



DIPLOMA IN DIALYSIS TECHNICIAN

DURATION :3 YEARS

ELIGIBILITY : 10TH PASS

DDT			
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101 HUMAN ANATOMY

Unit -1

Terminology and General Plan of the Body, Body Parts and Areas, Terms of Location and Position, Body Cavities and Their Membranes, Dorsal cavity, Ventral cavity, Planes and Sections

Unit -II

Cells: Structure, function and location, Prokaryotic and eukaryotic cells, Cell organelles, Cell division
Tissue, Types, Structure, Location and Function of Epithelial Tissue, Connective Tissue, Muscle Tissue, Nerve Tissue, Membranes, Glandular tissue
The Integumentary System: structure and function of The Skin, Subcutaneous Tissue

Unit-III

Musculoskeletal System: Basic anatomy of important muscles and bones

Unit-IV

Respiratory system: Basic anatomy of nose, larynx, trachea, bronchi and lungs

Unit - V

Digestive system: basic anatomy of oesophagus, stomach, small intestine, large intestine, liver, gall bladder, pancreas

Unit VI

Urinary system:

- Kidney, ureter, urinary bladder, male and female urethra
- Histology of kidney, ureter and urinary bladder

102 HUMAN PHYSIOLOGY

Unit-I

Cell physiology: Structure, membrane, transport across cell membrane, Active, Passive, Organization of the Body, Body Composition, Body Fluid Volumes and its measurement, Diffusion, Osmosis, Tonicity, Homeostasis

Unit-II

Blood-composition, function, cellular component & their function, haemoglobin & anaemia, blood groups and coagulation

Lymphatic system-Composition & function of lymph, lymphatic tissue, Immunity with the role of thymus

Unit-III

Cardiovascular system-general arrange, heart, arteries, veins and capillaries, heart structure and function, cardiac cycle, heart sounds, heart rate, blood pressure, mechanism of circulation, definition of hypertension & shock

Unit-IV

Respiratory system: parts of respiratory system, mechanism of respiration, pulmonary function, pulmonary circulation, lungs volume, Gas transport between lungs and tissues, Definition of hypoxia, dyspnoea, cyanosis, asphyxia and obstructive airways diseases

Unit- V

Gastrointestinal physiology: Organs of GIT and their structure & function, secretion, digestion, absorption and assimilation, gastrointestinal hormones, physiology of digestion of carbohydrates, proteins & lipids, Structure & function of liver, spleen, gall bladder & pancreas, Jaundice, Cirrhosis

& Pancreatitis

103 DIALYSIS SYSTEM AND EQUIPMENT

Unit1. Introduction

- 1.1 Introduction to Dialysis Technology
- 1.2 Indications of dialysis
- 1.3 History & types of Dialysis

Unit2. Thermodynamics

- 2.1 Theory of haemodialysis
 - 2.1.1 Diffusion, osmosis, Ultrafiltration & solvent drag
- 2.2 Haemodialysis apparatus
 - 2.2.1 Types of dialyzer & membrane, dialysate.

Unit3. Physiology of peritoneal dialysis

- 3.1 Overview of the Dialysis machine
- 3.2 Mechanism of functioning & management
- 3.3 Haemodialysis machine
- 3.4 Peritoneal dialysis machine
- 3.5 Biochemical investigations required for renal dialysis

Unit4 Adequacy of dialysis:

- a) Haemodialysis.
- b) Peritoneal dialysis.
- c) Peritoneal Equilibration Test (PET)
- d) Anti coagulation

Unit5. Withdrawal of dialysis criteria:

- a. Acute dialysis.
- b. Chronic dialysis.

