:** **(6 hours)**

- Definition Classification of Endocrine glands & their Hormones
- Properties of Hormones .
- Thyroid gland hormone– Physiological, Anatomy, Hormone secreted, Physiological function, regulation of secretion.
- Disorders– hypo and hyper secretion of hormone

Adrenal gland

- Adrenal cortex- physiologic anatomy of adrenal gland, Adrenal cortex- cortical hormones functions and regulation
- Adrenalmedulla– Hormones , regulation and secretion. Functions of Adrenaline and nor adrenaline
- Pituitary hormones – Anterior and posterior pituitary hormones, secretion, function Pancreas– Hormones of pancreas
- Insulin – secretion, regulation, function and action Diabetesmellitus– Regulation of blood glucose level
- Parathyroid gland – function, action, regulation of secretion of parathyroid hormone, CKD-MBD parameters.
- Calcitonin– function and action

8. **Special senses** (Basics only) **(4 hours)**

- Vision– structure of eye. Function of different parts. Structure of retina Hearing structure and function of can mechanism of hearing
- Taste– Taste buds functions. Smell physiology, Receptors.

9. **Nervous system** (basics only**)** **(10 hours)**

- Functions of Nervous system, Neurone structure, classification and properties. Neuroglia, nerve fiber, classification, conduction of impulses continuous and saltatory.Velocity of impulse transmission and factors affecting.
- Synapse– structure, types, properties.
- Receptors – Definition, classification, properties.
- Reflexaction– unconditioned properties of reflex action. Babinski's sign. Spinal cord- nerve tracts. Ascending tracts, Descending tracts;
- Pyramidal tracts– Extra pyramidal tracts.

- Functions of Medulla, pons, Hypothalamic disorders. Cerebral cortex lobes and functions, Sensory cortex, Motor cortex, Cerebellum functions of Cerebellum. Basal ganglion-funtions. EEG.
- Cerebro Spinal Fluid(CSF) : formation, circulation, properties, composition and functions lumbar puncture.
- Autonomic Nervous System : Sympathetic and parasympathetic distribution and functions and comparison of functions.

10. **Excretory System and reproductive system (10 hours)**

- **Excretory organs**
  - **Kidneys:** Functions of kidneys structural and functional unit nepron, vasarecta, cortical and juxtamedullary nephrons – Comparision, Juxta Glomerular Apparatus –Structure and function. Renal circulation peculiarities.
  - **Mechanism of Urine formation:** Ultra filtration criteria for filtration GFR, Plasmafraction,EFP, factors effecting EFR. Determination of GFR selective reabsorption – sites of reabsorption ,substance reabsorbed, mechanisms of reabsorption Glucose, urea. H + Claminoacids etc. TMG, Tubular lead, Renal threshold % of reabsorption of different substances, selective e secretion. Properties and composition of normal urine, urine output.Abnormal constituents in urine Mechanism of urine concentration.
  - Counter –Current Mechanisms: Micturition, Innervation of Bladder, Cysteurethrogram. Diuretics : Water, Diuretics, osmotic diuretics, Artificial kidney Renal function tests –plasma clearance Actions of ADH, Aldosterone and PTH on kidneys. Renal function tests

- **Reproductive system**
  - Function of Reproductive system, Puberty, male reproductive system. Functions of testes, spermatogenesis site, stages, factors influencing semen. Endocrine functions of testes
  - Androgens – Testosterone structure and functions. Female reproductive system. Ovulation, menstrual cycle. Physiological changes during pregnancy, pregnancy test.
  - Lactation : Composition of milk factors controlling lactation.

11. **Muscles (1 hour)**

Classification of muscle, structure of skeletal muscle, Sarcomere contractile proteins,

Excitation contraction coupling. Mechanism of muscle contraction muscle tone, fatigue Rigour mortis.

12. **Skin** **(2 hours)**

-Structure and function Body temperature measurement, Physiological variation, Regulation of body Temperature by physical chemical and nervous mechanisms. Role of Hypothalamus, Hypothermia and fever.

PRACTICALS **(8 hours)**

- Examination of Pulse (1 hour)
- Blood pressure Recording (1 hour)
- ABPM 24 hr and orthostatic changes in BP
- Assessment of volume status both intra vascular volume and ECF as well as total body water using clinical and bioimpedance devices.
- Examination of cardiovascular system (2 hours)
- Examination of Respiratory system (2 hours)
- Examination of Gastro-intestinal system (2 hours)

NO UNIVERSITY PRACTICAL EXAMINATION FOR BASICS OF PHYSIOLOGY

Reference books:

Physiology

1. Guyton (Arthur) Text Book of Physiology. Latest Ed.
2. Choudhari (Sujith K) Concise Medical Physiology Latest Ed.
3. Ganong (William F) Review of Medical Physiology. Latest Ed.

Paper III-Basics of Biochemistry

1	Specimen collection and pre-analytical variables	Total hours
	a. Blood, CSF, Urine b. Use of urine preservatives & Anticoagulants	2 Hours
2	Units of measurements –conventional /SI Units	1 Hours
3	Preparation of standards –Stock & working standard.	3 Hours

	Primary& secondary)	
4	Acid & Base Definition Concepts of Acid Base Reaction, Hydrogen ion concentration PH value of solution, Buffers. Acid Base Indicators, commonly used indicators PH range, suitable PH indicators, universal indicators	4 Hours
5	Regulation of Acid Base Henderson-Hasselbach equation, Blood Buffer, Regulation of blood PH	3 Hours
	Disturbances in Acid Base Balance	2 Hours
	Basic Principles of estimation of Blood gases & PH ,electrolytes	1 Hours
6	Water and Electrolyte Regulation, sodium and potassium-electrolyte imbalance in details (renin angiotensin mechanism to be dealt by physiology)	2 Hours
7	Nutrition-Nitrogen balance, Dietary fibres.	1 Hours
	Nutritional importance of li-pids, carbohydrates, proteins, Vitamins, minerals-calcium	4 Hours
	Major metabolic disorder-diabetes mellitus. Dibates ketoacidosis, atherosclerosis.	2 Hours
	Vitamin deficiency disorders.	1 Hours
8	Plasma protein and immunoglobulin and electrophoresis	3 Hours
9	Renal function tests, Liver function tests	4 Hours
10	Total parenteral nutrition	1 Hours

Practical's

No	Topics	Total hours – 20 Hours
1	Introduction of Lab Apparatus, Measuring cylinders, centrifuge	
	a. Describe the different pipette, flasks, funnels, Measuring cylin-der, Bottle dispensers, desiccators	2 hours
	b. Maintenance and cleaning of Lab Glassware and Apparatus. C. Centrifuge, Balance, PH meter, incubator	2 hours
2	Dilutions	

	a. Preparation of O.1N Nacl from 1N solution	2 hours
	b. Preparation of standard solution of a) urea b) creatinine c) NaOH	2 hours
3	Preparation of Buffer	2 hours
4	Demonstration of specimen handling, ABG analysis, Estimation of im-portant renal profile parameters, centrifugation and processing of sample, chemical purity of water (clinical lab visit)	4 hours
	Normal and abnormal urine analysis (demonstration)	4 hours
	Analysis of urine for calculus (demonstration)	2 hours

Recommended text books:

1. Text book of Biochemistry – 9thedition, Jaypee Publishers – Dr. D. M. Vasudevan, Dr. S. Sreekumari& Dr. KannanVaidyanathan.
2. Study Guide of Biochemistry – Dr. Beena V. Shethy& Dr. Gayathri. M. Rao

Reference books:

1. Clinical biochemistry principles, techniques and correlations – Dr. Micheal M Bishop – 8th Edition.
2. Tietz fundamentals of clinical chemistry and molecular diagnostics – 8th edition – Dr. Nader Rifai, Dr. Andria Rita Horvath & Dr. Karl T Wittver.

