Dr. M. G. R.

EDUCATIONAL AND RESEARCH INSTITUTE

UNIVERSITY

(Declared as Deemed to be University u/s. 3 of UGC Act, 1956)

MADURAVOYAL, CHENNAI – 600 095

FACULTY OF ALLIED HEALTH SCIENCE

B.Sc. Renal Dialysis Technology

Regulations, Curriculum and Syllabus

2017

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Regulations for B.Sc. (Allied Health Science) Courses

Introduction:

B.Sc. (Allied Health Science), a (3-year course work + 1-year internship) program under the **Faculty of Allied Health Sciences**, is aimed at training students who will be able to meticulously assist the doctors for providing quality patient care in selected areas of clinical specialty. This program is a taught course that covers relevant topics and specialized areas of knowledge as opted. The aim of this B.Sc. program is to provide a thorough training to the candidates through formal lectures and/or seminars and practical programs which culminate in a one year internship that finally prepares the student for the rigors of the medical world.

1. Short Title and Commencement:

These Regulations shall be called the "Regulations for B.Sc. (Allied Health Science) Course" of Dr. M.G.R Educational and Research Institute. These regulations shall come into force from the academic year 2017-2018. These regulations are subject to modifications as may be approved by the Academic Council from time to time.

2. Eligibility for Admission:

a) A candidate desiring to join the (3-year course work + 1-year internship) program, leading to the degree B.Sc. (Allied Health Science) should have passed the HSC/CBSE/ISC or equivalent examination with one of the following subject combinations:

i) Physics, Chemistry, Biology

ii) Physics, Chemistry, Botany and Zoology

b) A candidate shall, at the time of admission submit to the Head of the Institution, a certificate of medical fitness from an authorized Medical Officer certifying that the candidate is physically fit to undergo the academic course and does not suffer from any disability or contagious disease.

3. Age limit for admission

A candidate should have completed the age of 17 years or would complete the age as on 31st December of the year of admission to the BSc .Allied Health Science Course.

4. Eligibility Certificate

Candidates, who have passed any qualifying examination other than the Higher Secondary Course examination conducted by the Government of Tamil Nadu, shall obtain an Eligibility Certificate from Dr. M.G.R Educational and Research Institute and produce the same at the time of admission.

5. Registration

A candidate admitted to the course shall register his/her name with the University by submitting the application form for registration, duly filled in along with the prescribed fee, through the Head of the Institution within the stipulated date.

6. Duration of the course

The duration of the B.Sc. (Allied Health Science) Degree Course shall be 3-year course work comprising of 6(six) semesters and one year (semesters 7 & 8) of compulsory internship. The candidate is required to pursue the course on a full time basis, and must complete the course within seven years from the date of provisional registration.

7. Commencement of the Course:

The course shall ordinarily commence by the month of August of the academic year.

8. Curriculum:

The Curriculum and syllabus for the course shall be as specified in the annexure to these regulations which are subject to modifications by the standing Academic Board from time to time.

(i) The first three years of the course will be utilized as follows:

- The first two semesters will be spent on Pre and Para clinical subjects including Anatomy, Physiology, Biochemistry, Microbiology, Pathology, Physics , English and Communication skills, Introduction to Computers, and Pharmacology.
- At the beginning of the third semester, students will be assigned to one of the following branches of specialization as per the admission policy, and they will be offered specialized training in that specialty during the third, fourth, fifth and sixth semesters.

(ii) The fourth year of the course shall be compulsory internship in the respective specialty.

9. Medium of Instruction:

English shall be the medium of instruction for all the subjects of study and for the examination.

10. Working Days:

Each semester shall consist of not less than 100 working days and each academic year shall have a total of 200 working days or above in the first to Sixth Semesters. In the Seventh and Eighth semesters, each semester shall have a minimum of 120working days.

11. Attendance:

The candidate shall have not less than 80 % attendance in Theory and Practical separately. Each semester shall be taken as a unit for the purpose of calculating the attendance. The candidate lacking attendance in a subject shall be denied permission to appear for the University Examination in that subject.

12. Condonation of Lack of Attendance:

The discretionary power of condonation of shortage of attendance to appear for University Examination rests with the University.

Lack of attendance can be condoned up to a maximum of 10% of the minimum attendance required in the following exceptional circumstances:

(i) Any illness/ accident (for which Medical certificate from a registered medical practitioner must be produced)

(ii) Any unforeseen tragedy in the family (should produce the letter from the parent/guardian)

(iii) Participation in NCC/NSS and other co-curricular activities representing the Institution / University. (Certificate from competent authority is required)

For any of the above reasons, request shall be made by the candidate with prescribed fees to the Controller of Examination through proper channel, ten days prior to the commencement of the theory examination.

13. Commencement of the examinations

There shall be two sessions of University examinations in an academic year, viz., February and August.

14. Continuous (Internal) Assessment:

Continuous (Internal) Assessment for Theory shall be the average of the best two out of three.

Continuous (Internal) Assessment for Practical shall be the average of the best two out of three.

15. Semester - End Examination (University/Department):

a. The examination in B.Sc. (Allied Health Science) shall consist of Written Theory examinations and Practical examinations. The Semester - End Examination (University/Department) shall be conducted at the end of each semester.

b. Papers for which Internal Examination is recommended by the Board of Studies and approved by the Academic Council, the date of Semester - End Examinations (Internal examinations) shall be as per the University guidelines.

16. Pattern of Semester - End Examination (University/Department):

EXAMINATION PATTERN

Semester-I and Semester-II (FOR ALL SPECIALITIES)

THEORY **MAX.MARKS**- 60 Marks **DURATION** -$2^{1}/2$ Hours

PART –A (Answer any one from Two)

1. Essay (1x15=15 Marks)

PART-B (Answer all questions)

1. Short Notes (5x5=25 Marks)

PART-C (Answer all questions)

1. Short answers (10x2=20 Marks)

PRACTICAL

Practical (including Orals) 15 Marks

CONTINUOUS (INTERNAL) ASSESSMENT

(i) Theory 20 Marks

(ii) Practical 5 Marks

TOTAL - 100 Marks

Question pattern for SEMESTER III – SEMESTER VI

Duration -3hours

Theory Pattern **80 marks**

Section –A (Answer any TWO from THREE)

1. Essay (2x15=30)

Section-B (Answer any EIGHT from TEN)

1. Short notes (8x5=40)

Section-C

1.Very short notes (5x2=10)

Internal assessment **20 marks**

- **Based on CAT Exams**

TOTAL **100 Marks**

Practicals Pattern

Max marks:80

1. Spotters	20 marks
2. Viva (Theory &Practicals)	20 marks
3. Charts/stations	20 marks
4. Record	20 marks

Internal assessment

Max marks:20

- Based on CAT Exams
- Attendance
- Log book

TOTAL **100 Marks**

17. Marks Qualifying for a Pass:

For passing the University/End-Semester Examination from Semester I to Semester VI, the candidate shall secure the marks as stated below,

(i) 40% minimum in the University End-Semester Theory examination

(ii) 40% minimum in the University End-Semester Practical examination

(iii) 40% of marks in the subject where internal evaluation alone is conducted

(iv) 40% of aggregate of theory, practical and internal assessment taken together

18.Classification of successful candidates:

a) Successful candidates who secure 75% marks and above as a course aggregate in the first appearance taking University theory, practical, and project/dissertation evaluation shall alone be awarded Distinction. This will also apply for award of University rank.

b) Successful candidates who secure 60% marks and above as a course aggregate in the University theory, practical, project/dissertation evaluation and viva shall be awarded First Class.

c) All others who secure 40-59% in gross percentage will be classified to have passed in Second Class.

19.Revaluation of answer papers

There shall be revaluation and retotaling of answer papers of failed candidates. Failed candidates are however, permitted to apply to the University within fifteen days of publication of the results for revaluation and retotaling.

20. Carry- over of failed subjects

1) A candidate has to pass in theory and practical examinations separately in each of the paper.

2) If the candidate fails either in theory or practical examinations, he/she has to reappear for both (theory and practical)

3) The student shall start the Internship training (VII & VIII semester) only after he/she clears all the papers from Semester I to Semester VI.

21. Temporary break of study

a) A candidate is not normally permitted to temporarily break the study.

b) If a candidate is continuously absent from the institute for four or more weeks,

i) Having notified the Dean/Director/Principal within this period, this absence shall be treated as "Temporary Break of Study".

ii) Without notifying the Dean/Director/Principal, his/her name will be removed from the institute rolls.

c) If a candidate is compelled to temporarily break the study for valid reasons (such as accident or hospitalization due to prolonged ill health), he/she shall apply for condonation of the break to the Dean/Director/Principal through the Head of the Department.

d) For condonable break of study:

i) If the lack of attendance is within condonable limits as per Clause No. 12, the candidate shall be permitted to write the examination for the current semester.

ii) If there is non-condonable lack of attendance, the candidate shall rejoin the program at the respective semester as and when it is offered after the break and shall be governed by the rules and regulations in force at the time of rejoining.

e) The total period for completion of the program reckoned from the commencement of the semester to which the candidate was first admitted shall not exceed the maximum period specified in Clause No.6 irrespective of the period of break of study in order that he/she may be qualified for the award of the degree.

f) In any case, a candidate shall be permitted to temporarily break the study only once during the entire duration of the program. The candidate shall forfeit the registration in case of a second break or in case of a non-condonable break ofstudy.

g) Without prejudice to the above rules, the candidate who has completed the attendance requirement for a semester, but has proceeded on a condonable break of study without appearing for the University Examination, shall be permitted to appear for the examinations without repeating the semester and thereafter continue the subsequent semester.

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FACULTY OF ALLIED HEALTH SCIENCES

SCHEME OF EXAMINATION

SEMESTER – I **TOTAL HOURS : 330**

S.No.	Paper	Hours/ Semester		Evaluation (Marks)				
		Theory	Practical	Continuous Assessment (Internals)		End Semester examination (University/Department Exams)		Total
				Theory	Practical	Theory	Practical	
1	Anatomy -I	**40 hours**	**20 hours**	**20**	**5**	**60**	**15**	**100**
2	Physiology -I	**40 hours**	**20 hours**	**20**	**5**	**60**	**15**	**100**
3	Biochemistry -I	**40 hours**	**20 hours**	**20**	**5**	**60**	**15**	**100**
4	Microbiology -I	**40 hours**	**20 hours**	**20**	**5**	**60**	**15**	**100**
5	Pathology -I	**40 hours**	**20 hours**	**20**	**5**	**60**	**15**	**100**
6	English	**30 hours**	-	**50**	**15**	**20**	**05**	**50**

SEMESTER – II

TOTAL HOURS : 420

S.No.	Paper	Hours / Semester		Evaluation (Marks)				
		Theory	Practical	Continuous Assessment (Internals)		End Semester examination (University/Department Exams)		Total
				Theory	Practical	Theory	Practical	
1	Anatomy -II	40 hours	20 hours	20	5	60	15	100
2	Physiology -II	40 hours	20 hours	20	5	60	15	100
3	Biochemistry -II	40 hours	20 hours	20	5	60	15	100
4	Microbiology -II	40 hours	20 hours	20	5	60	15	100
5	Pathology -II	40 hours	20 hours	20	5	60	15	100
6	Pharmacology	40 hours	20 hours	20	5	60	15	100
7	Physics	30 hours	-	50	-	-	-	50
8	Computer Science	30 hours	-	50	-	-	-	50