Unit6. Dialyzer reuse

Unit7. Water treatment system

104 ENGLISH COMMUNICATION & SOFT SKILLS

UNIT-I: Introduction to English language

- a) Role and significance of English language in the present scenario
- b) English Language: Its relevance for the Indian industry
- c) Introduction to Listening, Speaking, Reading, Writing (LSRW) and benchmarking of the class
[Note: As part of classroom activity, a guest lecture from an industry representative/Director (CRC) and maintaining progress card for each student on LSRW for future reference]

UNIT-II: Phonetics& Functional Grammar

- a) Pronunciation and daily usage correction (speak with differences between p/b, s/sh, f/ph, t/d, v/w sounds)
- b) Parts of speech, articles, tenses, verbs and modals
- c) Practice of daily use words, numerals and tongue twisters
- d) Vocabulary building, Construction of simple sentences: Basic sentence pattern, subject and Predicate

[Note: As part of classroom activity, language games, tongue & jaw exercises, simple passages from the newspapers for oral drills in the classroom and practice tests (written and oral)]

UNIT-III: English Communication- About Myself

- a) Let's talk, making conversation, meeting and greeting
- b) Introducing myself, my family and my friends
- c) My opinions, my likes and dislikes

d) Life at college, hostel and workplace

[Note: As part of classroom activity, use the Workbook for reference for classroom and home assignments, carry out practice tests (written and oral)]

UNIT-IV: Personality Development

a) First impression: Dressing sense, good manners, speaking well and respectably

b) Positive Attitude: Being happy and alert, a good listener and a good friend

c) Consultation among peers: Soliciting advice and giving advice

d) Goal setting, confidence building & handling rejection

[Note: As part of classroom activity, refer Workbook for classroom and home assignments, carry out practice tests (written and oral)]

105 GENERAL MICROBIOLOGY

Unit-I

Development of microbiology as a discipline, Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming, Edward Jenner

Introduction to bacterial taxonomy, Classification of Bacteria, Morphology based on size, shape, arrangement, motility, flagella, spores, capsules, cell wall, plasma membrane, pili, ribosomes.

Unit-II

Microscopy: Study of compound microscope – magnification, numerical aperture, resolution and components of microscope. Dark ground illumination, care of microscope and common difficulties micrometry. Bright Field Microscope, Dark Field Microscope, Phase Contrast Microscope, Fluorescence Microscope, Transmission Electron Microscope, Scanning Electron Microscope

Unit-III

Cell size, shape and arrangement, cell-wall, composition and detailed structure of Gram-positive and Gram-negative cell walls, Cell Membrane: Structure, function and chemical composition of bacterial cell membranes. Cytoplasm: Ribosome, mesosomes, inclusion bodies, nucleoid, chromosome and plasmids, Endospore: Structure, formation

Unit-IV

General safety measures used in Microbiology laboratory, Sterilization and disinfection: Various physical methods of sterilization – heat, UV radiation, ionizing radiation, filtration, characters affecting sterilization, auto clave control and sterilization indicators.

Biomedical waste management in a Medical Microbiology laboratory: Types of the waste generated, Segregation, Treatment, Disposal

Unit-V

Antiseptics & Disinfectants: Definition, types and properties, mode of action, use, qualities of good disinfectants

Chemical disinfectants – phenol and its compounds, alcohol, halogen, heavy metals and quaternary ammonium compounds, aldehyde, gaseous compound. use and abuse of disinfectants. precautions while using the disinfectants.

106 CONCEPTS OF RENAL DISEASES

Unit-I

Assessment and Diagnostic studies of the Urinary system: Physical assessment of a person with kidney disease, basics of assessment, list various diagnostic tests done for kidney diseases, Laboratory tests, imaging studies, normal values, interpretation of the tests including the roles and responsibilities of a technologist.

Unit-II

Classification of renal diseases: Define renal disorders, introduction to the classification of the various types of renal disorders.

Unit-III

Glomerular diseases – causes, types & pathology: Definition, etiology, type's

pathophysiology, medical and surgical management.

Unit-IV

Tubulointerstitial diseases & Renal vascular disorders, asymptomatic urinary abnormalities: Definition, etiology, type's pathophysiology, medical and surgical management.