NO UNIVERSITY PRACTICAL EXAMINATION FOR BASICS OF BIOCHEMISTRY

Paper IV -Basics of Microbiology

1. Morphology (4hours)

Classification of micro-organisms, size, shape and structure of bacteria. Use of microscope in the study of bacteria.

2. Growth and nutrition (4hours)

Nutrition, growth and multiplications of bacteria, use of culture media in diagnostic bacteriology.

3. Sterilisation and Disinfection (4hours)

Principles and use of equipment of sterilization namely Hot Air oven, Autoclave and incinerator. Pasteurization, Anti septic and disinfectants.

Antimicrobial sensitivity test

4. Immunology (12hours)

Immunity Vaccines, Types of Vaccine and immunization schedule, Basics Immunology

related to renal diseases & Renal Transplantation.

Principles and interpretation of commonly done serological tests namely Widal, VDRL, ASLO, CRP, RIA & ELISA. Rapid tests for HIV and HbsAg, HCV antibody (Technical details to be avoided)

5. Systematic Bacteriology (20 hours)

Morphology, cultivation, diseases caused, laboratory diagnosis including specimen collection of the following bacteria (the classification, antigenic structure and pathogenicity are not to be taught) Staphylococci, Streptococci, Pneumococci, Gonococci, Mycobacteria (only mycobacterium tuberculosis and M.leprae), Shigella, Salmonella, Esch coli, Klebsiella, Proteus, Pseudomonas & Spirochetes (only leptospira) and other major anerobes

6. Parasitology (2hours)

Morphology, life cycle, laboratory diagnosis of following parasites, Plasmodium, Tape worms, Intestinal nematodes

7. Mycology (4hours)

Morphology, diseases caused and lab diagnosis of following fungi. Candida, Cryptococcus, Dermatophytes, opportunistic fungi.

8. Virology (8hours)

General properties of viruses, diseases caused, lab diagnosis and prevention of following viruses, Herpes, Hepatitis, HIV

9. Hospital infection (2 hours)

Causative agents, transmission methods, investigation, prevention and control Hospital infection.

10. Principles and practice Biomedical waste management (4 hours)

Visit to hospital for demonstration of Biomedical waste management. Disposal of used dialyzers, tubings, fistula needles, catheters and CAPD bags.

11. Practical Demonstrations (2and 1/2hours)

- Gram Staining-½ hr
- Acid Fast Staining-½ hr
- Antibiotic Susceptibility Testing-½ hr
- CSR (Central Sterilization area) Visit-0ne hr.17
- Culture techniques: various media for culture of blood, urine, other body fluids and water for dialysis

How to take samples for culture of various biological fluids and culture of treated water for dialysis and their importance.

NO UNIVERSITY PRACTICAL EXAMINATION FOR BASICS OF MICROBIOLOGY

Reference books:

Microbiology

1. Ananthanarayanan and Paniker's Textbook of Medical Microbiology
2. Textbook of Microbiology- Dr C P Baveja
3. Essentials of Medical Microbiology – ApurbaShastry (reference book)

Paper V- Basics of Pathology

1. Histo Pathology – Theory (12 hours)

- Introduction to Histo Pathology
- Receiving of Specimen in the laboratory
- Grossing Techniques
- Mounting Techniques – various Mountants
- Maintenance of records and filing of the slides.
- Use & care of Microscope
- Various Fixatives, Mode of action, Preparation and Indication.
- Section Cutting
- Tissue processing for routine paraffin sections
- Decalcification of Tissues.
- Staining of tissues - H& E Staining

2. Clinical Pathology – Theory (7 hours)

- Introduction to Clinical Pathology
- Collection, Transport, Preservation, and Processing of various clinical specimens
- Urine Examination – Collection and Preservation of urine. Physical, chemical, Microscopic Examination
- Examination of body fluids.
- Examination of cerebrospinal fluid (CSF)
- Sputum Examination.
- Examination offeces

3 Haematology – Theory (8 hours)

- Introduction to Haematology
- Normal constituents of Blood, their structure andfunction.
- Collection of Blood samples
- Various Anticoagulants used in Haematology
- Various instruments and glassware used in Haematology, Preparation and use
- Of glassware
- Laboratory safety guidelines
- SI units and conventional units in Hospital Laboratory
- Hb, PCV
- ESR
- Normal Haemostasis Bleeding Time, Clotting Time, Prothrombin Time, Activated Partial Thromboplastin Time.

4. **Blood Bank (3 hours)**
   - Introduction
   - Blood grouping and Rh Types
   - Cross matching

Practicals : Urine Analysis **(10 hrs)**

NO UNIVERSITY PRACTICAL EXAMINATION FOR BASICS OF PATHOLOGY

Reference books:

Pathology –

1. Histological techniques-A Practical manual by K.Lakshminarayanan
2. Medical Laboratory Technology. Procedure Manual for Routine Diagnostic tests by Kanai.L.Mukherjee
3. Text book of Pathology by Robins

Paper VI– Basics of Bio Statistics & Principles of Nursing

BASICS OF BIO STATISTICS

(20 HOURS)

1. **Introduction**

- Meaning, definition, characteristics of statistics.
- Importance of the study of biostatistics.
- Role of biostatistics in health sciences.
- Parameters and estimates.
- Descriptive and inferential statistics.
- Variables and their types.

2. **Tabulation of Data**

- Raw data, frequency distribution.
- Basic principles of graphical representation.
- Types of diagrams -histograms, frequency polygons
- Commulative frequency curve
- Normal probability curve.

3. **Measure of Central Tendency**

- Need for measures of central tendency
- Definition and calculation of mean -ungrouped and grouped
- Meaning, interpretation and calculation of median ungrouped and grouped.
- Meaning and calculation of mode.
- Guidelines for the use of various measures of central tendency.

4. **Measure of Variability**

- Need for measure of dispersion.
- The range, the mean deviation.
- The variance and standard deviation.
- Calculation of variance and standard deviation ungrouped and grouped.