SEMESTER – III (RENAL DIALYSIS TECHNOLOGY)

TOTAL HOURS : 420

S.No	Paper	Hours/ Semester		Evaluation (Marks)				
		Theory	Practical	Continuous Assessment (Internals)		End Semester examination (University/Department Exams)		Total
				Theory	Practical	Theory	Practical	
1	Applied Anatomy and Physiology related to Renal Dialysis Technology -Theory (UE)	**60** hours	-	**20**	-	**80**	-	**100**
2	Applied Anatomy and Physiology related to Renal Dialysis Technology -Practicals (UE)	-	**120** hours	-	**20**	-	**80**	**100**
3	Applied Pharmacology related to Renal Dialysis Technology - Theory (UE)	**60** hours	-	**20**	-	**80**	-	**100**
4	Applied Pharmacology related to Renal Dialysis Technology - Practicals (UE)	-	**120** hours	-	**20**	-	**80**	**100**
5	Medical Ethics and Biosafety - Theory (IE)	**30** hours	-	-	-	**50**	-	**50**
6	Psychology - Theory (IE)	**30** hours	-	-	-	**50**	-	**50**

SEMESTER – IV (RENAL DIALYSIS TECHNOLOGY)

TOTAL HOURS : 420

S.No	Paper	Hours / Semester		Evaluation (Marks)				
		Theory	Practical	Continuous Assessment (Internals)		End Semester examination (University/Department Exams)		Total
				Theory	Practical	Theory	Practical	
1	Concepts of disease and outlines of clinical evaluation related to Renal Dialysis Technology Paper - I Theory (UE)	**60** hours	-	**20**	-	**80**	-	**100**
2	Concepts of disease and outlines of clinical evaluation related to Renal Dialysis Technology Paper - I Practical (UE)	-	**120** hours	-	**20**	-	**80**	**100**
3	Concepts of disease and outlines of clinical evaluation related to Renal Dialysis Technology Paper - II Theory (UE)	**60** hours	-	**20**	-	**80**	-	**100**
4	Concepts of disease and outlines of clinical evaluation related to Renal Dialysis Technology Paper - II Practical (UE)	-	**120** hours	-	**20**	-	**80**	**100**
5	Basics and Advanced Life Support - Theory (IE)	**30** hours	-	-	-	**50**	-	**50**
6	Medical Sociology - Theory (IE)	**30** hours	-	-	-	**50**	-	**50**

SEMESTER – V (RENAL DIALYSIS TECHNOLOGY)

TOTAL HOURS : 390

S.No	Paper	Hours / Semester		Evaluation (Marks)				
		Theory	Practical	Continuous Assessment (Internals)		End Semester examination (University/Department Exams)		
				Theory	Practical	Theory	Practical	Total
1	Renal Dialysis Technology - Part I - Paper I Theory (UE)	**60** hours	-	**20**	-	**80**	-	**100**
2	Renal Dialysis Technology - Part I - Paper I Practical (UE)	-	**120** hours	-	**20**	-	**80**	**100**
3	Renal Dialysis Technology - Part I - Paper II Theory (UE)	**60** hours	-	**20**	-	**80**	-	**100**
4	Renal Dialysis Technology - Part I - Paper II Practical (UE)	-	**120** hours	-	**20**	-	**80**	**100**
5	Environmental Science and Community medicine - Theory (IE)	**30** hours	-	-	-	**50**	-	**50**

SEMESTER – VI (RENAL DIALYSIS TECHNOLOGY)

TOTAL HOURS: 390

S.No	Paper	Hours/ Semester		Evaluation (Marks)				
		Theory	Practical	Continuous Assessment (Internals)		End Semester examination (University/Department Exams)		
				Theory	Practical	Theory	Practical	Total
1	Renal Dialysis Technology – Part II – Paper I Theory (UE)	**60** hours	-	**20**	-	**80**	-	**100**
2	Renal Dialysis Technology – Part II – Paper I Practical (UE)	-	**120** hours	-	**20**	-	**80**	**100**
3	Renal Dialysis Technology – Part II – Paper II Theory (UE)	**60** hours	-	**20**	-	**80**	-	**100**
4	Renal Dialysis Technology – Part II – Paper II Practical (UE)	-	**120** hours	-	**20**	-	**80**	**100**
5	Health Care and Basic Principles - Theory (IE)	**30** hours	-		-	**50**	-	**50**

SEMESTER – VII (FOR ALL SPECIALITIES)

Project/Dissertation

S.No	Paper	Hours / Semester		Evaluation (Marks)				Total
				Continuous assessment (Internals)		End Semester Examination		
		Theory	Practical	Project	Viva	Project	Viva	
1.	Project/ Dissertation(UE)	-	-	100	-	100	-	200
2.	Bio-Statistics and research methodology(IE)	30 hours	-	-	-	Theory 50		50

SEMESTER – VII & VIII (FOR ALL SPECIALITIES)

Internship -1 year

Objectives

The course of study offers a practical approach to Dialysis. The course of study includes extensive didactic and experiential training that will enable graduates to effectively apply knowledge, experience, analytical skills and expertise to meet the needs of Dialysis practice. Students will learn the principles of renal failure and dialysis, operation of dialysis devices, monitoring treatment and other related topics of dialysis, patient care and treatment. After completing the course, the student will obtain adequate skills and knowledge to perform various procedures and operate dialysis equipment under physician's supervision. A dialysis technologist can set up, evaluate, operate, and troubleshoot dialysis machines, and this knowledge can be used to find work in quality control or other areas in dialysis machine manufacturing. The technologist is also trained to monitor the condition of the patient, including taking vital signs and other medical evaluation criteria.

SEMESTER - I

S.No	Subject
1.	Anatomy – I(UE)
2.	Physiology –I (UE)
3.	Biochemistry - I(UE)
4	Microbiology - I(UE)
5.	Pathology – I(UE)
6.	English (IE)

SEMESTER - I

ANATOMY – I (UE)

Course description:

- A study of the anatomical structure of the human body.
- Body structure will be studied by organ systems.
- Form-function relationships with emphasis on clinically relevant anatomy.
- The laboratory study will involve observing and learning from human skeletal collections and dissected cadavers and preserved specimens.

Objectives:

- At the end of the course the student should be able to:
- Describe the structure and functions of the organ systems of the human body.
- Describe how the organ systems function and interrelate.
- Learn basic technical terminology and language associated with anatomy.
- Develop a self-identity of what it means to be "human".

Learning Objectives: Skills

- Identify the anatomical structure in the dissected specimen.
- Learn to correlate anatomical structures with relevant clinical conditions.

CONTENTS

Unit I

Organization of the Human Body

- Introduction to the human body
- Definition and subdivisions of anatomy
- Anatomical position and terminology
- Regions and Systems of the body
- Cavities of the body and their contents
- Levels of organization of the body

Cell

- Definition of a cell, shapes and sizes of cells
- Parts of a cell – cell membranes cytoplasm, subcellular organelles and their main function
- Cell Division – Definition and main events that occur in different stages of mitosis and meiosis.

Tissues

- Tissues of the body
- Definition and types of basic tissues
- Characteristics, functions and locations of different types of tissues

Unit II

Systems of Support and Movement

1. **Skeletal system**
   - Skeleton – Definition, axial and appendicular skeleton with names and number of bones, Types of bones. Parts of bones. Functions of bones. Name location and general features of the bones of the body.
   - Joints – Definition and types of joints with examples. Axes and kind of movements possible. Name, location, type, bones forming, movements possible.

2. **Muscular system**
   - Parts of the skeletal muscle. Definition of origin and insertion. Name and location of the skeletal muscles of the body.Origin, insertion, nerve supply and action of large muscles like sternocleidomastoid, pectoralis major, deltoid, Biceps brachii, Triceps brachii, gluteus, gastronemius and diaphragm.

Unit III

Control Systems of the Body

1. **Nervous system**
   - Sub-divisions of the nervous system
   - **Spinal cord** – Location, extent, spinal segments, external features and internal structure.
   - **Brain** – Sub-divisions, location external features of medulla oblongata, pons, mid-brain, cerebellum and cerebrum. Meninges and spaces around them. Name and location of ventricles of brain and circulation of cerebrospinal fluid. Blood supply of the brain and spinal cord.
   - **Cranial nerves** - Name, number, location and general distribution.
   - **Spinal nerves** - Typical spinal nerve groups and number of spinal nerves. Name and location of cervical plexus and brachial plexus. Location and general distribution of the branches.
   - **Autonomic Nervous system** –definition and functions

2. **Sense organs**
   - Location and features of the nose, tongue, eye, ear and skin

3. **Endocrine system**
   - Names of the endocrine glands. Location and features of pituitary, thyroid, parathyroid, suprarenal, pancreas, ovaries and testes. Names of hormones produced by each gland.

PRACTICAL & VIVA VOCE SYLLABUS

1. **Histology** – Epithelium
2. **Axial & Appendicular Skeleton** With Names & Number Of Bones
3. **Muscles**
    a. Trapezius
    b. Lattisimusdorsi
    c. Biceps
    d. Triceps
    e. Deltoid
4. **Nervous System**
    a. Cerebrum
    b. Cerebellum
    c. Brain Stem
    d. Spinal Cord
5. **Special Senses**
    a. Tongue
    b. Ear
    c. Skin
    d. Eye ballSS
6. **Viva Voce**
    a. Radiology – Xrays
    b. Osteology
    c. Charts
    d. Models
    e. Gluteus Muscles

Recommended books:

1. Manipal manual of Anatomy for Allied Health Sciences, Sampathmadhyastha
2. B D Chaurasia: General human anatomy

References:

1. B D Chaurasia: Regional Anatomy. Vol I, II,III
2. Richard S. Snell: Clinical Anatomy

PHYSIOLOGY-I

Objectives of the course:

At the end of this course the students should be able to:

Comprehend basic terminologies used in the field of Human Physiology

Define and describe basic Physiological processes governing the normal functioning of the human body.

Apply this knowledge in their Allied Health Science practice.

Contents

Unit 1 **Ia. General Physiology**

- Concept of Homeostasis
- Cell structure and functions
- Transport across membranes

Ib. Nerve and muscle

- Nerve structure,classification of nerve fibres,
- Muscles- classification , structure ,Neuro-Muscular junction(NMJ).
- Muscle contraction-mechanism,types.

Ic.Blood and body fluids

- Body fluid volumes,compartments,and composition
- Blood composition and functions
- Plasma proteins
- Erythrocytes -Morphologyand functions
- Leucocytes-Morphology and functions
- Platelets-Morphology and functions
- Blood groups.

Unit II **IIa. Digestive system**

- Salivary glands -Nerve supply , functions of saliva**.**
- Gastric juice-composition &functions of gastric juice.
- Pancreatic juice-composition , functions and regulation of pancreatic juice.
- Bile- composition , functions of bile and bile salts.
- Succus entericus and small intestinal movements.
- Deglutition, vomiting, functions of large intestine.

IIb.Excretory system

- Structure of Nephron and its blood supply, Juxtaglomerular Apparatus(JGA).
- Formation of urine-Filtration,Reabsorption and secretion.
- Counter-Current mechanism
- Micturition.