Unit-V

Obstructive Diseases: Acute Kidney Injury & End stage renal diseases, Obstructive Uropathies- Causes & pathology, renal calculi & renal tumors: definition, etiology, type's pathophysiology, medical and surgical management.

Congenital & Inherited Renal Diseases: Peniel, scrotum, urinary bladder, Kidney: size, shape, positioning malformation: definition, cause and its management.

Pathology of kidney in hypertension, diabetes mellitus, pregnancy: Pathology of peritoneum – peritonitis – bacterial, tubercular & sclerosing Peritonitis, urinary tract

107 COMPUTER FUNDAMENTALS

Unit-I

Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages. Input output devices: Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices(monitors, pointers, plotters, screen image projector, voice response systems).

Processor and memory: The Central Processing Unit (CPU), main memory. Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.

Unit-II

Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).

Unit-III

Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.

Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.

Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.

Unit-IV

Introduction of Operating System: introduction, operating system concepts, types of operating system, Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.

Electronic Payment Systems: Introduction, Types of Electronic Payment Systems, Digital Token-Based, Electronic Payment Systems, Smart Card and Electronic Payment Systems, Credit Card- Based Electronic Payment Systems, Risk and Electronic Payment Systems.

Unit-V

Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.

108 PRACTICAL-I

Practical Human Anatomy

1. Demonstration of Major organs through models and permanent slides.
2. Demonstration of parts of circulatory system from models.

3. Demonstration of parts of respiratory system from models.
4. Demonstration of digestive system from models.
5. Demonstration of excretory system from models.
6. Demonstration of nervous system from models.
7. Structure of eye and ear
8. Demonstration of structural differences between skeletal, smooth and cardiac muscles.
9. Demonstration of various bones
10. Demonstration of various joints
11. Demonstration of various parts of male & female reproductive system from models

Practical Human Physiology

1. To measure pulse rate
2. To measure blood pressure
3. Demonstration of ECG
4. To perform Hemoglobin by Sahli's Method
5. To perform Hemoglobin by CMG method.
6. Haemoglobin by CMG method.
7. To perform Total RBC count.
8. To perform total leucocyte count.
9. To perform differential leucocyte count.
10. To perform PCV
11. To calculate Red cell indices.

Practical concepts of renal diseases

- 1 Care of Patient with CKD 5
- 2 Care of Patient with ARF 5
- 3 Health teaching on prevention of UTI 10
- 4 Health teaching on prevention of peritonitis

Fundamentals of Microbiology

1. Demonstration of Microscope and its parts
2. Demonstration of glassware used in microbiology.
3. Demonstration of autoclave and sterilization of glass wares.
4. Demonstration of Hot air oven and sterilization of glass wares.
5. To perform Gram staining
6. To perform Acid fast staining (Zeihl Neelsen staining)
7. To perform Indian ink staining
8. To perform Hanging drop method
9. Demonstration of capsule
10. Staining of bacterial spores
11. To demonstrate agglutination reaction.

Practical: Basics of Computer

Computer fundamental and internet lab

1. Using basic DOS commands.
2. Using external DOS commands
3. Creating a email account
4. Using web browser for searching and surfing.
5. Creating and formatting a document in MS office
6. Using autocorrect, auto text and spell check operation in MS office .
7. Create tables in MS Word.
8. Inserting different kinds of object in MS word.
9. Use main merge options in MS office.
10. Create a Excel work sheet with following options rows and columns alignment..
11. Using excel formulas.
12. Create a graph with available data in MS excel.
13. Create a PPT presentation using auto content wizard.
14. Use Clip art animation effects and word art galleries in presentations.
15. Using transition and setting timings for slide show.

