

OPJS UNIVERSITY, CHURU (RAJASTHAN)



SYLLABUS

For
B.Sc. in Dialysis Technology
B.Sc. DT
(Academic Program)

School of Para-Medical Science
OPJS UNIVERSITY, CHURU (RAJASTHAN)
2016-17



YEAR I

Course	Course Title	Distribution of Marks	
		Theory/	Continuous
BSDT-101	Human Anatomy and Physiology	70	30
BSDT-102	Communication Skills	70	30
BSDT-103	Safety and Sanitation	70	30
BSDT-104	Dialysis System and Equipment	70	30
BSDT-105	Biochemistry	70	30
TOTAL		350	150

YEAR II

Course Code	Course Title	Distribution of Marks	
		Theory/ Practical	Continuous
BSDT-201	Pharmacology	70	30
BSDT-202	Pathology	70	30
BSDT-203	Microbiology	70	30
BSDT-204	Concepts of Renal Diseases	70	30
BSDT-205	Nutrition	70	30
TOTAL		350	150

YEAR III

Course Code	Course Title	Theory/ Practical	Continuous Assessment
BSDT-301	Dialysis Technology	70	30
BSDT-302	Medical Ethics	70	30
BSDT-303	Toxicology	70	30
BSDT-304(P)	Dialysis Technology-Practical	150	50
TOTAL		360	140

BSDT-101- HUMAN ANATOMY & PHYSIOLOGY

Unit-I: Introduction

Definition of Anatomy and Physiology, land marks of the body, common anatomical terminologies, anatomical positions & anatomical Planes, definition of Cell & Tissues, Various types of cells and tissues- a brief description of cell structure with functions of cell organelles.

Unit II: Skeletal System

Introduction to bone & joints, different bones & joints of the body, various types of movements at the bony joints

Unit-III: Blood & Lymphatic System

Blood as a connective tissue, composition & functions of blood, Lymph & Lymphatic System- brief overview, clinical terminologies

Unit-IV: Cardiovascular System

Anatomical Structure of Heart, Systemic or body circulation, Pulmonary or lesser circulation, Cardiac cycle, Cardiac output, stroke Volume, Heart sounds, brief description of blood supply in upper & lower limb, circle of Willis or blood supply in Brain Clinical notes.

Unit-V: Digestive System

Introduction to digestion, brief anatomical description of various parts of the digestive system & their functions, nine regions of the abdominal cavity, an overview of the mechanism of digestion, digestive Juices, outlines of the Hepato-biliary system.

Unit-VI: Excretory System

Definition of excretion & excretory system, gross anatomy of Kidney, Ureters & Urinary Bladder & their functions, formation of Urine, composition of urine, structure of nephron, clinical terminologies.

Unit-VI: Respiratory System

Introduction & definition of respiration, inspiration & expiration, various parts of the respiratory system & their functions with emphasis on the lungs, mechanism of gaseous exchange, clinical terminologies.

Unit-VII: Reproductive System

Introduction & definition of reproduction, brief anatomical description of the male and female reproductive system and their functions, male & female reproductive hormones, related clinical notes

Unit- VIII: Endocrine System

Definition & classification of glands, various endocrine glands & their hormones with special emphasis on pituitary gland

Unit-IX: Nervous System

Introduction to nervous system, various parts of brain & their functions, Meninges as

protective coverings of brain, different regions of brain with their specific function, C.S.F, ventricles of brain, hypothalamus as specialized centre of brain, cranial & spinal nerves

Unit X: The Sensory System

Brief overview of structure & functions of eye, ear, nose, tongue

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BSDT-102: COMMUNICATION SKILLS

Unit - I

- Comprehending a story from Louis Fischer's narrative story "My week with Gandhi"
- Distinguish between words having related meaning and using them in appropriate context.
- Noun , pronoun & their uses

Unit – II

- Using some words and it's opposite
- Present, Past & Future tense & their different forms
- Prefixes & suffixes

Unit – III

- Reading and understanding a short story using some of the words occurring in the story.
- Using various forms of past present tense correctly.
- Using a series of sentences to form a connected story.

Unit – IV

- Some common sentences used in daily life
- Using various forms of present tense
- Verbs & its types
- Three forms of verbs in the light of some commonly used words
- Re-writing a story in abridged form

Unit – V

- Forming different questions.
- Narrating a story.

Unit -VI

- Using words in different meanings.
- Direct & indirect speech & using them correctly
- Writing a short narrative composition based on experience.