PRACTICAL & VIVA VOCE SYLLABUS

I. Microscope

II.Estimation of Hemoglobulin

III.RBC

IV.WBC

V.Spotters

BIOCHEMISTRY-I (UE)

Objectives:

- To have a knowledge about the chemistry and metabolism of various macromolecules- carbohydrate, protein and lipids
- To learn about enzymes, vitamins, minerals and nutrition
- To know the structure and function of Hemoglobins, Nucleic acids.
- To learn about the organ function tests like Liver Function Tests and Renal Function Tests.

CONTENTS

Unit I - CARBOHYDRATES

Carbohydrates:

- Classification of carbohydrates and their biological importance,
- Reducing property of sugars.

Metabolism of Carbohydrates :

- Digestion and Absorption of carbohydrates,
- Steps of Glycolysis and energetics,
- Steps of TCA cycle and energetics,
- Steps of Glycogen synthesis and breakdown,
- Significance of HMP shunt pathway,
- Definition and steps of Gluconeogenesis,Galactose metabolism

- Galactosemia.
- Diabetes mellitus ,

Bioenergetics :

- Importance of ATP, Outline of respiratory chain.

Unit II - LIPIDS

Lipids:

- Classification of lipids,
- Essential fatty acids,
- Functions of cholesterol,
- Triglycerides,
- Phospholipids

Metabolism of Lipids :

- Digestion and Absorption of lipids,
- Fatty acid synthesis & Steps of β oxidation of fatty acids,
- Types and functions of lipoprotein,
- Lipid profile, hyper cholesterolemia

Unit III - VITAMINS

Vitamins:

- Vitamins, its classification
- Vitamin A
- Vitamin D
- Vitamin E & K
- Vitamin B complex
- Vitamin C

Unit IV - ENZYMES

Enzymes:

- Definition,
- Classification,
- Coenzymes,

Factors affecting enzyme activity, Types and examples of enzyme inhibition

PRACTICAL & VIVA VOCE

1 Reactions of Glucose
2 Reactions of Fructose
3 Reactions of Maltose
4 Reactions of Lactose
5 Tests for Sucrose
6 Tests for Starch
7 Identification of unknown Carbohydrates
8 Spotters

Spotters:

The student must identify the spotter and write some important uses of the spotter.

- **CRYSTALS**

  - Maltosazone
  - Lactosazone
  - Glucosazone/Fructosazone

- **REAGENTS**

  - Benedict's reagent
  - Barfoeds reagent
  - Foulgers reagent
  - Seliwanoff reagent
  - Fouchets reagent

- **CHEMICALS**

  - Sodium Acetate
  - Phenylhydrazine
  - αNaphthol

- **STRUCTURES.**

  - Structure of Cholesterol
  - Structure of Glucose
  - Structure of Fructose

- **VITAMINS**

  - Carrots
  - Rickets
  - Scurvy

- Egg

MICROBIOLOGY – I (UE)

OBJECTIVE:

At the end of the semester the students should be able to

- Know the concepts of sterilization and disinfection procedures and their applications.
- Understand the basic principles of immunology.
- Understand the basic fundamental aspect of bacteria and study the common disease caused by them.

Contents

Unit I:

General Microbiology-History and Introduction of Microbiology, Microscopy and Morphology of bacterial cell and their function, Growth and nutrition of Bacteria, Sterilization and Disinfection , Culture media, Culture methods and Identification of bacteria.

Unit II:

Immunology-Basic concept about Infection (Source, Portal of entry and Spread), Immunity, Antigen, Antibody, Antigen-Antibody reaction, Hypersensitivity.

Unit III

Systemic bacteriology- Disease caused and lab diagnosis of medically important bacteria (Staphylococcus, Streptococcus, Neisseria, Echerichia coli, Salmonella, Shigella, Vibrio, Mycobacteria, Spirochetes)

PRACTICAL & VIVA VOCE

1. **Gram staining**

2. **Spotters:**

- Disposable syringe
- Sterile cotton swab
- Bacteriological loop
- Sterile tube
- McIntosh fildes Jar
- Autoclave
- Nutrient Agar plate
- Mac Conkey agar plate
- Mac conkey with LF
- Mac conkey with NLF
- Blood agar plate
- L J Media

- RCM
- BHI broth
- Antibiotic susceptibility test
- Gram Positive Cocci in Clusters
- Gram negative bacilli
- AFB
- VDRL Slide
- Microtitre plate

PATHOLOGY-I (UE)

1.Introduction to cell

- Normal Cell Structure Function

2.Cell injury and Adaptation

- Types of cell injury
- Adaptation
- Necrosis
- Apoptosis
- Pathological calcification

3.Inflammation and Repair

- Acute Inflammation
- Chronic Inflammation
- Wound Healing and Repair

4.Infectious Disease

- TB
- Leprosy

5.Hemodynamic Disorder

- Edema
- Thrombosis and Embolism
- Shock

6.Neoplasia

- Classification
- Nomenclature
- Characteristics of Benign & Malignant neoplasm
- Pathogenesis of cancer
- Spread of Cancer

7.Genetic Disorders

- Down syndrome
- Klinfelter Syndrome
- Turner Syndrome

8.Radiation

- Biological Effect of Radiation

PRACTICAL & VIVA VOCE

- **DIFFERENTIAL COUNT**
  - Spotter

- **GROSS (SPOTTER)**
  - Fatty liver
  - Lipoma
  - Dry gangrene foot
  - Wet gangrene bowel
  - CVC Spleen
  - Hydatid cyst
  - TB – Lung

- **INSTRUMENTS**
  - Westergrens ESR tube
  - Sahlihemocytometer
  - Neaubaur's chamber
  - Bone Marrow Needle

SEMESTER-II

S.No:	Subject
1.	Anatomy – II
2.	Physiology –II
3.	Biochemistry – II
4	Microbiology – II
5.	Pathology – II
6.	Pharmacology
7.	Physics
8.	Computer science

SEMESTER II

ANATOMY – II (UE)

Objectives:

- At the end of the course the student should be able to:
- Describe the structure and functions of the organ systems of the human body.
- Describe how the organ systems function and interrelate.
- Learn basic technical terminology and language associated with anatomy.
- Develop a self-identity of what it means to be "human".

Unit I

Maintenance of the Human Body

1. Cardio-vascular system

- Types and general structure of blood vessels. Structure and types of arteries and veins. Structure of capillaries. Shape, size, location, coverings, external and internal features of heart. Structure of heart wall, conducting system of the heart.
- Blood supply of the heart. The systemic arteries and veins. Name, location, branches and main-distribution of principal arteries and veins.

2. Lymphatic system

- Lymph, lymphatic vessels, name, location and features of the lymphatic organs.

3. Respiratory system

- Names of organs of respiration, Location and features of nose, pharynx, larynx, trachea, bronchi, lungs and pleura.

Unit II

4. Digestive system

- Names of organs of digestion. Parts of alimentary canal and accessory organs. Location and features of mouth, pharynx, esophagus, stomach, small and large intestines. Location and features of salivary glands, pancreas, liver and gall bladder.

5. Urinary system

- Names of urinary organs, location and features of kidney, ureter, urinary bladder and urethra.

Unit III

6. Reproductive system

- Names of male and female organs of reproduction. Location and features of scrotum, testis, epididymis, vas deferens, seminal vesicle, ejaculatory duct, prostate gland, penis and spermatic cord. Location and features of uterus and its supports, uterine tube, ovary vagina vulva and breast.

Anatomical Regions

- Simple ideas about scalp, triangles of neck, axilla, cubital fossa, mediastinum, inguinal canal, femoral triangle, popliteal fossa.

PRACTICAL & VIVA VOCE SYLLABUS

- **Endocrine System**
  - Pituitary gland
  - Pineal body
  - Thyroid & parathyroid gland
  - Adrenal
  - Pancreas
  - Gonads – Ovary & Testis
- **Cardio-Vascular System**
  - Heart
- **Lymphatic system**
  - Spleen
- **Respiratory System**
  - Lungs
  - Larynx
  - Trachea
- **Digestive System**
  - Salivary glands
  - Esophagus
  - Pharynx
  - Stomach
  - Liver, Gall bladder
  - Duodenum
  - Small intestine
  - Large intestine
- **Urinary system**
  - Kidneys
  - Ureter
  - Urinary bladder

- **Reproductive System**

  - Saggital section – Male & Female pelvis
  - Uterus & ligaments
  - Ovary
  - Prostate
  - Seminal vesicals
  - Vas deferens
  - Testis

- **Viva Voce**

  - Radiology – Xrays
  - Osteology
  - Charts
  - Models

Recommended books:

1. Manipal manual of Anatomy for Allied Health Sciences, Sampathmadhyastha.
2. B D Chaurasia: General human anatomy.

References:

1. B D Chaurasia: Regional Anatomy. Vol I, II,III.
2. Richard S. Snell: Clinical Anatomy.

PHYSIOLOGY-II (UE)

Unit III Cardiovascular System

- Cardiac muscle, action potential and conductingsystem of the heart.
- Cardiac cycle.
- ECG, heart sounds, Heart Rate.
- Cardiac output-Definition ,factors regulating cardiac output and measurement of cardiac output.
- Blood pressure-Definition, measurement, factors maintaining BP.
- Regional circulation-Coronary and cerebral.

Unit -IV Nervous system

- Structure& Properties of Neuron.

- Nerve- Classification,injury.
- Types and properties of Receptors
- Synapse and synaptic transmission.
- Reflex and its properties.
- Spinal cord-Ascending & Descending tracts.
- Thalamus , Basal ganglia , Cerebellum, Cerebral cortex, Hypothalamus &Cerebrospinal fluid.
- Autonomic nervous system.
- Ascending and desending tracts.

Unit -V Respiratory system

- Structure of upper and lower respiratory tract. Muscles of respiration and Mechanism of respiration.
- Lung volumes and capacities-definition,normal values,intrapulmonary and intra pleural pressures,surfactant.
- Oxygen transport,carbon-dioxide transport.
- Neural and chemical regulation of respiration.
- Hypoxia ,cyanosis,Artifical Respiration.

Unit – VI Special sense and skin

- Vision,
- Audition,
- Olfaction,
- Gustation.

Unit – VIIReproductive system

- Malereproductive organs-Spermatogensis and testosterone actions.
- Female reproductive organs.
- Contraception Methods.

Unit – VIII Endocrine system

- Hypothalamus hypophyseal inter relationship.
- Anterior pituitary hormones and their functions.
- Posterior pituitary hormones and their actions.
- Thyroid hormones, biosynthesis and functions.
- Parathyroid hormones ,functions.
- Insulin, glucagons, actions and Diabetes mellitus.
- Adrenal cortex hormones and their functions.
- Adrenal medullary hormones and their actions.

PRACTICAL & VIVA VOCE SYLLABUS

1. WBC.
2. Blood pressure.
3. Bleeding time
4. Clotting time.
5. Charts and spotters.

BIOCHEMISTRY – II (UE)

Objectives:

- To have a knowledge about the chemistry and metabolism of various macromolecules- carbohydrate, protein and lipids
- To learn about enzymes, vitamins, minerals and nutrition
- To know the structure and function of Hemoglobins, Nucleic acids.
- To learn about the organ function tests like Liver Function Tests and Renal Function Tests.

Unit I - PROTEINS

Proteins :

- Classification of amino acids,
- Structure of proteins,
- Plasma proteins,
- Immunoglobulins.