16. Use MS access to create data base and tables.

109 Hospital Training

201 GENERAL PATHOLOGY

Unit I

Introduction & History of pathology, Basic definitions and familiarization with the common terms used in pathology, Causes and mechanisms of cell injury, reversible and irreversible injury, Introduction of hyperplasia, hypoplasia, hypertrophy, atrophy, metaplasia, necrosis and apoptosis

Unit II

General features of acute and chronic inflammation: Vascular changes, cellular events, Cells and mediators of inflammation, Phagocytosis and its mechanism

Unit III

Tissue Renewal and Repair, healing and fibrosis, cirrhosis, introduction of oedema, hyperaemia, congestion, haemorrhage, haemostasis, thrombosis, embolism, infarction, shock and hypertension.

Unit IV

Protein energy malnutrition, deficiency diseases of vitamins and minerals, nutritional excess and imbalances. Role and effect of metals (Zinc, Iron and Calcium) and their deficiency diseases, Aetiology and pathophysiology of diabetes, arteriosclerosis, myocardial infarction, respiratory diseases (COPD), Parkinson disease

Infectious Diseases: pathogenesis & overview of modes of infections, prevention and control with suitable examples like Typhoid, Dengue

Unit V

Cancer: Definitions, nomenclature, characteristics of benign and malignant neoplasm, metastasis, Carcinogens and cancer, concept of oncogenes, tumour suppressor genes, DNA repair genes and cancers stem cells.

Learning Outcome: This curriculum will provide an introductory nature and build the concepts of how human system work in altered and diseased stage under the influence of various internal and external stimuli to the students.

202 GENERAL PHARMACOLOGY

Introduction to Pharmacology: Definitions, Terminology used, Types:

Classification, Pharmacodynamics: Actions, therapeutic, Adverse, toxic effects,

Pharmacokinetics: Absorption, distribution, metabolism, interaction, excretion,

Review: Routes and principles of administration of drugs, Indian pharmacopoeia:

Legal issues, Storage of various drugs, Calculation of drugs dosage, Rational use of drugs, Principles of therapeutics in Kidney Dialysis

Fluid therapy with special emphasis in renal diseases: Define IV fluids, differentiate the various IV fluids. Use of crystalloids and colloids in renal diseases. Mode of action, contraindication, precautions and side effects of using various IV fluids.

Anti hypertensive Definition, classification, actions, dosage, side effects & 5 Curriculum for B. Sc. Medical Dialysis Technology MGM Institute of Health Sciences contraindications, special reference during dialysis, vasopressors, drugs used in Hypotension

Drugs & dialysis Dose & duration of drugs used in dialysis. The administration of drugs and the effect of dialysis on the action of drugs

Dialyzable drugs List of drugs that are dialyzable, action, dosage, side effects and contraindications of phenobarbitone, lithium, methanol etc

Heparin including low molecular weight heparin Introduction to heparin and Low molecular weight heparin. Description of Heparin & LMWH, pharmacokinetics,

mode of action, indications and use, dosage and route of administration & side effects

Protamine sulphate Introduction to protamine, mode of action, pharmacokinetics, indications, uses, dosage, route of administration, side effects, precautions, contraindications

Fomalin, sodium hypochlorite, hydrogen peroxide Action, characteristics, the use of the drugs and its role as disinfectants & adverse effects of residual particles applicable too formalin

Hemodialysis: concentrates Composition & dilution (acetate & bicarbonates).

Peritoneal dialysis fluid in particular hypertonic solutions – composition Fluids used in peritoneal dialysis, the composition and strength of concentration. Mode of action, uses, indications and precaution

Potassium exchange resins with special emphasis on mode of administration

Introduction to potassium exchange resins, chemical composition. Types, mode of action, indications for use, side effects, precautions and contraindications

203 GENERAL BIOCHEMISTRY

Unit-I

Basics of Metabolism, metabolism of Carbohydrates, Glycolysis, bioenergetics, regulation of blood sugar, Introduction and significance of gluconeogenesis, glycogenesis, glycogenolysis, HMP Pathway, Role of G-6-PD.