5. **Probability and Standard Distributions.**

- Meaning of probability of standard distribution.
- The Binominal distribution.
- The normal distribution.
- Divergence from normality -skewness, kurtosis.

6. Sampling Techniques

- Statistical inference
- Sampling distribution of a statistics
- Standard error
- Testing of hypothesis- t test, chi square test
    - Need for sampling -Criteria for good samples.
    - Sampling and non-sampling errors.
    - Probability and non-probability sampling techniques.

7. Health Indicators

- Importance of health Indicator.
- Indicators of morbidity, mortality.
- Calculation of rates and rations of health.

Internal Assessment

There shall be an internal assessment examination towards the end of the whole teaching schedule- 50 marks

Reference Books:

Social and Preventive Medicine – Park and Park

Biostatistics in brief made easy by K. Visweswara Rao

PRINCIPLES OF NURSING **(20 hrs)**

(i) Goal:

The broad goal of the teaching of undergraduate students in the Principles of nursing aims at providing comprehensive knowledge of the principles of asepsis, assessment of vital signs, dressings, small procedures, assisting the physician in the care of the sick patient and adequate documentation of therapy instituted.

(ii) Objectives

(A) Knowledge:

At the end of the course the student shall be able to:

a) Explain the principles of asepsis and its necessity in the clinical area;

b) Assess the medical condition of the patient with respect to his vital signs;

c) Triage the patient needing immediate medical attention.

(B) Skill

At the end of the course the student shall be able to;

a) Perform small procedures like bed making, insertion of intravenous canulae, give Injections, cleaning and dressing of wounds, care of bed ridden patients, bladder catheterization.

b) Assist the physician in procedures and therapy of patients;

c) Document all treatments undertaken with medico-legal completeness.

(C) Integration:

At the end of the integrated teaching the student shall acquire an integrated knowledge of nursing principles and its importance in the care of the sick patient.

The course in Principles of Nursing is to provide understanding of essential principles in the care of the sick patient as to well as to learn the skills needed to assist the physician in the practice of dialysis therapy.

1. Bed making
2. Bladder catherization
3. Injections – intravenous, intra muscular, subcutaneous
4. Insertion of intra venouscanulae
5. Cleaning and dressing of wounds and vascular access Sites And Peritoneal Catheter Exit Site
6. Assisting the physician in procedures like minor surgery, vascular access, etc
7. Removal of sutures
8. Care of bed ridden patients,
9. Documentation
10. Collection of blood, urine and stool specimens and their transferaseptic
11. precautions to the laboratory
12. CAPD Exchanges

Practicals : **20 hrs**

Principles of Nursing is a part of paper VI.

NO UNIVERSITY PRACTICAL EXAMINATION for BASICS OF BIO STATISTICS & PRINCIPLES OF NURSING

Reference books:

1. Kozier. B etal. Fundamentals of Nursing, Concepts, Process and Practice New Delhi,Dorling Kendersl
2. Susamma Varghese & Dr. Valsamma Joseph. Nursing Foundations & First aid, 2nd edi- tion, Frontline Publications, Hyderabad.
3. Taylor. C .etal. Fundamentals of Nursing-The Art & Science of Nursing Care, New Delhi
4. Fundamentals of Nursing –A procedure manual TNAI.
5. Wilkinson. J. M. Leuven .K .V. Fundamentals of Nursing-Thinking and Doing, NewDelhi, Jaypee Brothers Medical Publishers (P) Ltd.

SYLLABUS FOR SECOND YEAR B.Sc. DIALYSIS TECHNOLOGY

MAIN SUBJECTS

PAPER I - APPLIED ANATOMY & PHYSIOLOGY RELATED TO DIALYSIS

APPLIED ANATOMY (15 hrs)

1. Basic Anatomy Of Urinary System – Structural Anatomy Of Kidney, Bladder, Ureter, Urethra,Prostate
2. Histology Of Kidney
3. Blood Supply Of Kidney
4. Development Of Kidney In Brief
5. Anatomy Of Peritoneum Including Concept Of Abdominal Hernias
6. Anatomy Of Vascular System

Upper Limb Vessels–Course, Distribution, Branches, Origin&
Abnormalities Neck Vessels–Course, Distribution, Branches, Origin
& Abnormalities Femoral Vessels-Course, Distribution, Branches,
Origin & Abnormalities

1. Inderbir Singh'S Textbook Of Anatomy- 3 Volume Set - 7 th edition, Jaypee
2. Vishram Singh'S Textbook Of Anatomy- 3 Volume Set - 3rd Edition
3. Textbook of Anatomy and Physiology for Nurses - Dr Ashalatha PR - 4 th edition
4. Human Anatomy- Regional and Applied - B.D Chaurasia,

PHYSIOLOGY (15 hrs)

- Mechanism Of Urine Formation

- Glomurular Filtration Rate (GFR)
- Clearance Studies and assessment of residual renal function.
- Physiological Values –Urea, Creatinine, Electrolytes, Calcium, Phosphorous, Uric Acid, Magnesium, Glucose
- 24 Hours Urinary Indices–Urea, Creatinine, Electrolytes, Calcium, Magnesium
- Physiology of Renal Circulation
- Factors Contributing & Modifying RenalCirculation Auto regulation
- Hormones Produced By Kidney & Physiologic Alterations In Pregnancy
- Haemostasis –Coagulation Cascade, Cogulation Factors, Auto Regulation, Bt, Ct, Pt, Ptt, ThrombinTime
- Acid Base Balance –Basic Principles and interpretation & Common Abnormalities LikeHypokalemia, Hyponatremia, Hyperkalemia, Hypernatremia, Hypocalcemia, Hypercalcemia, Ph, Etc.

Reference books:

1.Guyton (Arthur) Text Book of Physiology. Latest Ed. 2.Choudhari (Sujith K) Concise Medical Physiology Latest Ed.
3.Ganong (William F) Review of Medical Physiology. Latest Ed.

NO UNIVERSITY PRACTICAL EXAMINATION FOR APPLIED ANATOMY & PHYSIOLOGY RELATED TO DIALYSIS

Anatomy reference books:

1-.Inderbir Singh'S Textbook Of Anatomy- 3 Volume Set - 7 th edition, Jaypee
2- Vishram Singh'S Textbook Of Anatomy- 3 Volume Set - 3rd Edition
3- Textbook of Anatomy and Physiology for Nurses - Dr Ashalatha PR - 4th edition
4- Human Anatomy- Regional and Applied - B.D Chaurasia

Physiology reference books:

1. Guyton (Arthur) Text Book of Physiology. LatestEd.
2. Choudhari (Sujith K) Concise Medical Physiology LatestEd.
3. Ganong (William F) Review of Medical Physiology. Latest Ed.