Metabolism of Proteins :

- Digestion and absorption of proteins,
- Ttransamination,
- Deamination,
- Steps of urea cycle,
- Phenylketonuria,
- Alkaptonuria,
- Transmethylation,
- Products derived from Glycine and tyrosine

Unit II -- NUCLEIC ACIDS

Nucleic acids:

- Structure & Function of DNA,
- Structure, Its types & Functions of RNA

- Nucleic Acid Metabolism

Unit III - HAEMOGLOBIN

Haemoglobin:

- Structure & Function of Haemoglobin
- Haemoglobin Metabolism

Unit IV-- MINERALS

Minerals:

- Macro & Minor Minerals & Metabolism

Unit V -- NUTRITION

Nutrition:

- BMR, SDA & Glycemic Index
- Dietary Fibers & Balanced Diet
- Protein Energy Malnutrition

Unit VI -- ORGAN FUNCTION TEST

- RFT

Unit XI - ACID BASE BALANCE

Acid Base Balance:

- pH Homeostasis
- Buffers
- Buffers
- Acidosis
- Alkalosis

PRACTICAL & VIVA VOCE

- Non- Protein Nitrogenous Substances
- Analysis Constituents of normal urine
- Analysis Constituents of abnormal urine
- Identification of abnormal constituents in urine

- Estimation of Glucose in blood
- Estimation of Urea in blood.

Spotters

Spotters: The student must identify the spotter and write some important uses of the spotter.

1. Urinometer
2. Lactometer
3. Centrifuge
4. Spectroscope
5. Colorimeter
6. pH meter
7. Ryles's Tube
8. Chromatography apparatus
9. Electrophoresis apparatus
10. Micropipette
11. Fluorosis
12. Inborn Errors of Metabolism
13. Protein Energy Malnutrition
14. Benzidine powder
15. Sulphur powder
16. Fouchet's Reagent
17. Structure of t RNA
18. Egg White
19. Jaundice
20. Gout
21.

MICROBIOLOGY – II (UE)

OBJECTIVE:

At the end of the semester the students should be able to

- Know the concepts of sterilization and disinfection procedures and their applications.
- Understand the basic principles of immunology.
- Understand the basic fundamental aspect of bacteria and study the common disease caused by them.

Unit- I

Virology: Introduction to virology, List of medically important viruses and diseases (AIDS, Hepatitis, Rabies, Polio) and Lab diagnosis of viral infections

Unit - II

Mycology: Introduction to Mycology, List of medically important fungi and diseases (Candidiasis, Cryptococcosis, Dermatophytes, Aspergillosis and Mucor mycosis) and Lab diagnosis of fungal infections.

Unit - III

Parasitology: Introduction to Parasitology, List of medically important parasites and diseases (E.histolytica, Plasmodium, W.bancrofti, Ascaris,Ancylostoma) and Lab diagnosis of parasitic infections

Unit - IV

Applied Microbiology-Collection and transport of clinical specimen, Sexually transmitted disease, Hospital acquired infection, Urinary tract infection, Skin and Soft tissue infection, Anaerobic infection, Respiratory tract infection and Bloodstream infection, Immunoprophylaxis, Biomedical Waste Management and standard precautions.

PRACTICAL & VIVA VOCE

I.SPOTTERS

1. Ascarislumbricoides
2. Taenia
3. Gram stained smears showing Candida
4. Universal container
5. Vaccine-OPV
6. BCG
7. Hepatitis
8. DPT
9. TT
10. MMR
11. Virology –Embryonated egg
12. Tissue culture
13. Rhabdovirus

14. Polio virus
15. HIV

II.Clinical case discussion with charts

1. Skin and soft tissue infections
2. Ring worm/ Tinea infections
3. Food poisoning
4. Gastroenteritis

RECOMMENDED BOOK:

1. Dr.C.P.Baveja- Microbiology in Nutshell (Arya Publications).

REFERENCE BOOKS:

1. Ananthanaryanan and Paniker's - Textbook of Microbiology.
2. Dr.C.P.Baveja – Textbook of Microbiology.

PRACTICAL BOOK:

1. Patwardhan,Bhat,SatishPatwardhan – Handbook of Practical examination in Microbiology.

PATHOLOGY- II (UE)

1. CVS

-Atherosclerosis
-Ischemic heart diease
-Congenital heart diseae
-Valvular heart disease

2. RESPIRATORY SYSTEM

-Bronchial Asthma
-Emphysema
-Bronchiectasis

3. GIT

-Gastric ulcer
-Tumors of GIT

4. HEPATOBILIARY

-Hepatitis
-Liver Abscess
-Cirrhosis
-Cholecystits

5. KIDNEY AND URINARY TRACT

-Renal stones
-UTI and Pyelonephritis

-Renal cell carcinoma(RCC)
-Renal Failure

6. REPRODUCTIVE SYSTEM
-Diseases of testis, uterus, cervix and ovary

7. CNS
-Infections

8. BONES and JOINTS
-Septic Arthritis
-Osteomyelitis
-Rhematoid Arthritis

9. ANEMIA

10. AUTOIMMUNE DISEASES

PRACTICAL & VIVA VOCE

INSTRUMENT TEST

- RBC Pipette
- WBC Pipette
- Sahli's Pipette
- Wintrobe's PCV tube
- Hb Estimation
- Blood grouping

SPECIMEN

- Chronic Pyelonephritis
- RCC
- SCC – Foot
- Leiomyoma – Fibroid uterus
- Gall stones
- Appendicitis
- Liver abscess

PHARMACOLOGY (UE)

COURSE OBJECTIVES:

To understand the terminologies and basic principles of pharmacokinetic and pharmacodynamic involved in the use of drugs.

To understand the pharmacological action and mechanism of action of common drugs used for different disease conditions.

To know the therapeutic uses and adverse effects of common drugs used for different disease conditions

Introduction

General pharmacological principles-Definition-Routes of drug administration-Pharmacokinetics-

Unit I:

- Pharmacodynamics-Adverse drug effects
- Drugs acting on Autonomic Nervous System, Peripheral Nervous System and Drugs acting on Central Nervous system

Unit II

- General considerations-Cholinergic system & drugs-Anticholinergic drugs-Adrenergic drugs-antiadrenergic drugs-Drugs acting on autonomic ganglia.

Unit III:

- Skeletal muscle relaxants-Local anaesthetics,General anaesthetics-Ethyl & Methyl alcohol-Sedatives-Hypnotics-Antiepileptics-Antiparkinsonian drugs-Drugs used in mental illness-Opioid analgesics and Non opioid Analgesics-Nonsteroidal Antiinflammatory drugs

Unit IV

- Cardiovascular drugs , Drugs affecting Blood & Blood formation and Drugs on Respiratory system
- Cardiac glycosides,Antiarrhythmic drugs, Antianginal drugs,Antihypertensives and Diuretics,Haematinics,Erythropoietin,,Drugs affecting-coagulation,Fibrinolytic and Antiplatelet drugs,Treatment of cough and antiasthmatic drugs.

Unit V

- Antimicrobial drugs
- General consideration-Antibiotics-Antibacterial agents-Antitubercular drugs-Antifungal-Antileprotic-Antiviral-Antimalarial-Antiamoebic-Antiprotozoal drugs-Cancer Chemotherapy,Antiseptic-Disinfectant-others.

Unit VI

- Hormones & related Drugs, Drugs used in Gastrointestinal diseases & Miscellaneous drugs
- Corticosteroids,Antithyroid drugs and Drugs for Diabetes Mellitus, Treatment of Vomiting,Constipation,Diarrhoea and Treatment of peptic ulcer
- Vitamins, Vaccines, Sera and chelating agents.

Recommended books:

Prep Manual for Undergraduates in Pharmacology by Tara V Shanbag, 2nd edition

Pharmacology for Dental and Allied Health Sciences by Padmaja Udaykumar, 3rd edition

Reference books:

Essentials of Medical Pharmacology by KD Tripathi, 7th edition

Basic and Clinical Pharmacology by Bertram G Katzung, 12th edition

PRACTICAL & VIVA VOCE

Learning Objective

This module is intended to discuss the various modalities of drug delivery and instruments relevant to it.

Instruments

Needles	Intravenous
	Intrathecal
	Spinal
	Intra arterial
Students Discussion	Syringes: Tuberculin
Insulin	
I.V cannula	

	Scalp. Vein set
Students Discussion	Enema can
	Inhalers
	Spacers
	Nebulizers
Students Discussion	Tablets – Enteric coated, Sustained release, Sub-lingual
Students Discussion	Capsules, Spansules, Pessary, Suppository
Students Discussion	Topical Preparation, Ointment, Lotion, Powder, Drops – eye / ear

Charts: Mechanism of action of drugs, adverse effects, toxicology

Spotters: drugs

Text books suggested for reading:

- Text book of pharmacology for Dental &Allied Health Science 2rd edition Padmaja Udaykumar
- Pharmacology for dental students Tara V shanbhag, Smita Shenoy, Veena Nayak
- Principles of pharmacology 2rd edition H.L.Sharma & KK Sharma

PHYSICS

Unit 1: Basic concepts

Basic Units, Heat, Acoustics etc. Basic concepts of power, work, force, energy Einstein's formula Electronics, Electricity & Magnetism, electromagnetic waves Units and measurements temperature and heat SI units of above parameters Atomic structure Nucleus Atomic Number, Mass Number electron orbit and energy levels Periodic table Isotopes Isobars Ionization and excitation Radioactivity, Natural and artificial radioactivity alpha decay beta decay.

Unit 2: Electromagnetic induction

Electric charges electric induction electric potential capacitance and capacitors. Electrical energy and power unit of current resistance and Ohm's law circuit laws heating effect of current

sources of electrical energy E.M.F. Magnetism, Magnetic effect of an electric current application of magnetic field. Electromagnetic induction, laws of mutual induction and self-induction. Alternating current transformers theory and losses practical aspects reactance –resonance impedance and power factors.

Unit 3: 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 4: 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 5: Introduction to Imaging Technique

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

Unit 6: 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 7: 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 – Electroencephalography – Electromyography.

Computer Science

1. History of computers,

- Definition of computers,
- Input devices,
- Output devices,
- Storage devices,
- Types of memory,
- And units of measurement,
- Range of computers,
- Generations of computers,
- Characteristics of computers

2. System:

- Hardware,
- Software,
- system definition,
- Fundamentals of Networking,
- Internet,
- Performing searches and working with search engines,
- types of software and its applications

3. Office application suite –

- Word processor,
- spreadsheet,
- presentations,
- other utility tools,
- Fundamentals of Linux / Windows operating system, functions, interfaces, basic commands, working with the shell and other standard utilities.

4. Language

- Comparison chart of conventional language,
- programming languages,
- generations of programming languages,
- Compilers and interpreters,
- Universal programming constructs based on SDLC,
- Variable, constant, identifiers, functions, procedures, if while, do – while,
- For and other Structures.