Unit – VII

- Reading an unseen passage and answering the questions from the given text
- Writing personal, official, business & other form of letters

Unit – VIII

- Reading and understanding an interesting story.
- Using model auxiliaries correctly.
- Writing short composition expressing your views on a particular topic.

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BSDT-103-SAFETY & SANITATION

Unit1. Communicable & Non Communicable Diseases

- 1.1 Introduction to communicable diseases
- 1.2 Modes of transmission
- 1.3 General measures of prevention and control of communicable diseases
- 1.2 Immunization
 - 1.2.1 Purpose, types and effects of immunization
- 1.3 Disinfection and sterilization
 - 1.3.1 Effective methods of disinfection and sterilization
- 1.4 Non-communicable diseases
 - 1.4.1 Causes, symptoms, diagnosis, prevention and treatment

Unit2. Personal Hygiene

- 2.1 Introduction and definition of hygiene
- 2.2 Factors affecting health and hygiene
- 2.3 Health habits and practice
- 2.4 Methods of maintaining physical, psychological and emotional health

Unit3. Environmental Sanitation

- 3.1 Water Pollution
 - 3.1.1 Sources and nature of water pollution
 - 3.1.2 Overview of the process of water purification
- 3.2 Air Pollution
 - 3.2.1 Sources and nature of air pollution
 - 3.2.2 Parameters of air pollution, estimation of level of air pollutants
 - 3.2.3 Overview of air purification
 - 3.2.4 Green house effect, types of ventilation, thermal comfort, air temperature, humidity and their measurement
- 3.3 Solid Waste
 - 3.3.1 Classification and pollution effects of solid waste
 - 3.3.2 Process of disposal of solid waste
 - 3.3 Sanitary land filling and incineration
- 3.4 Liquid Waste
 - 3.4.1 Classification
 - 3.4.2 Health hazards of sanitary drainage system

Unit4. Clinical Pathology

- 4.1 Introduction to clinical pathology
- 4.2 Collection, transport, preservation, and processing of various clinical specimens
- 4.3 Urine Examination: collection and preservation of urine, physical, chemical & microscopic examination
- 4.4 Examination of body fluids- CSF, Sputum Examination
- 4.5 Examination of faeces.

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Unit5. Microbiology

- 5.1 Classification of microorganism's size, shape and structure of bacteria
- 5.2 Use of microscope in the study of bacteria.

Unit6. Immunology & Bacteriology

- 6.1 Immunity, vaccines, types of vaccine and immunization schedule
- 6.2 Principles and interpretation of common serological tests
- 6.3 Systematic bacteriology
 - 6.3.1 Diseases caused & laboratory diagnosis of:
 - 6.3.1.1 Staphylococci
 - 6.3.1.2 Pneumococci
 - 6.3.1.4 Gonococci
 - 6.3.1.5 Meningococci
 - 6.3.1.6 Mycobacterium

Unit7. Mycology & Virology

- 7.1 Morphology, diseases caused and lab diagnosis of
 - 7.1.1 Candida, Cryptococcus
 - 7.1.2 Dermatophytes, opportunistic fungi
- 7.2 General properties of viruses, diseases caused & lab diagnosis of:
 - 7.2.1 Herpes, Hepatitis, HIV, Rabbits and Poliomyelitis

Unit8. Hospital infection

- 8.1 Causative agents, transmission methods, investigation, prevention and control of hospital Infections.

BSDT-104-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

BSDT-105-CLINICAL BIOCHEMISTRY

Unit1. Bio-molecules and the cell: Major complex bio-molecules of cell and cell organelles- Prokaryotic and eukaryotic cell

Unit2.Carbohydrates: Chemical structure, function and Classification: Monosaccharide, Disaccharides, Polysaccharides, Homo polysaccharides, Hetero polysaccharides, Glycoproteins

Unit3.Proteins: Amino acids, Classification, Structure of proteins, Determination of protein structure, Properties of proteins, Denaturation, Classification of proteins, Antigen Antibody Types, Plasma proteins, Blood clotting.

Unit4.Lipids: Chemical structure, functions and Classification, fatty acids, Triacylglycerols, Phospholipids, glycoproteins, Lipoproteins, Steroids, Amphipathic lipids.

Unit5.Nucleic acids: Purines and pyrimidine, Structure of DNA, Watson & Crick model of DNA, Structure of RNA, types of RNA

Unit6.Enzymes: Definition, Nomenclature, Classification, Factors affecting enzyme activity, Active site, Coenzyme, Enzyme Inhibition, Mechanism of enzyme action, Units of enzyme, Isoenzymes, Enzyme pattern in diseases.