PAPER II -APPLIED PHARMOCOLOGY RELATED TO DIALYSIS (20 hrs)

1. IV Fluid therapy with special emphasis in renal diseases
2. Diuretics – classification, actions, dosage, side effects &contraindications
3. Anti Hypertensives – classification, actions, dosage, side effects& contraindications, special reference to during dialysis, vasopressors, drugs used in hypotention
4. Drugs & Dialysis – dose & duration of administrationc of drugs
5. Dialysable Drugs – Phenobarbitone, Lithium, Anti hypertensives ,Methanol Etc.
6. Vitamin D & Its Analogues, Phosphate Binders, Iron, Folic Acid & Other Vitamins Of Therapeutic Value
7. Erythropoietin in detail
8. Heparin including low molecular weightheparin
9. Protamine Sulphate
10. Formalin, Renalin , Sodium Hypochlorite, Hydrogen Peroxide – role as disinfactants& adverse effects of residual particles applicable to formalin
11. Haemodialysis Concentrates – Composition & Dilution (Acetate &Bicorbonates), Fluids for Hemodiafiltration and CRRT fluids.
12. Peritoneal Dialysis Fluid In Particular Hypertonic Solutions – composition , newer solutions, bicarbonate buffer and amino acids.
13. Potassium exchange resins with special emphasis on mode of administration

NO UNIVERSITY PRACTICAL EXAMINATION FOR APPLIED PHARMACOLOGY RELATED TO DIALYSIS

Reference book:

1. Essentials of Medical Pharmacology-K.D.Tripathi

PAPER III - APPLIED ASPECTS OF PATHOLOGY & MICROBIOLOGY RELATED TO DIALYSIS

PATHOLOGY

1. Introduction to Pathology (3 hours)

- Histopathology- Methods and techniques
- Cytology-FNAC, Exfoliative advantages and limitations of cytology
- Hematology-Sample collection.
- Immunohistochemistry,Immunofluorescence, Electron microscopy, Flowcytometry

2. Cell injury & adaptations (1 hour)

- Etiology
- Reversible & - Irreversible cell injury
- Necrosis & Apoptosis
- Gangrene - Dry - Wet
- Atrophy, Hypertrophy, Hyperplasia, Metaplasia, Dysplasia. Fatty change

3. Inflammation& Repair (2hours)

What is inflammation

Signs of inflammation, Acute and chronic inflammation, Types of inflammation, Giant cells, Macrophages, Ulcer, abscess, Acute inflammation, Systemic effects of acute inflammation

Factors affecting healing- Complications of healing

4. Hemodynamic Disorders (2 hours)

- Definition of edema and causes of edema
  - Exudate and transudate
- Shock – Definition and types of shock Thrombosis
- Embolism- Definition and types of emboli ,- Pulmonary thromboembolism

5. Applied pathology related to Excretory System (10 hours)

a. Congenital Abnormalities of Urinary System
b. Classification of Renal Diseases
c. Glomerular Diseases – Causes, Types & Pathology
d. Tubulointerstitial Diseases
e. Renal Vascular Disorders
f. End Stage Renal Diseases – Causes & Pathology
g. Pathology of Kidney In Hypertension, Diabetes Mellitus, Pregnancy
h. Pathology of Peritoneum – Peritonitis – Bacterial, Tubular & Sclerosing Peritonitis Dialysis Induced Changes
i. Pathology of Urianry Tract Infections
j. Pyelonephritis &Tuberculous Pyelonephritis

6. Anaemias - Types of anaemia (1 hour)

7. WBC disorders Non neoplastic and neoplastic (1 hour)

8. Lymphoreticular system- Lymphadenitis, Lymphomas (1hour)

9. Platelet and coagulation abnormalities-Primary & Secondary Hemostasis

Lab visit **(4 hours)**

Histopathology lab – 1 hour

Hematology lab and blood bank – 2

hours Cytology lab- 1 hour

Reference book:

1. Text book of Pathology –Harsh Mohan

MICROBIOLOGY **(10 hrs)**

1. Hepatotrophic Viruses in Detail – Mode of Transfusion, Universal Precautions, Vaccinations
2. Human Immunodeficiency Virus (Hiv), Mode of Transfusion, Universal Precautions.
3. Oppurtunistic Infections
4. Microbiology of Urinary Tract Infections
5. Microbiology of Vascular Access Infection (Femoral, Jugula, Subclavian Catheters)
6. Sampling Methodologies for Culture & Sensitivity

Lab visit - Culture and sensitivity of body fluids **(2 hrs)**

NO UNIVERSITY PRACTICAL EXAMINATION FOR APPLIED ASPECTS OF PATHOLOGY & MICROBIOLOGY RELATED TO DIALYSIS

Reference books:

1. Ananthanarayanan and Paniker's Textbook of Medical Microbiology
2. Textbook of Microbiology- Dr C P Baveja
3. Essentials of Medical Microbiology – ApurbaShastry (reference book)

PAPER IV – INTRODUCTION TO RENAL DISEASES & NUTRITION, BASICS OF DIALYSIS TECHNOLOGY

a) INTRODUCTION TO RENAL DISEASES **(30hrs)**

1. Classification of renal diseases
2. Glomerular diseases

3. Tubulointerstitial diseases
4. Pathology of kidney in hypertension, diabetes mellitus and pregnancy
5. Acute Kidney Injury
6. Nephrotic Syndrome
7. Nephritic Syndrome
8. Urinary Tract Infections
9. Asymptomatic Urinary Abnormalities
10. Chronic Kidney Disease
11. Renal Stone Diseases
12. Obstructive Uropathies
13. Congenital & Inherited Renal Diseases
14. Tumors Of Kidney
15. Pregnancy Associated Renal Diseases
16. Renal Vascular Disorders & Hypertension Associated Renal Diseases

Reference book:

1. Essentials of Nephrology:-Dr.R.Kasivisweswaran

b) NUTRITION - **(6hours)**

Definition

Food Pattern and Its Relation to Health

Factors Influencing Food Habits, Selection and Food Stuffs Superstitions, Culture, Religion, Income, Composition of Family, Age, Occupation, Special Group Etc

Food Selection, Storage & Preservation Prevention of Blood Adulteration

CLASSIFICATION OF NUTRIENTS

MACRONUTRIENTS AND MICRONUTRIENTS

Proteins– Types, Sources, Requirements and Deficiencies of Proteins Carbohydrates Sources, Requirements &Deficiency

Fats– Types, Sources, Requirements and Deficiency of Fats

Water– Sources of Drinking Water, Requirements, Preservation of Water and methods of water treatments for drinking water.

Minerals – Types, Sources, Requirements Deficiencies of Minerals Vitamins - Types,

Sources, Requirements Deficiencies of Vitamins

PLANNING DIETS

- Need For Planning Diets
- Concept of A Balanced Diet
- Food Group &Balanced Diet
- Influence of Age, Sex, Occupation & Physiological State
- Recommended Dietary Intake In Planning Diet
- Steps In Planning Balanced Diet
- Planning Renal Diet , Diet for CAPD and HD patients.