5. Programming in C language,

- Data types, identifiers, functions and its types, arrays, union, structures and pointers
- Introduction to object oriented programming with C++: classes, objects, inheritance
- Polymorphism and encapsulation. Introduction to databases, and query languages,
- Introduction to Bioinformatics

Practicals:

1. Various browsers, search engines, email

2. Text document with mages with multiple formatting options using a specified office package

3. Spreadsheet using a specified office package

4. Presentation on a specified topic using the specified locations

5. Shell programming-parameters

6. Shell program- regular expressions

7. C program- functions

8. C program – file handling

9. C program demonstrating the usage of user defined variables

10. Databases

11. Applications in Optometry

SEMESTER III

S.NO	SUBJECT
1	Applied Anatomy and Physiology related to Renal Dialysis Technology - Theory(UE)
2	Applied Anatomy and Physiology related to Renal Dialysis Technology - Practical(UE)
3	Applied Pharmacology related to Renal Dialysis Technology - Theory(UE)
4	Applied Pharmacology related to Renal Dialysis Technology - Practical(UE)
5	Medical Ethics and Biosafety (IE)
6	Psychology (IE)

SEMESTER – III

APPLIED ANATOMY AND PHYSIOLOGY

RELATED TO RENAL DIALYSIS TECHNOLOGY – THEORY (UE)

Course Objective :

An Outline of Renal Anatomy and Physiology will be provided to improve the students understanding of Technical and Diagnostic procedures used with Special emphasis on Applied aspects.

Objective :

To develop the In depth knowledge on Anatomy of Renal system and Physiology of Renal system.

Contents

Unit- I

Gross structures of Excretory system :

- Structure of kidney
- Structure of Ureter and Urinary Bladder
- Structure of Nephron (Renal corpuscle, Proximal tubule, Loop of Henle, Distal tubule and Collecting tubule)
- Embryology of Kidney
- Histology of Kidney

Unit- II

Vascular supply of Excretory system :

- Renal artery & Renal vein
- Jugular vein
- Subclavian vein
- Femoral vein
- Artery & Veins used for creation of AV Fistula
- Innervations of Kidney and Urinary Bladder
- Peritoneum in general

Unit- III

Physiology related to Dialysis technology – Mechanism of Urine formation

- Filtration
- Reabsorption
- Concentration
- Dilution
- Acidification

Unit- IV

Functions of Excretory system :

- Excretory and Regulatory functions
- Metabolic and Endocrine functions
- Physiology of Micturition, Types of Bladder dysfunction
- Renal function Test

Unit- V

Regulatory functions of Excretory system :

- Role of Kidney in Blood Pressure regulation in health and diseases
- Mechanism of Blood formation and regulation
- Role of Kidney in Bone formation
- Role of Kidney in Acid – Base balance
- Other Endocrine functions of the Kidney
- Body fluids and Electrolytes & their regulation in health and diseases
- Disorders of Water Metabolism (Potassium, Sodium, Phosphate, Calcium)
- Role of Peritoneum in Peritoneal Dialysis

Recommended Books :

1. Anatomy and Physiology in Health and Illness – Ross and Wilson, 12th Edition, Elsevier Health Sciences, 2014.

2. Fundamentals of Medical Physiology - L.Prakasam Reddy, 5th Edition, Paras Medical Publishers,

2013.

3.Essentials of Medical Physiology – K.Sembulingam, Prema sembulingam, 6th Edition, Jaypee.

Reference Books :

1. Human Anatomy – B D Chaurasia, 6th Edition, CBS, 2013.

2. Text Book of Medical Physiology – Guyton and Hall, 12th Edition, Saunders, 2010.

3. The Kidney – Brenner and Rector's, 9th Edition, Elsevier Health Sciences, 2012.

Specific Learning Outcomes (SLO) :

- Will be able to explain the Anatomy of Renal system with better knowledge on terminologies.
- Will be able to explain to Physiological processes with understanding.
- Will be able to provide better support during a Renal disorder with knowledge of Anatomy and Physiology.

APPLIED ANATOMY AND PHYSIOLOGY

RELATED TO RENAL DIALYSIS TECHNOLOGY – PRACTICAL (UE)

Objective :

1. To inculcate thorough knowledge on the Anatomy of various organs and structures related to Renal system.

2. To elaborate on various Physiological processes related to Renal system.

Contents

Gross Specimens / Spotters :

1. Kidney

2. Ureter

3. Urinary Bladder

Charts :

1. Renal corpuscle

2. Glomerular apparatus

3. Nephron ((Renal corpuscle, Proximal tubule, Loop of Henle, Distal tubule and Collecting tubule)

4. Renal artery & Renal vein, Jugular vein, Subclavian vein, Femoral vein, Radial artery, Cephalic vein

5. Innervations of Kidney and Urinary Bladder

6. Peritoneum in general

7. Functions of Excretory system (Excretory, Regulatory, Metabolic and Endocrine functions)

8. Physiology of Micturition, Types of Bladder dysfunction

9. Renal function Tests

10. Physiology of Micturition

11. Types of Bladder dysfunction

12. Mechanism of Urine formation

13. Role of Kidney in Blood Pressure regulation in health and diseases

14. Mechanism of Blood formation and regulation

15. Role of Kidney in Bone formation

16. Role of Kidney in Acid – Base balance

17. Other Endocrine functions of the Kidney

18. Body fluids and Electrolytes & their regulation in health and diseases

19. Disorders of Water Metabolism (Potassium, Sodium, Phosphate, Calcium)

20. Role of Peritoneum in Peritoneal Dialysis

Specific Learning Outcomes (SLO) :

- Will be able to express anatomical terminologies with clarity.
- Will be able to recognize improper physiological functions.
- Will be able to show competency in handling patients with renal disorders with knowledge on Applied Anatomy and Physiology.

APPLIED PHARMACOLOGY

RELATED TO RENAL DIALYSIS TECHNOLOGY – THEORY (UE)

Course Objective :

The Course will cover General Pharmacology with Special Emphasis on common drugs used, Route of Administration, Type of formulations, Dose and frequency of administration, Side effects and Toxicity, Management of Toxic effects, Drug interactions, Knowledge of chemical and trade names, Importance of Manufacturing and expiry dates and instruction about handling each drug.

Objective :

1. To develop understanding of various drugs and their Pharmacokinetics in relation to Renal System.

2. To introduce the Importance of Pharmacology in Dialysis Emergencies.

Contents

Unit- I

Common Drugs used in Renal Medicine :

- Diuretics
- Antihypertensives
- Antibiotics
- Steroids
- IV Fluids in Renal patient
- Iron therapy in Dialysis
- Vitamin-D analogues, Phosphate binders
- Erythropoiesis Stimulating Agents
- Chemicals used in Dialysis unit including composition and mechanism of action
- Hemodialysis Concentrates
- Peritoneal Dialysis Fluids
- Replacement Fluids used for CRRT
- Chemicals used for Sterilization including Formaldehyde, Hyderogen Peroxide, Sodium Hypochlorite, Citrosterile, Renalin and its mechanism of action
- Vaccines used in Dialysis patients – Hepatitis B
- Immunosuppressive medications used in Renal Transplantation

Unit- II

Drugs affecting Coagulation :

- Heparin including Low Molecular Weight heparin
- Warfarin
- Protamine Sulphate
- Regional Citrate Anticoagulation

Drugs preventing Coagulation :

- Antiplatelet drugs
- Thrombolytic agents

Unit- III

Cardiovascular drugs & Inotropic Drugs :

- Digoxin
- Beta – blockers
- Dopamine
- Dobutamine
- Adrenaline
- Isoprenaline

Unit- IV

Other drugs :

- Antihistamine
- Lipid Lowering agents
- Dialysable drugs
- Bicarbonate
- Potassium
- Magnesium

Unit- V

Vasodilators :

- Nitro-glycerine
- Nitroprusside

Recommended Books :

1. Pharmacology for Dental and Allied Health Sciences - Padmaja Udaykumar, 3rd Edition, CBS, 2012.

2. Essentials of Medical Pharmacology – K D Tripathi, 7th Edition, Jaypee Brothers Medical Publishers, 2013.

Reference Books :

1. Pharmacology - Richard A.Harvey, 4th Edition, Saunders, 2009.

2. Pharmacology and Pharmacotherapeutics - R S Sataskar, 21st Edition, Popular Prakashan Ltd, 2015.

Specific Learning Outcome (SLO) :

- Will be able to explain various drug mechanisms, Route of Administration, Type of formulations, dose, Frequency of administration, side effects and toxicity.
- Will be able to recognize drug actions in their regimes in relation to Renal system conditions.
- Will be able to identify and support Physicians in diagnosis and treatment of renal disease conditions with competency.

APPLIED PHARMACOLOGY

RELATED TO RENAL DIALYSIS TECHNOLOGY – PRACTICAL (UE)

Objective :

1. To cover General Pharmacology with Special Emphasis on common drugs used, Route of Administration, Type of formulations, Dose and frequency of administration, Side effects and Toxicity, Management of Toxic effects, Drug interactions.

2. To impart knowledge of chemical and trade names, importance of manufacturing, expiry dates and instruction about handling each drug.

Contents

Spotters And Charts :

1. Diuretics
2. Antihypertensives
3. Antibiotics
4. Steroids
5. IV Fluids in Renal patient
6. Iron therapy in Dialysis
7. Vitamin-D analogues, Phosphate binders
8. Erythropoiesis Stimulating Agents
9. Chemicals used in Dialysis unit including composition and mechanism of action
10. Hemodialysis Concentrates
11. Peritoneal Dialysis Fluids
12. Replacement Fluids used for CRRT
13. Chemicals used for Sterilization including Formaldehyde, Hyderogen Peroxide, Sodium Hypochlorite, Citrosterile, Renalin and its mechanism of action
14. Vaccines used in Dialysis patients – Hepatitis B
15. Immunosuppressive medications used in Renal Transplantation
16. Heparin including Low Molecular Weight heparin
17. Warfarin
18. Protamine Sulphate
19. Regional Citrate Anticoagulation
20. Antiplatelet drugs
21. Thrombolytic agents
22. Cardiovascular drugs (Digoxin, Betablockers, Dobutamine, Adrenaline, Isoprenaline)
23. Antihistamine
24. Lipid Lowering agents
25. Dialysable drugs
26. Bicarbonate

27. Potassium
28. Magnesium
29. Vasodilators (Nitro-glycerine, Nitroprusside)

Specific Learning Outcome (SLO) :

- Will be able to explain on various drug mechanisms.
- Will be able to recognize drug actions in their regimes in relation to disorders to Renal system.
- Will be able to identifying and supporting physicians in diagnosis and treatment of renal pathological conditions with competency.

MEDICAL ETHICS AND BIOSAFETY

UNIT-I

Definition and key Concepts; philosophical considerations; epistemology of science; ethical terms; principles and theories; relevance to health care; ethics and the law issues: genetic engineering, stem cells, cloning, medical techniques, trans-humanism, bio-weapons.

UNIT-II

Define negligence, malpractice & liability; iatrogenic harm; Influence of ethics in general practice; Describe primary and secondary ethical principles; Hippocrates' oath; Professional codes of ethics; Describe the moral basis of informed consent and advance directives; research ethics – animal rights, ethics of human cloning, and stem cell research; ICMR guidelines.

UNIT-III

Genetic testing, genetic screening, Fertility and birth control, sex determination and sex selection, Reproductive control: assisted reproduction and ethics, pre-natal genetic counseling, pre-implantation genetic diagnosis, Ethical issues in applied medicine; Workers compensation.

UNIT-IV

Euthanasia and physician-assisted dying; end-of-life care; Physicians, patients and other: autonomy, truth telling & confidentiality; emerging issues: impact of medical advances on society; Use of genetic evidence in civil and criminal court cases; Challenges to public policy – to regulate or not to regulate; improving public understanding to correct misconceptions.