Unit-II

Fate of Pyruvate, TCA cycle and its significance, Electron transport Chain Diabetes, types, clinical features, diabetic profile test, HbA1C, GTT, Types of sugar, Hyperglycemia and Hypoglycemia, Ketone bodies, Introduction of carbohydrate metabolism

Unit-III

Digestion and Absorption of Proteins, Metabolism of Proteins, Formation of ammonia, Transamination, Deamination, Urea Cycle, Significance of Urea, Estimation of total protein, Albumin, Globulin and A/G ratio, Aminoaciduria, 24 hrs of urinary proteins

Unit-IV

Digestion and absorption of fatty acids, Metabolism of fatty acids, Beta oxidation of fatty acids, Ketone bodies and ketosis, Cholesterol, Plasma lipids, Lipoproteins, Lipid profile Test, Triglycerides, HDL, VLDL, LDL, Risk factors, Hyperlipidemia and Dyslipidemia

Unit-V

Principle, application, calibration and maintenance of photcolorimeter, spectrophotometer, Blood Chemistry analyzer, Flame photometer, Turbidimetry

204 FUNDAMENTALS OF DIALYSIS

Medical Abbreviations& Patient pedigree: Common medical abbreviations, Patient encounter, History taking of patient: - Present, Past, Family History.

Physical Examination: Inspection of whole body of the patient e.g. Chest, abdomen, pedal edema & Facial edema. Significance of edema as per the dialysis patient concern. Palpation – Method for palpation, Percussion - Resonance, hyper-resonance and dullness, Heart sounds & murmurs & any other abnormal body sound.

Vital signs: Assessing Pulse - Radial, Brachial, Apical & Femoral, Assessing Respiration - Normal rhythm and rate, Common disorders, Assessing Blood Pressure - Normal values, Hyper and hypotension, Assessing Temperature - Methods, Common abnormalities.

Safety Practices: Identify specific risks associated with any work activities undertaken as a renal dialysis technician, The principles and practice of health and safety at work. Safe lifting and handling techniques when moving equipment and/or supplies. Correct handling procedures for chemicals and toxic agents. Health and Safety regulations and

guidance, the consequences of current flow within the body & control measures to be taken to manage risks, clinical risks posed by the application of technologies to treat renal disease. Patient Welfare, Safety and Confidentiality.

Aseptic Technique: Hand Washing: Medical & surgical Management, use of appropriate personal protective equipment for all personnel involved in the renal area, type and range of personal protective equipment and the reasons for their use.

Procedures for infection control within the renal environment. Methods to control spread of infection by hospital personnel.

Patient Management: Cannulating, Line cannula termination. Positioning during the procedure of dialysis.

Essential Care: Blood leaks, clotting, acute bleeding, hypotension, hypertension, fever, nausea, pyrogenic vomiting, headache, cardiac arrhythmias, chest pain, reactions muscle cramps, restlessness pruritus, convulsion, hemolysis.

Total patient care: Nutritional consideration in CKD and dialysis patient, Diet, hygiene, fluid, rehabilitation. Recording and reporting.

205 PATIENT CARE AND BASIC NURSING

Unit I

Introduction, Communication and Documentation

1. Introduction to Patient Care:

- a) Principles of patient care
- b) Types of patients (gender, age, diseases, severity of illness, triage)

2. Communication & Documentation:

- a) Communication with doctors, colleagues and other staffs.
- b) Non-verbal communication, Inter-personnel relationships.
- c) patient contact techniques, communication with patients and their relatives

3. Documentation:

- a. Importance of documentation,
- b. initial and follow up notes;
- c. documentation of therapy, procedures and communication

Unit II

Universal Precautions and Infection Control

4. Universal Precautions and Infection Control:

- a) Hand washing and hygiene.
- b) Injuries and Personal protection, Insulation and safety procedures.
- c) Aseptic techniques, sterilization and disinfection.
- d) Disinfection and Sterilization of devices and equipment
- e) Central sterilization and supply department
- f) Biomedical Medical waste management