Unit7.Vitamins & Minerals: Fat soluble vitamins(A,D,E,K), Water soluble vitamins, B-complex vitamins, principal elements(Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chlorine and sulphur), Trace elements, Calorific value of foods, Basal metabolic rate(BMR), respiratory quotient(RQ), Specific dynamic action(SDA), Balanced diet, Marasmus, Kwashiorkor

Unit8.Hormones: Classification, Mechanism of action, hypothalamic hormones, Pituitary– Anterior, posterior; Thyroid – Adrenal cortex, Adrenal medulla; Gonadal hormones, menstrual cycle, GI hormones

Unit9.Acids and bases: Definition, pH, Henderson Hasselbach equation, Buffers, Indicators, Normality, Molarity, Molality

PRACTICAL

I. Qualitative tests of monosaccharide (glucose and fructose)

- a. Molisch's test
- b. Fehling's test
- c. Benedict's test
- d. Seliwanoff's test

II. Qualitative tests of lipids

- a. Solubility tests
- b. Emulsification tests

- c. Saponification tests

III. Qualitative tests of proteins

- a. Isoelectric precipitation tests
- b. Heat coagulation tests

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SECOND YEAR

BSDT-201-PHARMACOLOGY

Unit1. Introduction to Pharmacology, IV fluid therapy with special emphasis in renal diseases

Unit2. Diuretics: classification, actions, dosage, side effects & contraindications

Unit3. Anti hypertensives: classification, actions, dosage, side effects & contraindications, special reference during dialysis, vasopressors, drugs used in hypotension

Unit4. Drugs & dialysis: dose & duration of administration of drugs

Unit5. Dialyzable drugs: phenobarbitone, lithium, methanol etc.

Unit6. Vitamin D & its analogues, phosphate binders, iron, folic acid & other vitamins of therapeutic value

Unit7. Erythropoietin in detail

Unit8. Heparin including low molecular weight heparin, Protamine sulphate

Unit9. Formalin, sodium hypochlorite, hydrogen peroxide: role as disinfectants & adverse effects of residual particles applicable to formalin

Unit10. Haemodialysis concentrates: composition & dilution (acetate & bicarbonates)

Unit11. Peritoneal dialysis fluid in particular hypertonic solutions: composition

Unit11. Potassium exchange resins with special emphasis on mode of administration.

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BSDT-202- PATHOLOGY

Unit1. Congenital abnormalities of urinary system

Unit2. Classification of renal diseases

Unit3. Glomerular diseases: causes, types & pathology

Unit4. Tubulo-interstitial diseases

Unit5. Renal vascular disorders

Unit6. End stage renal diseases: causes & pathology

Unit7. Pathology of kidney in hypertension, diabetes mellitus, pregnancy

Unit8. Pathology of peritoneum, peritonitis, bacterial, tubular & sclerosing peritonitis, dialysis induced changes

Unit9. Pathology of urinary tract infections

Unit10. Pyelonephritis & tuberculous pyelonephritis

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BSDT-203- MICROBIOLOGY

Unit1. Hepatotrophic viruses in detail: mode of transfusion, universal precautions vaccinations

Unit2. Human immunodeficiency virus (HIV), mode of transfusion, universal precautions

Unit3. Opportunistic infections

Unit4. Microbiology of urinary tract infections

Unit5. Microbiology of vascular access infection (femoral, jugula, subclavian catheters)

Unit6. Sampling methodologies for culture & sensitivity

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BSDT-204- CONCEPTS OF RENAL DISEASE

Unit1. Renal Diseases

- 1.1 Acute renal failure.
- 1.2 Nephrotic syndrome – primary & secondary.
- 1.3 Nephritic syndrome.
- 1.4 UTI (urinary tract infections.)
- 1.5 Asymptomatic urinary abnormalities.
- 1.6 Chronic renal failure.
- 1.7 Renal stone diseases.
- 1.8 Obstructive uropathies.
- 1.9 Congenital & inherited renal diseases.
- 1.10 Tumors of kidney.
- 1.11 Pregnancy associated renal diseases.
- 1.1 Renal vascular disorders & hypertension associated renal diseases.

Unit2. Basic Concepts of Dialysis Technology

- 2.1 Definition.
- 2.2 Indications of dialysis.
- 2.3 Types of dialysis.
- 2.4 Principles of dialysis.
- 2.5 Haemodialysis apparatus - types of dialyser & membranes.
- 2.6 Types of vascular access for haemodialysis.
- 2.7 Introduction to haemodialysis machine.
- 2.8 Priming of dialysis apparatus.
- 2.9 Dialyser reuse.
- 2.10 Common complications of haemodialysis.
- 2.11 Monitoring of patients during dialysis.