UNIT-V

Introduction to Biosafety; biological safety cabinets; containment of biohazard; precautions for medical workers; precautions in patient care; Biosafety levels of microorganisms; mitigation of antibiotic resistance; radiological safety; measurement of radiation; guidelines for limiting radiation exposure; maximum reasonable dose; precautions against contamination; Institutional Biosafety committee.

PSYCHOLOGY

UNIT 1: Basic Concepts of Psychology

Definition of Psychology, Origin of Psychology - Philosophical roots of psychology, Schools of Psychology –Structuralism – Gestalt – Functionalism – Behaviorism - Psychoanalysis – Humanistic. Fields of Psychology - Work of a psychologist – Applications of psychology.

UNIT 2: Learning principles and methods

Definition of learning, Factors In The Process of Learning Classical conditioning - Operant Conditioning – The principle of reinforcement and Punishment. Theory of learning. Cognitive learning- Latent learning, Insight learning, and Imitation.

UNIT 3: Motivation, Emotion, Memory and forgetting

Motivation - Definition of motivation – Theories of motivation - Physiological basis of motivation – Motivational factors in aggression – Self-actualization motivation. Emotion – Emotional expression –Theories of emotions. Kinds of remembering – Retrieval processes – The nature of forgetting – Two process theories of memory – Improving memory –Language and thought – Symbols and concepts – Structure – Forms of thought - Thinking and reasoning – Concept formation.

UNIT 4: Development, Sensory Processes and Perception.

Erikson's stages of psychosocial development Lawrence Kohlberg's stages of moral development Freud’s Stages of Psychosexual Development Physiological basis of behavior – The brain and nervous system –The sensory process , Some general characteristic of senses – Five senses ,Perception: Organization – The role of learning in perception – Perception and attention – Perceptual process.

UNIT 5: Intelligence & Personality

Theories of intelligence – Measuring Intelligence – Kinds of intelligence tests – Ability – Formation of aptitude and attitude – Aptitude tests –Creativity and its tests. Personality – Definition of Personality – Theories of Personality – Assessment of Personality. Social Factors Influencing Personality.

UNIT 6: Social Psychology

Definition, Nature, Subject Matter and Scope Of Social Psychology-Applications and Importance of Social Psychology, Groups: Definition and Type- Primary And Secondary Groups Social Interaction, Social and Inter-Personal Relations. Inter-personal attraction – Love and Companionship. Prosocial-behavior. Modes of empathy: self – other differentiation and development of empathy. Social influence: attitude and conformity. Definition - Characteristics and Classification of Crowd. Leadership: Definition and characteristics, Defense Mechanisms, frustration and conflict, sources of frustration and conflict, types of conflicts. Aggression and Types of aggression.

UNIT 7: Health Psychology

Definition of Health Psychology -Relating Health Psychology to other fields Clinical Health Psychology, Public Health Psychology, Community Health Psychology, Critical Health Psychology

Abnormal Psychology: Concepts of normality and abnormality, causation of mental illness, neuroses, psychoses, psychosomatic disorders, measures to promote mental health.

Stress - Definitions- Models of Stress – Theories of Stress - Stress reactions – Coping and Stress Management techniques, Pain and its management - Psychological reactions of a patient to loss – Stages of Acceptance by Kubler-Ross.

REFERENCES:

1. Clifford T. Morgan, Richard a. King, John R. Weis and John Schopler,"**Introduction to Psychology" – 7th Edition**. Tata McGraw Hill Book Co. New Delhi, 1993.

2. Baron, R. A., & Byrne, D (2006), "**Social psychology",** New Delhi: Prentice hall of India private limited.

3.Elliot Aronson, Timothy D. Wilson, Robin M. Akert, Samuel R. Sommers, **"Social psychology" 9th edition** published by Pearson education, Inc.,2006

4. Shelley E. Taylor. "**Health Psychology" Third Edition**. McGraw Hill International Editions, 1995.

5. Swaminathan, V.D, Latha Sathish, "**Psychology for Effective Living"**, Department of Psychology, University of Madras.

6. Coleman, James. 1980. "**Abnormal Psychology and modern life"**. New Delhi: Tata McGraw Hill Ltd.

SEMESTER IV

S.NO	SUBJECT
1	Concepts of disease and outlines of clinical evaluation related to Renal Dialysis Technology Paper - I Theory (UE)
2	Concepts of disease and outlines of clinical evaluation related to Renal Dialysis Technology Paper - I Practical (UE)
3	Concepts of disease and outlines of clinical evaluation related to Renal Dialysis Technology Paper - II Theory (UE)
4	Concepts of disease and outlines of clinical evaluation related to Renal Dialysis Technology Paper - II Practical (UE)
5	Basics and Advanced Life Support - Theory (IE)
6	Medical Sociology - Theory (IE)

SEMESTER – IV

CONCEPTS OF DISEASE AND OUTLINES OF CLINICAL EVALUATION RELATED TO RENAL DIALYSIS TECHNOLOGY - PAPER I - THEORY (UE)

Course Objective :

An outline of concepts of various Kidney Diseases will be provided to improve the students in-depth understanding of the causes, pathophysiology, diagnosis and management used with special emphasis on applied aspects and also assists in disease diagnosis, based on observed changes in tissue structure or biochemistry, while the focus of investigative pathology is the elucidation of the underlying mechanisms related to tissue injury and disease processes. The Goal of the course will be to expand and extend the student's knowledge of normal structure and function into the realm of disease processes.

Objective :

1.To inculcate knowledge on various pathological conditions.

2.To elaborate on Renal diseases and disorders and their diagnosis and therapeutic techniques.

Contents

Unit- I

Basic Renal Disorders :

- Glomerular Diseases
- Post Infectious Glomerulonephritis
- Acute Renal Failure
- Chronic Renal Failure – Chronic Kidney Disease (CKD)

Unit- II

Acid – Base, fluids and Electrolyte Disorders :

- Metabolic Acidosis, Metabolic Alkalosis & Respiratory Acidosis, Respiratory Alkalosis
- Edema and The Clinical Use Of Diuretics
- Disorders Of Sodium (Hyponatremia, Hypernatremia)
- Disorders Of Potassium Metabolism
- Disorders Of Calcium And Phosphorus Homeostasis

Unit- III

The Kidney in Systemic diseases :

- Renal function in Congestive heart failure
- Renal function in Liver diseases
- Renal involvement in Systemic vasculitis
- Renal manifestations in SLE and other Rheumatic disorders

Unit- IV

Diabetic Nephropathy :

- Epidemiology
- Pathogenesis
- Diagnosis
- Management
- Prevention

Unit- V

Renal Biopsy :

- Indications
- Contraindications
- Procedure
- Pre and Post biopsy care

Recommended Books :

1. Basic Pathology - Robbins, 9th Edition, Saunders, 2012.

2. Primer on Kidney diseases - Greenberg, 5th Edition, Elsevier Health Sciences, 2009.

Reference Books :

1. Textbook of Pathology – Harsh Mohan, 7th Edition, Jaypee Brothers Medical Publishers, 2014.

2. Kidney Diseases in Primary Care – K.Mandal and Stanley, 3rd Edition, Dorrance Publishing Co, 2008.

3. Davidson's Principle and Practice of Medicine – Brain R Walker, 22nd Edition, Churchill Livingston, 2014.

4. ABC of Kidney Diseases – David Goldsmith, 22nd Edition, BMJ books, 2011.

Specific Learning Outcome (SLO) :

- Will be able to identify the pathological processes in relation to Renal disorders.
- Will be able to demonstrate the competency in handling patients with Renal disorders.
- Will be able to express support in diagnosing and treatment of Kidney disease patients with care.

CONCEPTS OF DISEASE AND OUTLINES OF CLINICAL EVALUATION RELATED TO RENAL DIALYSIS TECHNOLOGY - PAPER I - PRACTICAL (UE)

Objective :

1.To inculcate knowledge on various pathological conditions.

2. To elaborate on Renal diseases and disorders and their diagnosis and therapeutic techniques.

Contents

Specimens and Charts / Case Discussions :

1. Glomerular Diseases
2. Post Infectious Glomerulonephritis
3. Acute Renal Failure
4. Chronic Renal Failure – Chronic Kidney Disease (CKD)
5. Acid – Base, fluids and Electrolyte Disorders
6. Renal function in Congestive heart failure
7. Renal function in Liver diseases
8. Renal involvement in Systemic vasculitis
9. Renal manifestations in SLE and other Rheumatic disorders
10. Diabetic Nephropathy
11. Renal Biopsy

Urine Analysis :

1. Physical Examination
2. Chemical Examination
3. Microscopic Examination

Specific Learning Outcome (SLO) :

- Will be able to identify the pathological processes in relation to Renal sciences.
- Will be able to demonstrate the competency in handling patients with Renal disorders.
- Will be able to express support in diagnosing and treatment of Kidney disease patients with care.

CONCEPTS OF DISEASE AND OUTLINES OF CLINICAL EVALUATION RELATED TO RENAL DIALYSIS TECHNOLOGY - PAPER II - THEORY (UE)

Course Objective :

An outline of concepts of various Kidney Diseases will be provided to improve the students in-depth understanding of the causes, pathophysiology, diagnosis and management used with special emphasis on applied aspects and also assists in disease diagnosis, based on observed changes in tissue structure or biochemistry, while the focus of investigative pathology is the elucidation of the underlying mechanisms related to tissue injury and disease processes. The Goal of the course will be to expand and extend the student's knowledge of normal structure and function into the realm of disease processes.

Objective :

1.To inculcate knowledge on various pathological conditions.

2.To elaborate on Renal diseases and disorders and their diagnostic techniques.

Contents

Unit- I

The Kidney in Systemic disease :

- Amyloidosis
- Hyperoxaluria
- HUS / TTP
- Hereditary Renal disorders
- Kidney disorders in Pregnancy

Unit- II

Obstructive Renal Disorders :

- Obstructive Uropathy
- VUR and Reflux Nephropathy
- Nephrolithiasis

Unit- III

Infectious Diseases :

- Renal diseases associated with HIV infection
- Urinary Tract Infection (UTI)

Unit- IV

Drugs and The Kidney :

- Analgesics and The Kidney
- Principles of Drug therapy in Kidney failure

Unit- V

Renal Hypertension :

- Pathogenesis
- Essential HTN
- Renovascular HTN
- Therapy of HTN

Recommended Books :

1. Basic Pathology - Robbins, 9th Edition, Saunders, 2012.

2. Primer on Kidney diseases - Greenberg, 5th Edition, Elsevier Health Sciences, 2009.

Reference Books :

1. Textbook of Pathology – Harsh Mohan, 7th Edition, Jaypee Brothers Medical Publishers, 2014.

2. Kidney Diseases in Primary Care – K.Mandal and Stanley, 3rd Edition, Dorrance Publishing Co, 2008.

3. Davidson's Principle and Practice of Medicine – Brain R Walker, 22nd Edition, Churchill Livingston, 2014.

4. ABC of Kidney Diseases – David Goldsmith, 22nd Edition, BMJ books, 2011.

Specific Learning Outcome (SLO) :

- Will be able to identify the pathological processes in relation to Renal disorders.
- Will be able to demonstrate the competency in handling patients with Renal disorders.
- Will be able to express support in diagnosing and treatment of Kidney disease patients with care.

CONCEPTS OF DISEASE AND OUTLINES OF CLINICAL EVALUATION RELATED TO RENAL DIALYSIS TECHNOLOGY - PAPER II - PRACTICAL (UE)

Objective :

1.To inculcate knowledge on various pathological conditions.