Unit III

Medication Administration and Transport of patient

5. Medication Administration:

- a) Oral / Parenteral route
- b) Parenteral medication administration: Intra venous, intra muscular, subcutaneous, intra dermal routes, Intra venous Infusion
- c) Aerosol medication administration, Oxygen therapy
- d) Intravenous fluids,
- e) Blood and blood component transfusion

6. Position and Transport of patient:

- a) Patient position, prone, lateral, dorsal, dorsal recumbent, Fowler's positions, comfort measures, bed making, rest and sleep.
- b) Lifting and transporting patients: lifting patients up in the bed, transferring from bed to wheel chair, transferring from bed to stretcher.
- c) Transport of ill patients (inotropes, intubated / ventilated patients)

Unit IV

Bedside care and monitoring

7. Bedside care:

- a) Methods of giving nourishment: feeding, tube feeding, drips, transfusion.
- b) Recording of pulse, blood pressure, respiration, saturation and temperature.
- c) Bed side management: giving and taking bed pan, urine container.
- d) Observation of stools, urine, sputum, drains
- e) Use and care of catheters and rubber goods.
- f) Care of immobile/bed ridden patients, bed sore and aspiration prevention

8. Monitoring of Patient:

- a) Pulse, ECG (Cardiac Monitor), Oxygen Saturation, Blood Pressure, Respiration
- b) Multi parameter monitors, Capnography and End Tidal CO₂ (ETCO₂)
- c) Hydration, intake and output monitoring
- d) Monitoring ventilator parameters: Respiratory Rate, Volumes, Pressures, Compliance, Resistance

Unit V

Wound care and first aid

9. Dressing and wound care:

- a) Bandaging: basic turns, bandaging extremities, triangular bandages and their application.
- b) Surgical dressing: observation of dressing procedures.
- c) Suture materials and suturing techniques
- d) Splinting
- e) Basic care of patient with burns

10. First Aid and Basic Life Support (BLS)

206 HEMODIALYSIS

UNIT - I

History, Types of Dialysis, principles of dialysis, Quantification of adequacy Dialysis Team - Rights - Responsibilities - Lab data analysis - medication in dialysis patients.

UNIT - II

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

UNIT - III

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

UNIT - IV

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 - V

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

207 DIALYSIS TECHNOLOGY-I

- Patient assessment
- Acute complication
- MARS
- Plasmapheresis
- Hemoperfusion

- Current research in HD
- Paediatric dialysis
- Slow continuous therapies
- High flux and high efficiency dialysis
- Machine monitoring in dialysis
- Lab data analysis
- Quality assurance in HD
- Dialysis Amyloidosis
- Ascites in dialysis patients
- Pregnancy in dialysis patients

208 PRACTICAL-II

GENERAL BIOCHEMISTRY

- 1 Introduction to Personnel protective equipments used in laboratory and their importance (LCD)
- 2 Handling of colorimeters – operation and maintenance (LCD)
- 3 Serum electrolytes measurement (only demo)
- 4 Demonstration of semi automated / fully automated blood analyser
- 5 Demonstration of tests for carbohydrates (Monosaccharides, disaccharides and polysaccharides)
- 6 Precipitation Reactions of protein (only demonstration)
- 7 Test on bile salts (only demonstration)
- 8 Tests on Normal constituents of Urin (only demo)
- 9 Tests on Abnormal constituents of Urin (only demo)

PRACTICAL FUNDAMENTALS OF DIALYSIS

- 1 Checking Vitals
- 2 Physical Examination
- 3 Patient and Technologist safety practices
- 4 Aseptic Techniques
- 5 Medication techniques (Demo): Oral, IM, IS, IV & catheter 10
- 6 Diet Plan & Intake and output plan