Reference books:-

Social and Preventive Medicine – Park and Park

Hand book of Nutrition and Kidney-William E.Mitch, Saulo Klahr

BASICS OF DIALYSIS TECHNOLOGY (24 hrs)

1. History of dialysis
2. Indications of Dialysis
3. Types of Dialysis
4. Principles of Dialysis –Definition
5. Haemodialysis Apparatus – Types of Dialyser &Membrane
6. Types of Vascular Access For Haemodialysis
7. Introduction To Haemodialysis Machine , Hemodiafiltration and CRRT machine
8. Priming of Dialysis Apparatus , Connection to and disconnection from HD machine
9. Dialyser Reuse- automated and manual method.
10. Common Complications of Haemodialysis and their management.
11. Monitoring of Patients During Dialysis – Meaning and management of various safety alarms during dialysis.
12. CAPD- Initiation , monitoring , exit site, connection and disconnection , changing trans- fer set , detecting PD infections and immediate actions.

NO UNIVERSITY PRACTICAL EXAMINATION FOR INTRODUCTION TO RENAL DIS- EASES & NUTRITION, BASICS OF DIALYSIS TECHNOLOGY

Reference books:

1. Handbook of Dialysis – Daugirdas
2. Henrich's Principles and Practice of Dialysis-Edgar V.Lerma,MathewR.Weir
3. Clinical Dialysis.-Allen R.Nissenson
4. Peritoneal Dialysis primer.-Dakshinamoorthy.K.V

SYLLABUS FOR THIRD YEAR B.Sc. DIALYSIS TECHNOLOGY

PAPER I - DIALYSIS TECHNOLOGY AND HEMODIALYSIS, MEDICAL ETHICS, BIO MEDICAL WASTE MANAGEMENT, BIO MEDICAL ENGINEERING

A) Dialysis Technology and Hemodialysis (62 Hrs)

1. History and types of dialysis
2. Indications of Dialysis
3. Theory of Haemodialysis – Diffusion, Osmosis, Ultra filteration & Solvent Drag, Hemodiafiltration and CRRT.
4. Haemodialysis Appratus – Types Of Dialyser & Membrane, Dialysate
5. Physiology of Peritoneal Dialysis
6. Vascular Access For Haemodialysis & Associated Complications
7. Peritoneal Access Devices – Types of Catheter, Insertion Techniques & Associated Complications
8. Dialysis Machines - Mechanism of Functioning & Management - Haemodialysis Machine
   - Peritoneal Dialysis Machine , Sterilization of machines
9. Complications of Dialysis
   Haemodialysis – Acute & Long Term Complications Peritoneal Dialysis – Mechanical & Metabolic Complications
10. Biochemical Investigations Required for Renal Dialysis
11. Adequacy of Dialysis and (Haemodialysis and Peritoneal Dialysis) Peritoneal Equilibriation Test (Pet)
12. Anti Coagulation
13. Peritonitis & Exit Site Infection
14. Withdrawal of Dialysis

    Indications –Acute
    Dialysis Chronic

Dialysis

15. **Cardio Pulmonary Resuscitation –** Basic Cardiac Life Support & Advanced Cardiac Life Support (3 hours)
16. **Basic Principles of Blood Transfusion & Fluid Therapy (6 hours)**

B) Medical Ethics (3 Hours)

Medical Ethics &The Relevant Medico Legal Aspects (3 hours)

- Responsibilities & Duties
- Ethical Behaviour & Conduct
- Medico Legal Aspects And Its Relation To Consumer
- Protection Act
- **Sterilisation techniques** (6 hours)

C) Bio Medical Waste Management (3 Hrs)

D) Bio Medical Engineering (20 Hours)

Various aspects of Bio Medical Engineering in relation to Dialysis machines and other life saving equipment in Dialysis unit and in Critical Care Units.

Practical Exam

The student should know how to start a dialysis on his own, priming, avfcannulation, starting and closing of dialysis, and tackling common complications during dialysis and managing alarms during hemodilaysis preparing the dialyser and tubings for reuse. biomedical waste disposal,and Technical aspects of dialysis machines

ONE COMMON UNIVERSITY PRACTICAL EXAMINATION

Reference books for dialysis:

- Handbook of Dialysis – Daugirdas
- Henrich's Principles and Practice of Dialysis-Edgar V.Lerma,MathewR.Weir
- Clinical Dialysis.-Allen R.Nissenson
- Peritoneal Dialysis primer.-Dakshinamoorthy.K.V

Reference books for biomedical waste management:

- Social and preventive medicine- Park and Park (Biomedical waste management)
- Text book of microbiology-Ananthanarayanan and Jayarampanicker

Reference book for biomedical engineering:

- Handbook of biomedical instrumentation- R.S. Khanpur

PAPER II - SPECIALISED EXTRA CORPOREAL THERAPIES, CRITICAL CARE NEPHROLOGY INCLUDING RENAL TRANSPLANTATION

1. **Dialysis in Special Situations - 70hrs**
    - Patients with Congestive Cardiac Failure
    - Advanced Liver Disease
    - Patients Positive for HIV (Human Immuno Deficiency Virus), Hepatitis C Virus & Hepatitis B Virus
    - Failed Transplant
    - Patients with hypo orhypertension
    - AKI with multisystem organfailure
    - Poisoning Cases
    - Pregnancy
2. **Dialysis in Infants &Children**
3. **Dialyser Reuse**
4. **Special Dialysis Procedures**
    - Continuous Therapies in Haemodialysis
    - Different Modalities of Peritoneal Dialysis
    - Haemodiafiltration
    - Haemoperfusion
    - SLED (Sustained Low Efficiency Dialysis)
    - MARS
5. **Plasmapheresis**
6. **Home hemodialysis**
7. **Sorbent technology**
8. **Special Problems in Dialysis Patients**
    - Psychology &Rehabilitation
    - Diabetes
    - Anaemia

- Hypertension
- Infections
- BoneDiseases
- Aluminium Toxicity

9. **Recent Advances in Haemodialysis**
    - Nocturnal Dialysis
    - Homehemodialysis
    - Daily Diaysis
10. **Telemedicine in Dialysis Practice**
11. **Water Treatment System**

    Water Contaminants, Water qualityfor Dialysis, Components of water treatment system, Maintenance
12. **Renal Anaemia Management**
13. **Critical Care Nephrology** –Management of Renal Failure In ICU (4 hours)
14. **Renal Transplantation –** Principles, Immunology, Patients Selection, Surgical Procedure, Complications, Post Transplant Evaluation & Management (5 hours)

Practical demonstration sessions:

- Effective communication with patients & relatives - 3 hrs
- Aseptic techniques in Dialysis Unit - 3 hrs
- Checking vital signs-Pulse, blood pressure, respiration, temperature - 2 hrs
- Disinfection of dialysis equipments - 3 hrs
- Water treatment plant – Operation & Maintenance - 5 hrs
- Nursing care of patients during treatment - 3 hrs
- Connecting dialyzers and blood tubings- 1 hour
- Priming of dialysers and blood tubings - 1 hour
- Checking Fibre bundle volume of dialyzers - 2 hrs
- Reuse of hollow fibre kidney- 3 hrs
- Assesing fibre bundle volume -1hour
- Reuse of blood tubings - 1 hour