2. To elaborate on Renal diseases and disorders and their diagnosis and therapeutic techniques.

Contents

Charts / Spotters / Specimens :

1. Amyloidosis
2. Hyperoxaluria
3. HUS / TTP
4. Hereditary Renal disorders
5. Kidney disorders in Pregnancy
6. Obstructive Uropathy
7. VUR and Reflux Nephropathy
8. Nephrolithiasis
9. Renal diseases associated with HIV infection
10. Urinary Tract Infection (UTI)
11. Drugs and The Kidney
12. Renal Hypertension

Specific Learning Outcome (SLO) :

- Will be able to identify the pathological processes in relation to Renal sciences.
- Will be able to demonstrate the competency in handling patients with Renal disorders.
- Will be able to express support in diagnosing and treatment of Kidney disease patients with care.

BASIC AND ADVANCED LIFE SUPPORT

- BLS
- TRIAGE
- Primary survey
- Secondary survey
- Airway & Ventilatory management
- Shock
- Central & peripheral venous access
- Thoracic trauma – Tension pneumothorax
- Other thoracic injuries
- Abdominal trauma – Blunt injuries
- Abdominal trauma – Penetrating injuries
- Spine and spinal cord trauma
- Head trauma
- Musculoskeletal trauma
- Electrical injuries
- Thermal burns
- Cold injury
- Pediatric trauma
- Trauma in pregnant women
- Workshop BLS
- Workshop cervical spine immobilization
- Imaging studies in trauma
- The universal algorithm for adult ECC
- Ventricular fibrillation/Pulseless ventricular tachycardia algorithm
- Pulseless electrical activity (PEA) / asystole algorithm
- Bradycardia treatment algorithm
- Tachycardia Treatment algorithm
- Hypotension / Shock
- Acute myocardial infarction
- Pediatrics Advanced life support
- Defibrillation
- Drugs used in ACLS
- Emergency cardiac pacing
- AED

Techniques for oxygenation and ventilation

MEDICAL SOCIOLOGY

UNIT 1: NATURE AND SCOPE OF SOCIOLOGY

Definition, Historical background, subject matter of sociology, Nature and scope, Importance, Sociology of India, Relationship of sociology with other social sciences

UNIT 2: FUNDAMENTAL CONCEPTS OF SOCIOLOGY

Society and Individual, Community, Social structure and functions of Institutions, Association, Organization, Social system, social order, Social control, social groups, Social Process, Social change,

UNIT 3: CLASSICAL THINKERS AND THEIR CONTRIBUTIONS

Auguste comte, Emile Durkheim, Karl Marx, Max Weber, Herbert Spencer

UNIT 4: SOCIOLOGY OF INDIA

Characteristics of Indian society, Racial linguistic, Religious and demographic, Hindu social organization-ashramas, varnas, dharma and karma, purushartha, Caste system, Problems of SC&ST, Sanskritisation, Westernization and Modernization,

UNIT 5: ANTHROPOLOGY AND CULTURAL ANTHROPOLOGY

Definition of anthropology, Subfield of anthropology, Cultural Anthropology yesterday and today, Anthropological Perspectives, Early Anthropologist

Environment and culture, Kinship, Clan Ethno methodology, Gender, Subsistence and Exchange, Social Organization and evolution of political system.

Reference:

1. Bottomore.T.B., Sociology: A guide to problems and Literature,1971,Random House

2. Gisbert P. Fundamentals of sociology,3rd Edition,2004,Orient Longman publications

3. Neil J.Smelser,Handbook of sociology,1988.sage publication

4. Johnson R.M,Systematic Introduction to Sociology,1960,Allied Publishers

5. Cultural Anthropology,Barbara D.Miller,2006 Pearson/Allyn and Bacon Co

6. C.N.ShankarRao., Introduction to Sociology, 2008, S.CHAND & Company Publications.

7.. C.N.ShankarRao., Sociology of India, S.CHAND & Company Publications

SEMESTER V

S.NO	SUBJECT
1	Renal Dialysis Technology - Part I - Paper I -Theory (UE)
2	Renal Dialysis Technology - Part I - Paper I - Practical (UE)
3	Renal Dialysis Technology - Part I - Paper II - Theory (UE)
4	Renal Dialysis Technology - Part I - Paper II - Practical (UE)
5	Environmental Science and Community medicine - Theory (IE)

SEMESTER – V

RENAL DIALYSIS TECHNOLOGY PART I - PAPER I – THEORY (UE)

Objective :

1.To understand the Principles of Dialysis and Skills necessary to give safe and effective care during Haemodialysis treatments.

2.To understand Operation, Routine maintenance, Identification of Malfunction and Trouble shooting in Dialysis Equipment.

Contents

Unit- I

- Dialysis Team (Doctors, Technologist, Nurses, Technician, Renal Dietician – Rights, Responsibilities and Relationship with Patients)
- Basic chemistry of Body fluids and Electrolytes
- History of Haemodialysis
- Principles of Haemodialysis
- Indications for Dialysis
- Types of Haemodialysis

Unit- II

Water Treatment :

- Purpose of Water Treatment
- Filtration, Softener and Carbon Filtration
- Deioniser
- RO system
- Ultrafiltration

Unit- III

Haemodialysis Equipment :

- Components and Functions of HD Equipment's
- Dialyser Membranes – Types and Biocompatibility
- Types of Dialysers
- Haemodialysis Adequacy
- Anticoagulation
- Composition of Dialysate
- Dialyser Reprocessing and Reuse of Dialysers

Unit- IV

Vascular Access :

- History , Types of Access
- Access care
- Access complications & Management
- Vascular Access Recirculation

Unit- V

General Aspects :

- Infection Control and Universal Precautions
- Psychosocial Aspects of Dialysis
- Drugs and Dialysis

Recommended Books :

1. Handbook of Dialysis – J.T.Daugirdas, 5th Edition, Lippincott Williams & Wilkins, 2014.

2. Dialysis Therapy – Allen R.Nissenson, Richard N.Fine, 4th Edition, Hanley & Belfus, 2007.

Reference Books :

1. Dialysis History, Development and Promise – Tood S.Ing, 1st Edition, World Scientific Publishing Company, 2011.

2. Principles and Practice of Dialysis – William L.Henrich, 4th Edition, Lippincott Williams & Wilkins, 2009.

3. Basic Clinical Dialysis – David Harris, 1st Edition, McGraw – Hill Book Company Australia, 2008.

Specific Learning Outcome (SLO) :

- To prepare Accomplished Professionals in Dialysis Technology with a specific emphasis on Clinical Skills, Technical Knowledge that will enable Trainee to function as an independent Dialysis Professional.
- To acquire the knowledge and procedural skills necessary to deliver High Standard of Care to the Patients with Chronic Kidney Disease requiring Renal Replacement Therapy.

RENAL DIALYSIS TECHNOLOGY PART I - PAPER I – PRACTICAL (UE)

Objective :

1. To understand the Principles of Dialysis and Skills necessary to give safe and effective care during Haemodialysis treatments.

2. To understand Operation, Routine maintenance, Identification of Malfunction and Trouble shooting in Dialysis Equipment.

Contents

Charts / Slides / Spotters

1. Dialysis Team (Doctors, Technologist, Nurses, Technician, Renal Dietician – Rights, Responsibilities and Relationship with Patients)
2. Basic chemistry of Body fluids and Electrolytes
3. History, Principles and Indications of Haemodialysis
4. Types of Haemodialysis
5. Water Treatment System
6. Dialyser Membranes – Types and Biocompatibility
7. Types of Dialysers
8. Haemodialysis Adequacy
9. Anticoagulation
10. Composition of Dialysate
11. Infection Control and Universal Precautions
12. Psychosocial Aspects of Dialysis
13. Drugs and Dialysis

RENAL DIALYSIS TECHNOLOGY PART I - PAPER II – THEORY (UE)

Objective :

1. To be able to assess the patient for any complications with an understanding of the problem and recognize the need to report the complications to the Physician or Nephrologist.

2. To respond effectively to the Physical and Emotional needs of the patient undergoing Dialysis treatment.

Contents

Unit- I

- Quality assurance in Dialysis
- High Flux and High Efficiency Dialysis
- Machine monitoring during Haemodialysis

Unit- II

- Patient Assessment & Complications – General, Pre, Intra and Post dialysis
- Lab data analysis
- Acute complications during Haemodialysis

Unit- III

- Haemodialysis in Infants and Childrens

Unit- IV

- Special procedures – Slow Continuous Therapies
- Plasmapheresis
- Hemoperfusion
- MARS

Unit- V

- Current Research in Haemodialysis

Recommended Books :

1. Handbook of Dialysis – J.T.Daugirdas, 5th Edition, Lippincott Williams & Wilkins, 2014.

2. Dialysis Therapy – Allen R.Nissenson, Richard N.Fine, 4th Edition, Hanley & Belfus, 2007.

Reference Books :

1. Dialysis History, Development and Promise – Tood S.Ing, 1st Edition, World Scientific Publishing Company, 2011.

2. Principles and Practice of Dialysis – William L.Henrich, 4th Edition, Lippincott Williams & Wilkins, 2009.

3. Basic Clinical Dialysis – David Harris, 1st Edition, McGraw – Hill Book Company Australia, 2008.

Specific Learning Outcome (SLO) :

- Able to assess and evaluate associated patient and machine complication during Dialysis.
- Able to write reports, make referrals (medical, educational) and counsel the patient.
- Able to handle different types of HD machines.
- Able to calibrate of Haemodialysis machines.

RENAL DIALYSIS TECHNOLOGY PART I - PAPER II – PRACTICAL (UE)

Objective :

1. To be able to assess the patient for any complications with an understanding of the problem and recognize the need to report the complications to the Physician or Nephrologist.

2. To respond effectively to the Physical and Emotional needs of the patient undergoing Dialysis treatment.

Contents

Charts / Slides / Spotters / Case study :

1. Quality assurance in Dialysis
2. High Flux and High Efficiency Dialysis
3. Haemodialysis in Infants and Childrens
4. Acute complications in Haemodialysis patients
5. CRRT (Continuous Renal Replacement Therapy)
6. Plasmapheresis
7. Hemoperfusion
8. MARS
9. Nutrition management in Haemodialysis patients
10. Current Research in Haemodialysis

Specific Learning Outcome (SLO) :

- Able to assess and evaluate associated patient and machine complication during Dialysis.
- Able to write reports, make referrals (medical, educational) and counsel the patient.
- Able to handle different types of HD machines.
- Able to calibrate of Haemodialysis machines.

ENVIRONMENTAL SCIENCE AND COMMUNITY MEDICINE

UNIT-I

Natural Resources: Introduction, Multi-disciplinary nature of environmental studies, Earth Resources and Man, Renewable And Non-Renewable Resources, Water Resources, Mineral Resources: Food Resources: Effects of modern agriculture, Fertilizer/ pesticide problems, Water logging, nd salinity, Energy Resources.

Ecosystems: Concept of an Ecosystem, Structure And Functions of an Ecosystem, Producers, Consumers and Decomposers, Cycles in The Ecosystem

Pollution: Definition, Causes, Effects and Control Measures of Air Pollution, Water Pollution, Pollution, Marine Pollution, Noise Pollution, Thermal Pollution, Nuclear hazards, Solid Waste Management role of Individuals in Pollution Prevention.