PRACTICAL PATIENT CARE AND BASIC NURSING

1. Demonstration of Patient care Procedures:
 - a) Positioning of patient, transport of the patient, Dressing and Bandaging, Care of inter costal drain tube, Insertion of naso-gastric tube and feeding
 - b) Phlebotomy and obtaining blood samples, Arterial Blood sampling for ABG
 - c) Injections: intra muscular, intra venous, sub cutaneous, intra dermal
 - d) Insertion of intra venous catheter and infusion of medications, blood transfusion
 - e) Recording of ECG and monitoring of patient
 - f) 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)

PRACTICAL HEMODIALYSIS

1. Types of dialysis
2. Medication in dialysis patients
3. Renal replacement therapy
4. Predialysis patient education
5. Home hemodialysis
6. Vascular access
7. Arteriovenous access

8. Cannulation techniques
9. Hemodialysis blood circuit
10. Dialysers

209 HOSPITAL TRAINING

301 BASICS IN MEDICAL PHYSICS AND ELECTRONICS

UNIT I: Laser

Nature of light-Reflection-Refraction-Total internal reflection-Optical fibers-Applications in Medicine – Laser-Principles-Action-Types of laser, Basic principles of laser in Medical Application – Argon-Iron laser photo coagulator-Photo thermal-Photochemical application-Applications of laser in Medicine-Laser hazards and safety measures

UNIT II: Radiation Physics

Introduction to nuclear physics and radioactivity, Radioactive radiations – X-ray, production of x-ray, Properties of x-ray radiations – Biological effects of radiation, Radiation damage in matter, Radiation protection principles, radiation detection and measurement – Ultrasound and generation of ultrasound.

UNIT III: Introduction to Imaging Technique

Principles of Microscope: Simple microscope and compound microscope-Radiography: Making and X-ray image-Fluoroscopy. CT Scans, MRI – Ultrasonography: Ultrasound picture of Body-A-Scan-M-Scan-Ultrasound diathermy-Phonocardiography – Radio isotopes: Uses of Radio isotopes – ^{99m}Tc Generator – Scintillation detectors – Application of scintillation detectors – Gamma Camera – Positron Camera

UNIT IV: Semiconductor devices

Principles of diodes and Transistors – Integrated circuits – Amplifiers – Basic configuration and types – differential and operational amplifiers – Waveform generators – Timer – A/D and D/A converters – Active filters – Transducers – Basic configuration and types.

UNIT V: Biopotential Recording Systems

Introduction to bioelectric potential – Electrodes and surfaces – Biopotential amplifier – Frequency ranges of various biopotential signals – Working principles of bio potential recording systems –Electrocardiography – Electroencephalograph –Electromyography.

302 HEALTH CARE MANAGEMENT

UNIT I: Concept of Health Care and Health Policy

Health in Medical Care, Indigenous systems of Health Care & their relevance, Framework for Health Policy Development.

UNIT II: Health Organisation

Historical development of Health Care System in the third world & India, Organization & Structure of Health Administration in India, Type of Health Organization including International Organizations, Private & Voluntary Health care provider, Distribution of Health Care Services, Health Care System in Public Sector Organization, Health systems of Various Countries.

UNIT III: Health Policy and National Health Programme

National Health Policy, Drug Policy, National Health Programs (Malaria, T.B., Blindness, AIDS etc.) Evaluation of Health Programs (Developing indicators for evaluation), Medical Education & Health Manpower Development.

UNIT IV: Health Economics-Fundamentals of Economics

Scope & Coverage, Demand for Health Services, Health as an Investment, Population, health of Economic Development Economics of Health- Population based health services, Economics of Communicable and Non Communicable diseases

UNIT V: Methods & Techniques of Economic Evaluation of Health Program

Cost Benefit & Cost Effective Methods.

• **Household & Health**

Health Expenditure & Outcome, Rationale for Government action, Household capacity, income and schooling Health Insurance.

303 PERITONEAL DIALYSIS

UNIT - I

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

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.

UNIT - V

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

304 MEDICAL ETHICS

UNIT - I Principle of medical ethics, confidentiality, informed consent, decisions of life sustaining therapy, communication, communication barriers, doctor patient relationship, list of offences and professional misconduct of doctors, , bioethics, role of ethics committees, quality assurance programs, medical etiquette.