- Care of temporary vascular access (IJC & FC) - 3 hrs
- Care of AV fistula - 2 hrs
- Evaluation of AV fistula - 3 hrs
- Starting hemodialysis - 2 hrs
- Monitoring during hemodialysis - 3 hrs
- Closing hemodialysis - 2 hrs
- Operation of hemodialysis machine - 5 hrs
- Alarms in HD machine - 5 hrs
- Anticoagulation during HD - 2 hrs
- Performing heparin free dialysis - 2 hrs
- Cannulation of AV fistula - 3 hrs
- Assesing access recirculation-1hr
- Operation and maintenance of CRRT machine - 4 hrs
- Performing Continuous veno venous hemodialysis - 5 hrs
- Performing Plasmapheresis - 5 hrs
- Carrying out peritoneal dialysis - 2 hrs
- Performing Peritoneal Equilibration test - 3 hrs
- Preparation of bicarbonate dialysate - 2 hrs
- Identification & Correction of safety alarms on HD machine - 5 hrs
- Maintenance of HD machine - 3 hrs
- Care of an unconscious patient - 3 hrs
- Operation of cardiac monitor - 3 hrs
- Operation of syringe and infusion pump - 2 hrs
- Management of hypotension during HD - 3 hrs
- Operation of ventilators - 2 hrs

ONE COMMON UNIVERSITY PRACTICAL EXAMINATION

FOURTH YEAR

INTERNSHIP

Description:

One-year compulsory internship in various clinical areas in the hospital (dialysis unit, renal transplantation ICU, and in areas in hospital where their services are essential) during which the students get to hone their skills and knowledge acquired in the three years of rigorous study. During this period their work is very similar to what is expected from them after the completion of their training. The training ensures their readiness to approach a patient in any setting.

Eligibility:

Student who has successfully passing all the papers in all the 3 years.

Duration:

One year (compulsory internship) in the institution where they completed their course.

2.7 Total number of hour: Separately given in 2.11

2.8 Branches if any with definition: Nil

2.9 Teaching learning methods

There must be enough opportunities to be provided for self learning. The methods and techniques that would ensure this must become a part of teaching- learning process. Proper records of the work should be maintained which will form the basis for the students assessment.

2.10 Content of each subject in each year

	First Year
Paper I	Basics of Anatomy
Paper II	Basics of Physiology
Paper III	Basics of Biochemistry
Paper IV	Basics of Microbiology
Paper V	Basics of Pathology
Paper VI	Basics of Biostatistics & Principles of Nursing
	Second Year
Paper I	Applied Anatomy & Physiology related to dialysis,

Paper II	Applied Pharmacology related to dialysis
Paper III	Applied aspects of Pathology and Microbiology related to dialysis
Paper IV	Introduction to renal diseases & nutrition, Basics of Dialysis Technology
	Third year
Paper I	Dialysis technology and Haemodialysis , Medical ethics, Biomedical waste management, Biomedical Engineering
Paper II	Specialized extra corporeal Therapies, Critical Care Nephrology including Renal transplantation
	Fourth Year
Internship	

2.11 No: of hours per subject

	First Year	No of theory hours	No of practical hours
Paper I	Basics of Anatomy	71	20
Paper II	Basics of Physiology	76	8
Paper III	Basics of Biochemistry	27	24
Paper IV	Basics of Microbiology	64	2 ½
Paper V	Basics of Pathology	30	10
Paper VI	Basics of Biostatistics & Principles of Nursing	40	20
	Clinical training in Nephrology Department -	1048 Hours	
	Second Year		
Paper I	Applied Anatomy & Physiology related to dialysis,	30	0
Paper II	Applied Pharmacology related to dialysis	20	0
Paper III	Applied aspects of Pathology and Microbiology related to dialysis	31	6
Paper IV	Introduction to renal diseases & nutrition, Basics of Dialysis Technology	60	0

	Clinical posting in Nephrology Department	1300 Hours	
	Third year		
Paper I	Dialysis technology and Haemodialysis , Medical ethics, Biomedical waste management, Biomedical Engineering	106	0
Paper II	Specialized extra corporeal Therapies, Critical Care Nephrology including Renal transplantation	79	103
	Clinical training in Nephrology Department	1152 Hours	
	Fourth Year		
	Internship		

2.12 Practical training

As specified in the respective part of syllabus

2.13 Records: Every graduate student shall maintain a record.

2.14 Dissertation: Not Applicable

2.15 Speciality training if any;

2.16 Project work to be done if any : Not Applicable

2.17 Any other requirements [CME, Paper Publishing etc.]: Desirable

2.18 Prescribed/recommended textbooks for each subject as specified in respective sections in the syllabus part

2.19 Reference books

As specified in respective sections in the syllabus part

2.20 Journals 1 .Indian Journal of Nephrology

2. Indian journal of peritoneal dialysis

2.21 Logbook

To be maintained by the candidate and counter signed by the concerned HOD.

a) Log Book

A log book has to be maintained by all students and this has to be reviewed by the HOD of the department periodically. Periodic assessment has also to be done in the department by the teachers. Log Book is to be submitted at the time of practical examination for perusal by examiners.

b) Model of Log Book

LOG BOOK

1. Name…….
2. Roll No.
3. Address
4. Details of Posting: To be signed by the Supervising Teacher

5. Participation Conferences – CME Programmes
6. Details of Leave availed
7. Details of participation in Academic Programmes
8. Seminars/ Symposia presented
9. Journal Clubs
10. Special duties (if any)
11. Miscellaneous
12. Daily Activities Record (Blank pages)
    (Four page for each month x 48 month pages)

Signature of student:

Signature of Supervising Teacher:

Signature of Head of Division/ Co-ordinator of the course:

Every graduate student shall maintain a record of skills he/she has acquired during the training period certified by the various Heads of Departments/Program Coordinator under whom he/she has undergone training.

In addition, the Head of the Department shall involve their graduate students in Seminars, Journal Club, Group Discussions and participation in Clinical, Clinical-Pathological meetings.

The Head of the Departments/Program coordinator shall scrutinize the log- book in every month.

At the end of the course, the student should summarize the contents and get the log book certified by the Head of the Department.