Social Issues Human, Population and Environment: From Unsustainable To Sustainable Development, Urban Problems Related To Energy, Water Conservation, Rain Water Harvesting, global warming, acid rain, ozone layer depletion, nuclear accidents and nuclear holocaust.

Concept of health &disease: Concept of health, Definition of health, Philosophy of health- Dimension of health - Concept of well being, Spectrum of health, Responsibility of health - Determinates of health & Indicators of health - Concepts of disease & Concepts of cessation – Natural history of disease – Iceberg phenomenon-concept of control- concept of prevention-Modes of Intervention, Changing pattern of disease.

Epidemiology: Definition & Explanation, Aims, Epidemiologic approach, Basic measurement in epidemiology & tools of measurement – of Mortality , Epidemiologic methods – Descripitive epidemiology – Analytical epidemiology -Cohort study – Expiremental epidemiology – RCT-Association & Caution Uses of epidemiology (Criteria for judging causality) – Infection disease epidemiology Definitions Dynamic of disease transmission & Mode of Transmission – Disinfection – Definitions Types Agents used Recommended disinfection procedures – Investigation of an epidemic.

Environmental & health: Definition & Components (environment sanitation environmental sanitation) Water : Safe & Whole some water Requirements Uses source of water supply (sanitary well) – Purification (1).Large scale purification, (2). Small scale purification – Water quality – Special treatment of water Air: Composition the air of occupied room discomfort.

Air pollution & its effects. Prevention & Control of air pollution

Ventilation : Definition Standards of ventilation Types of Ventilation. Light, Noise & Radiation, Meteorological environment, Housing, Disposal of waste Excreta disposal

SEMESTER VI

S.NO	SUBJECT
1	Renal Dialysis Technology – Part II – Paper I Theory (UE)
2	Renal Dialysis Technology – Part II – Paper I Practical (UE)
3	Renal Dialysis Technology – Part II – Paper II Theory (UE)
4	Renal Dialysis Technology – Part II – Paper II Practical (UE)
5	Health Care and Basic Principles - Theory (IE)

SEMESTER – VI

RENAL DIALYSIS TECHNOLOGY PART II - PAPER I – THEORY (UE)

Objective :

1. To understand the management of patients requiring Peritoneal Dialysis and technical aspects of Dialysis related equipment.

2. To contribute to a new generation of academic dialysis professional equipped to address the challenging problems in Renal Replacement Therapy.

Contents

Unit- I

Introduction to Peritoneal Dialysis :

- History of Peritoneal Dialysis
- Physiology of PD – Kinetics of PD
- Acute Peritoneal Dialysis
- Indications and Contraindications for Chronic PD

Unit- II

PD Apparatus :

- Solutions
- Transfer set
- Connectologies
- Access for CAPD
- Catheter and Exit site care

Unit- III

PD Process & Therapies :

- Assessment of Peritoneal membrane permeability
- Adequacy of Peritoneal Dialysis
- PD Therapies – Intermittent & Continuous

Unit- IV

PD Complications & Management :

- Non-infectious complications of PD – Mechanical and Metabolic
- Infectious complications of PD
- Patient education

Unit- V

Transplantation and Current Research :

- Types of Renal Donor & Cadaver Donor maintenance
- Recipient and Donor workup for Renal Transplantation
- Principles of Post-transplant management and followup
- Current Research in PD and Transplantation

Recommended Books :

1. Handbook of Dialysis – J.T.Daugirdas, 5th Edition, Lippincott Williams & Wilkins, 2014.

2. Handbook of Kidney Transplantation – Gabriel M.Danovitch, 5th Edition, Lippincott Williams & Wilkins, 2009.

Reference Books :

1. Nolph and Gokals Textbook of Peritoneal Dialysis – Ramesh Khanna, 3rd Edition, Martinus Nijhoff Publishers, 2009.

2. Kidney transplantation – Sir Peter J.Morris, 6th Edition, Saunders, 2014.

3. Medical Complications of Kidney Transplantation – Claudio Ponticelli, 1st Edition, CRC Press, 2005.

Specific Learning Outcome (SLO) :

- Able to independently train the patients on Home Peritoneal Dialysis.
- Able to assess and evaluate the patient waiting for Renal Transplant and Donor.
- Have the skill to administer required protocols and interpret the clinical findings with reference to the patients.
- Have the skills to take part in organising Cadaver Transplant.

RENAL DIALYSIS TECHNOLOGY PART II - PAPER I – PRACTICAL (UE)

Objective :

1. To understand the management of patients requiring Peritoneal Dialysis and technical aspects of Dialysis related equipment.

2. To contribute to a new generation of academic dialysis professional equipped to address the challenging problems in Renal Replacement Therapy.

Contents

Charts / Slides / Spotters / Case study :

1. History of Peritoneal Dialysis
2. Physiology of PD – Kinetics of PD
3. Acute Peritoneal Dialysis
4. PD Solutions
5. Transfer set
6. Adequacy of Peritoneal Dialysis
7. Non-infectious complications of PD – Mechanical and Metabolic
8. Infectious complications of PD
9. Patient education
10. Types of Renal Donor & Cadaver Donor maintenance
11. Recipient and Donor workup for Renal Transplantation
12. Principles of Post-transplant management and followup

Specific Learning Outcome (SLO) :

- Able to independently train the patients on Home Peritoneal Dialysis.
- Able to assess and evaluate the patient waiting for Renal Transplant and Donor.
- Have the skill to administer required protocols and interpret the clinical findings with reference to the patients.
- Have the skills to take part in organising Cadaver Transplant.

RENAL DIALYSIS TECHNOLOGY PART II - PAPER II – THEORY (UE)

Objective :

1. To understand and apply the Principles of Dialysis and skills necessary to give safe and effective care to the individual undergoing Dialysis Therapy.

2. To assess the patient for any long term complications with an understanding of the problem and recognize the need to report the complications to the Physician or Nephrologist.

Contents

Unit- I

Systemic diseases in Dialysis Patients :

- Nutrition in Dialysis Patients
- Diabetes in Dialysis Patients
- Hypertension in Dialysis Patients
- Serum enzyme levels
- Haematological abnormalities

Unit- II

Systemic and Infectious diseases in Dialysis Patients :

- Infections in Dialysis Patients
- Endocrine disturbances
- Bone disease
- Aluminium toxicity
- Sleep disorders

Unit- III

Special problems :

1. Musculoskeletal & Rheumatologic diseases in CRF patients
2. Special problems pertaining to Heart & Circulatory system in CRF patients
3. Special problems pertaining to Digestive tract in CRF patients
4. Special problems pertaining to Genitourinary tract and Male Reproductive oragns in CRF patients
5. Special problems pertaining to Obstetrics & Gynaecology in CRF patients

6. Special problems pertaining to Nervous system in CRF patients

Unit- IV

- Common Urosurgical Procedures, instruments & their management
- ESWL

Unit- V

- Principles of ICU Care

Recommended Books :

1. Handbook of Dialysis – J.T.Daugirdas, 5th Edition, Lippincott Williams & Wilkins, 2014.

2. Dialysis Therapy – Allen R.Nissenson, Richard N.Fine, 4th Edition, Hanley & Belfus, 2007.

Reference Books :

1. Dialysis History, Development and Promise – Tood S.Ing, 1st Edition, World Scientific Publishing Company, 2011.

2. Principles and Practice of Dialysis – William L.Henrich, 4th Edition, Lippincott Williams & Wilkins, 2009.

3. Basic Clinical Dialysis – David Harris, 1st Edition, McGraw – Hill Book Company Australia, 2008.

4.Principles and Practice of Intensive Care monitoring – Martin J.Tobin, 1st Edition, Kluwer Academic Publishers, 1998.

Specific Learning Outcome (SLO) :

- Able to assess and evaluate associated patient and machine complication for special problems in Dialysis.
- Able to deliver the ICU care
- Overall goal of this training is to foster the trainee's development into an independent care provider in the field of Dialysis.

RENAL DIALYSIS TECHNOLOGY PART II - PAPER II – THEORY (UE)

Objective :

- 1. To understand and apply the Principles of Dialysis and skills necessary to give safe and effective care to the individual undergoing Dialysis Therapy.
- 2. To assess the patient for any long term complications with an understanding of the problem and recognize the need to report the complications to the Physician or Nephrologist.

Contents

Charts / Slides / Spotters / Case study :

1. Diabetes in Dialysis Patients
2. Hypertension in Dialysis Patients
3. Serum enzyme levels
4. Haematological abnormalities
5. Infections in Dialysis Patients
6. Endocrine disturbances
7. Bone disease
8. Aluminium toxicity
9. Nutrition management in Peritoneal Dialysis Patients
10. Introduction to the science of Nutrition
11. Definition
12. Food apttern and its relation to Health
13. Factors influencing food habits
14. Selection of Food stuffs
15. Food storage and preservation
16. Sleep disorders
17. ESWL
18. Principles of ICU care
19. PD procedure
20. PD catheter and Exit site care
21. Performance of PD exchanges manually
22. Setting up of Automated PD equipments
23. First assessment in Minor procedures
24. PET analysis
25. CPR demonstration

HEALTH CARE AND BASIC PRINCIPLES

1. Concept of Health Care and Health Policy

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

2. Health Organization

- 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

3. 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

4. Health Economics

Fundamentals of Economics

- Scope & Coverage
- Demand for Health Services
- Health as an Investment
- Population, health of Economic Development

5. Methods & Techniques of Economic Evaluation of Health Program

- Cost Benefit & Cost Effective Methods

6. Household & Health

Health Expenditure & Outcome

- Rationale for Government action
- Household capacity, income and schooling

7. Economics of Health

- Population based health services
- Economics of Communicable and Non Communicable diseases

8. Health Insurance

SEMESTER VII

S.NO	SUBJECT
1	PROJECT AND DISSERTATION
2	BIOSTATISTICS AND RESEARCH METHODOLOGY

SEMESTER-VII

BIO-MEDICAL STATISTICS AND RESEARCH METHODOLOGY

1. What is statistics – Importance of statistics in behavioral sciences – Descriptive statistics and inferential statistics – Usefulness of quantification in behavioral sciences.
2. Measurements – Scales of measurements – Nominal, Ordinal, Interval and Ratio scales.
3. Data collection – Classification of data – Class intervals – Continuous and discrete measurements – Drawing frequency polygon – types of frequency polygon – Histogram.
4. Cumulative frequency curve – Ogives – Drawing inference from graph.
5. Measures of central tendency – Need – types: Mean, Median, Mode – Working out these measures with illustrations.
6. Measures of variability – Need – Types: Range, Quartile deviation, Average deviation, Standard deviation, Variance – Interpretation.
7. Normal distribution – General properties of normal distribution – Theory of probability – Illustration of normal distribution – area under the normal probability curve.
8. Variants from the normal distribution – skewness – Quantitative measurement of skewness – kurtosis – measurement of kurtosis – factors contributing for non-normal distribution.
9. Correlation – historical contribution – meaning of correlation – types: Product, moment, content correlation, variation of product, movement correlation, rank correlation, Regression analysis.
10. Tests of significance- need for – significance of the mean – sampling error – significance of differences between means – interpretation of probability levels – small samples – large samples.

SEMESTER – VII (FOR ALL SPECIALITIES)

Project/ Dissertation

SEMESTER – VIII (FOR ALL SPECIALITIES)

Internship -6 months