UNIT - II Advanced Ethical Decisions and Major Laws

Advance decisions to refuse treatment, doctor and criminal abortion, ethical issues in stroke management, ethical issues in dementia, quality of life in health care decisions, prenatal diagnostic techniques, regulations and prevention of misuse act 1994 (PNDT act), transplantation of human organs act 1994, medical termination of pregnancy act, labour laws applicable to a hospital, Indian trade union act 1926, industrial dispute act 1947, payment of wages act, employee provident fund act, maternity benefit act.

UNIT - III Organizational and Procedural Laws

Indian contract act, nursing home registration act, birth death registration act, regulation of genetic counselling center, regulation of prenatal diagnostic technique, determination of sex prohibited Dying declaration - definition, precautions, procedure of recording, special circumstances Death certificate - precautions while issuing death certificate, contents of death certificate, importance of death certificate.

UNIT - IV Medical Jurisprudence

Introduction and legal procedure, medico legal aspects of death injuries, medical ethics, consumer protection act, quality of life in health care decisions, ethical issues in health and social care.

UNIT - V Legal Framework for Hospitals

Introduction to legal framework, patients rights and providers responsibility, medical malpractice, medico legal aspects - impotence, sterility, sterilization and artificial insemination; medico legal aspects of psychiatric and mental health, toxicology, laws related to toxicology, organ transplantation act.

305 ACUTE AND CHRONIC KIDNEY DISEASES

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.

306 TOXICOLOGY

- ☑ Basic principles: factors that affect toxicity
- ☑ Toxicokinetics: absorption, distribution, excretion, and biotransformation
- ☑ Toxicity testing, dose response and risk assessment
- ☑ Environmental carcinogenesis
- ☑ Biomarkers of exposure and susceptibility factors
- ☑ Approaches to primary and secondary prevention
- ☑ Hepato and renal toxicology: basic principles and specific examples
- ☑ Reproductive and developmental toxicology: basic principles and specific examples (e.g., endocrine disruptors, thalidomide)
- ☑ Immunotoxicology: basic principles, cutaneous and pulmonary hypersensitivity
- ☑ Persistent organic pollutants (POPs) and dioxins
- ☑ Bone marrow toxicity: benzene as a case study
- ☑ Neurotoxicology
- ☑ Metal toxicology: mercury, cadmium
- ☑ Ozone, a criteria air pollutant
- ☑ Nanoparticle toxicology

307 Dialysis Technology - II

History of peritoneal dialysis
Physiology of PD
Indication and contraindication of chronic PD
PD apparatus
Access for CAPD
Catheter and exit-site care
PD process
Assessment of peritoneal membrane permeability
Adequacy of PD
PD therapies
Non-infectious complications
Infectious complications
Patient education
Types of renal donor and cadaver donor maintenance
Recipient and donor workup
Post-transplant management and follow up
Current research in PD and transplantation

308 PRACTICAL-III

PRACTICAL PERITONIAL DIALYSIS

1. Anatomy of peritoneum
2. Physiology of peritoneum transport
3. Peritoneal equilibration test
4. Peritoneal dialysis solutions
5. Automated peritoneal dialysis
6. Continuous ambulatory peritoneal dialysis
7. Nutrition in CAPD
8. Complications of peritoneal dialysis

DIALYSIS TECHNOLOGY-II

1. Setting up dialysis machine for dialysis.
2. A V cannulation.
3. A V fistula/A V graft cannulation .
4. Initiation of dialysis through central venous catheters like internal jugular, femoral subclavian vein.
5. Packing & sterilisation of dialysis trays.
6. Closing of dialysis.
7. Preparation of concentrates depending on the situations.
8. Reuse of dialysis apparatus.
9. Isolated ultrafiltration.
10. Performance of peritoneal dialysis exchange manually

309 HOSPITAL TRAINING