BSDT-205- NUTRITION

Unit1. Basic Concepts of Nutrition

- 1.1 Introduction to science of nutrition.
- 1.2 Definition.
- 1.3 Food pattern and its relation to health.
- 1.4 Factors influencing food habits.
- 1.5 Superstitions, culture, religion, income, composition of family, age, occupation, special group etc.
- 1.6 Food selection, storage and preservation.
- 1.7 Prevention of food adulteration

Unit2. Classification of nutrients.

- 2.1 Macronutrients and micronutrients.
- 2.2 Types, sources, requirements and deficiency of proteins.
- 2.3 Sources, requirements and deficiency of carbohydrates.
- 2.4 Types, sources, requirements and deficiency of fats.
- 2.5 Sources, requirement and storage of drinking water
- 2.6 Types, sources, requirements and deficiency of minerals.
- 2.7 Types, sources, requirements and deficiency of vitamins

Unit3. Planning of diets.

- 3.1 Need for planning of diets.
 - 3.1.1 Concepts of balanced diet.
 - 3.1.2 Food groups and balanced diet.
 - 3.1.3 Influence of age, sex, occupation & physiological state.
 - 3.1.4 Recommended dietary intake .
 - 3.1.5 Steps in planning balanced diet.
 - 3.1.6 Concepts of balanced diet for dialysis patients.
 - 3.1.7 Recommended dietary intake for dialysis patients.
 - 3.1.8 Planning diet for dialysis patients.
 - 3.1.9 Steps in planning balanced diet for dialysis patients

THIRD YEAR

BSDT-301-DIALYSIS TECHNOLOGY

Unit1. Dialysis in special situations:

- a) Patients with congestive cardiac failure.
- b) Advanced liver disease.
- c) Patients positive for HIV, HBsAg & HCV.
- d) Failed transplant.
- e) Poisoning cases.
- f) Pregnancy.

Unit2. Dialysis in infants & children

Unit3. Special dialysis procedures:

- a. Continuous therapies in haemodialysis
- b. Different modalities of peritoneal dialysis
- c. Haemodiafiltration
- d. Haemoperfusion
- e. SLED
- f. MARS
- g. Plasmapheresis

Unit4. Special problems in dialysis patients:

- a. Psychology & rehabilitation.
- b. Diabetes
- c. Hypertension.
- d. Infections.
- e. Bone diseases.
- f. Aluminum toxicity
- g. Renal anemia management: chronic dialysis

Unit5. Vascular access for haemodialysis & associated complications

Unit6. Peritoneal access devices: types of catheter, insertion techniques & associated complications.

Unit7. Complications of dialysis:

- a) Haemodialysis: acute & long term complications.
- b) Peritoneal dialysis: mechanical & metabolic complications
- c) Peritonitis & exit site infection.

Unit8. Recent advances in haemodialysis.

- a) Nocturnal dialysis.
- b) Online dialysis.
- c) Daily dialysis.

BSDT-302- MEDICAL ETHICS

Unit1. Introduction

Medical ethics introduction, Ethical principles in health care, Scope of practice, enforcing standards in health profession- promoting quality care, Professional Ethics in research, education and patient care delivery, Informed consent issues, Medical ethics and Economics in clinical decision making.

Unit2. Objectives

Identify underlying ethical issues and problems in medical practice

Unit3. Perspective of medical ethics

The Hippocratic Oath, The Declaration of Helsinki, The WHO Declaration of Geneva, International code of Medical Ethics (1993), Medical Council of India code of ethics(2002)

Unit4. Ethics of Individual

- a. Truth and confidentiality, the concept of disease, health and healing, the right to health
- b. The ethics of human life
- c. Prenatal sex determination
- d. The family and society in medical ethics
- e. Death and dying

Use of life-support systems, the right to die with dignity, suicide-the ethical outlook

- f. Professional Ethics

Unit5. Contract and confidentiality

Rules of professional conduct: Relationships with patients, colleagues, peers, medical and other professional and health care institutions.

Unit6. Confidentiality and Responsibility

Malpractice and Negligence, Provision of services and advertising, legal aspects: Consumer protection act, Legal responsibility of the individual for their action in professional context and understanding liability and obligations in case of medico-legal action.

BSDT-303- 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

BSDT-304- DIALYSIS TECHNOLOGY (Practical)

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

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