The log book should be submitted at the time of practical examination for the scrutiny of the Board of Examiners

3. EXAMINATIONS

3.1 Eligibility to appear for exams

As per course regulation

3.2 Schedule of Regular/Supplementary exams

As per examination calendar

3.3 Scheme of examination showing maximum marks and minimum marks

	Theory					
	University Examination		Internal Assessment		Grand Total	
First Year	Max	Min	Max	Min	Max	Min
Paper I	100	50	50	25	150	75
Paper II	100	50	50	25	150	75
Paper III	100	50	50	25	150	75
Paper IV	100	50	50	25	150	75
Paper V	100	50	50	25	150	75
Paper VI	100	50	50	25	150	75

	Theory					
	University Examination		Internal Assessment		Grand Total	
Second Year	Max	Min	Max	Min	Max	Min
Paper I	100	50	50	25	150	75
Paper II	100	50	50	25	150	75
Paper III	100	50	50	25	150	75
Paper IV	100	50	50	25	150	75

	Theory			Practical				Grand Total
	University Examination	Internal Assessment	Total	University Examination	Internal Assessment	Viva	Total	

Third year	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Max	Min	Max	Min
Paper I	100	50	50	25	150	75	80	40	20	10	20	120	60	270	135
Paper II	100	50	50	25	150	75	80	40	20	10	20	120	60	270	135

Fourth Year
Internship

3.4 Papers in each year

As per table 2.10

3.5 Details of theory exams

University Examination shall be conducted at the end of every academic year. A candidate who satisfies the requirement of attendance and internal assessment marks, as stipulated in the course regulation shall be eligible to appear for the University Examination.

3.6 Model question paper for each subject with question paper pattern [Annexure I]

3.7 Internal assessment component

Sl.No.	Items	Maximum marks	Split up
1	Attendance	5	96% and above - 5 marks 92.1 % - 95.9% - 4 marks 88.1 % - 92% - 3 marks 84.1% - 88% - 2 marks 80% - 84% - 1 mark
2	Assignments	5	Must be handwritten. Valuation is based on content, presentation, and originality. Plagiarism will not be accepted and treated seriously and those assignments will be rejected.
3	Class tests (including project of ethics in the case of second year)	40	The affiliated colleges shall conduct at least three internal examinations/ tests in each subject of which one shall be in the KUHS examination pattern, which shall be mandatory. Average Marks of the best 2of the periodical Assesement examinations shall be taken as the internal assessment mark of the candidate.

THERE SHALL BE NO UNIVERSITY PRACTICAL EXAMINATION IN FIRST YEAR, SECOND YEAR

3.8 Details of practical/clinical practical exams.

As specified in the syllabus part

3.9 Number of examiners (Internal & External) and their qualifications

Internal Examiners-2 (1 Professor/Associate Professor with DM Nephrology)

External Examiner-2

4. INTERNSHIP

4.1 Eligibility for internship

As per the Academic regulation of the course

4.2 Details of Internship Training

As specified in syllabus part

ANNEXURES

Check Lists for Monitoring: Log Book, Seminar Assessment etc. to be formulated by the curriculum committee of the concerned Institution

ANNEXURE I

FIRST YEAR BSC RENAL DIALYSIS TECHNOLOGY

REGULAR/ SUPPLEMENTARY EXAMINATION AUGUST 20

(BASICS OF ANATOMY)

Time: 3 hrs Max.Marks: 100

- Answer all questions
- Draw diagram wherever necessary

Essay:

1. Enumerate different parts of "Urinary System". Describe "Kidney" in detail under following headings.

a) coverings

b) position c) relations

d) microscopic structure

e)investigations 4+4+6+4+2=20 marks

Short notes:

2. Right atrium

3.Pouch of Douglas

4. Aorta

5. Cephalic Vein

6. Cartilage

7.Peripheral pulses

8. Ventricles of brain

9. Placenta

10.Portosystemic anastomoses

11. Thyroid Gland 10x8=80marks

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FIRST YEAR PAPER II

BASICS OF PHYSIOLOGY QUESTION PAPER

First year renal dialysis technology examination

Physiology

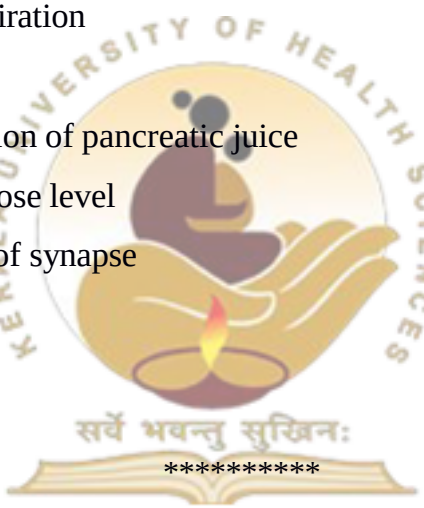
Time: 3 hrs Max marks :100

Essay

1. Mechanism of urine formation (20)

Short notes (10x8=80)

2. Complications of blood transfusion
3. Neural regulation of respiration
4. Explain the cardiac cycle
5. Composition and regulation of pancreatic juice
6. Regulation of blood glucose level
7. Structure and properties of synapse
8. Menstrual cycle



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FIRST YEAR PAPER III

BASICS OF BIOCHEMISTRY QUESTION PAPER

MODEL QUESTION PAPER

Time : 3 Hrs **Max Marks:100**

- *Answer all Questions*
- *Draw diagrams wherever necessary*

Long Essay **(1x20=20)**

1. Define buffers. Discuss the blood buffers in detail.

Short Essay **8x10=80**

2. Specific gravity of urine.
3. Serum Protein Electrophoresis.
4. Hyponatremia.
5. Anion gap?
6. Glomerular Function tests.
7. Renal Regulation of Blood P_H.
8. Define Beer-Lamberts law. what are the different principles in estimation of creatinine.
9. Urine preservatives.

****

FIRST YEAR PAPER IV

Bsc Dialysis Technology Microbiology Model Question Paper-1st year

Essay

1. Define sterilization. Describe various methods of sterilization by heat with uses. (20)

Short notes (10x8=80)

1. Briefly describe virulence factors of bacteria.
2. Bacterial growth curve.
3. Culture media for bacteria.
4. ELISA.
5. Classify vaccines with examples.
6. Lab diagnosis of dermatophytes.
7. prophylaxis of tetanus.
8. Pathogenesis and lab diagnosis of rabies.
9. Enumerate opportunistic fungal infections. Describe in detail any one.
10. Classify intestinal nematodes. Describe the life cycle of any one.

****

FIRST YEAR PAPER V

PATHOLOGY QUESTION PAPER

Time: 3 hrs Max.Marks: 100

- Answer all questions
- Draw diagram wherever necessary

ESSAY **20x1=20**

1. Discuss about normal constituents of blood and their functions?

SHORT NOTES **8X10=80**

2. Urinalysis?
3. Different blood group systems and Rh typing?
4. Laboratory safety guidelines?
5. Fixates used in histopathology?
6. ESR?
7. CSF examination?
8. Collection and transport of various clinical specimens?
9. Various anticoagulants used in hematology?

FIRST YEAR B.SC DIALYSIS TECHNOLOGY

PAPER VI - BASICS OF BIOSTATISTICS& PRINCIPLES OF NURSING

Principles of Nursing

Time: 1 ½ hours Max Marks: 50

Answer all questions. Draw diagrams wherever necessary

Essay

1. List down the indications of CAPD. Discuss the principles of CAPD. Briefly explain the pre and post procedure care of a patient undergoing CAPD. Enumerate the complications of CAPD. (2+2+5+1=10) .

Short notes **(10x4=40)**

2. Nursing care of a bedridden patient.
3. Purposes and guidelines of recording and reporting.
4. Collection and transport of urine specimen for culture.
5. Explain the procedure of bladder catheterization.
6. Complications of intramuscular injection.
7. Discuss the different types of hospital beds.
8. Care of patients with AV fistula.
9. Guidelines in removal of sutures.
10. Sites and equipments for intravenous access
11. Briefly describe the procedure of intravenous cannula insertion.

FIRST YEAR B.Sc. DIALYSIS TECHNOLOGY

BASICS OF BIOSTATISTICS& PRINCIPLES OF NURSING

Basics of Biostatistics

Time:1 ½ hours Max Marks:50

- Answer all questions
- Draw diagram wherever necessary

ESSAY (10)

1. What is Biostatistics? Describe the importance and characteristics of statistics?

ShortNotes (10X4=4)

2. What is the difference between normal distribution and binomial distribution?
3. What are the indicators of population, morbidity, mortality and health services?
4. Define measures of central tendency –ungrouped and grouped?
5. What is correlation coefficient? Compute spearman's rank correlation coefficient for the following data:

X	72	70	50	40	68	85
Y	56	60	45	49	58	75

6. Discuss the types of diagrams? Draw a bar-diagram for the following data of different cases in a certain hospital in one month.

Types of Cases	Number Of Cases
Neurological	26
Cardiac	49
Urological	17
General Surgery	71
Orthopedic	50

7. Define regression Coefficients and state their important properties?
8. Fit the curve of the type Y=a.b*Using least square principle to the following data and estimate manufacturing of surgical for the year2020

Year(X)	2015	2016	2017	2018	2019
Manufacturing(Y) (in tons)	5	40	135	320	625

9. The mean and standard deviation of 100 observations are40 and 5.1 respectively .During cross checking, it was found that an observation was misread as 50. Compute the correct values of mean and standard deviation?
10. Explain the concept of correlation and also explain how scatter diagram can be used in determining the type of correlation between two variables?
11. What do you meant by coefficient of variation .Compute coefficient of variation for the following data of marks obtained by 10students:
    40, 52,47,68,65.70,72,45,55,50

SECOND YEAR PAPER I

Applied Anatomy and Physiology Related to Basics of Dialysis Technology-

Model question paper

Time:3 hours MaxMarks:100

- Answer all questions
- Draw diagram wherever necessary

ESSAY

1. a) Describe renal circulation.
   a) Determinants of GFR. 20x1=20

SHORT ESSAYS **8x10=80**

2. Endocrine functions of kidney ?
3. Hyperkalemia?
4. Discuss the anatomy of peritoneum and three pore model?
5. Palmar arch?
6. Metabolic acidosis?
7. Discuss coagulation cascade? What are the tests to assess the coagulation abnormalities in CKD?
8. Discuss the development of kidney in brief?
9. Draw and label nephron?

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SECOND YEAR PAPER II

APPLIED PHARMOCOLOGY RELATED TO DIALYSIS

Time: 3 Hours Max Marks: 100

Answer all questions

Draw diagrams wherever necessary

ESSAY **(Marks 20)**

1. Diuretics – classification, site of action in the nephron, role in the management of kidney diseases, side effects.

SHORT NOTES **(Marks 8x10)**

1. Heparin induced thrombocytopenia
2. Choice of anti hypertensives in dialysis patients
3. Complications of dextrose based CAPD solutions
4. Management of anemia in CKD patients
5. Disinfectants in dialysis unit
6. Extracorporeal therapy for poisoning
7. Management of hyperkalemia
8. Catheter lock solutions

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SECOND YEAR PAPER III

APPLIED PATHOLOGY AND MICROBIOLOGY RELATED TO DIALYSIS

SECOND YEAR BSC RENAL DIALYSIS TECHNOLOGY EXAMINATION-PATHOLOGY

Maximum Marks : 100

Time : 3 hrs

Answer all Questions

Draw diagrams wherever necessary

ESSAY **(20 marks)**

1. Enumerate the causes and pathology of End Stage Renal Disease

SHORT NOTES **(8 x 10 marks)**

2. Urinary Stones
3. Gangrene
4. Vascular events in Inflammation
5. Pyelonephritis
6. Kidney in Diabetes Mellitus
7. Different types of Anemia
8. Exudate
9. Embolism

SECOND YEAR PAPER IV

INTRODUCTION TO RENAL DISEASES & NUTRITION, BASICS OF DIALYSIS TECHNOLOGY

Time: 3 Hours Max Marks: 100

Answer all questions

Draw diagrams wherever necessary

ESSAY **(Marks 20)**

1. Define chronic kidney disease . Discuss about staging, common etiologies and management of chronic kidney disease

SHORT NOTES **(Marks 8x10)**

1. Infection related glomerulonephritis
2. Indications for dialysis in acute kidney injury
3. Dialysis in pregnancy
4. Residual renal function
5. Treatment of diabetic nephropathy
6. Management of malnutrition in dialysis patients
7. Dietary prescription for a CKD patient on conservative management
8. Pathogenesis of intradialytic hypotension

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THIRD YEAR PAPER I

DIALYSIS TECHNOLOGY AND HEMODIALYSIS, MEDICAL ETHICS, BIO MEDICAL WASTE MANAGEMENT, BIO MEDICAL ENGINEERING

Time: 3 Hours Max Marks: 100

Answer all questions

Draw diagrams wherever necessary

ESSAY (marks 20)

1- CAPD peritonitis- Diagnosis, etiology, management and prevention. Briefly discuss on exit site and tunnel infection.

SHORT NOTES (Marks 8x10)

2- Dialysis disequilibrium syndrome

3- Temporary hemodialysis vascular access

4-Balancing chamber

5- Management of hepatitis B positive patient in hemodialysis unit

6- Dialyser reactions.

7- Informed consent for hemodialysis

8-Segregation of biomedical waste

9-Ultrafiltration failure

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THIRD YEAR PAPER II

SPECIALISED EXTRA CORPOREAL THERAPIES, CRITICAL CARE NEPHROLOGY INCLUDING RENAL TRANSPLANTATION

Time: 3 Hours Max Marks: 100

Answer all questions

Draw diagrams wherever necessary

ESSAY (Marks 20)

1. Dialysis in a critically ill patient. Discuss about SLED, CRRT ,SCUF and MARS

SHORT NOTES (Marks 8x10)

1. Hemodialysis in children

2. Fibre bundle volume
3. Newer CAPD solutions
4. Charcoal hemoperfusion
5. Alarms in hemodialysis
6. Home hemodialysis
7. Artificial and wearable kidney
8. Approach to Erythropoietin resistant anemia

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