



**MAHATMA GANDHI UNIVERSITY**  
*of*  
**MEDICAL SCIENCES & TECHNOLOGY**  
JAIPUR

# **Syllabus**

**B. Sc. Renal Sciences and Dialysis Technology**

**(Three Years Program)**

## **Notice**

1. Amendments made by the Board of Management of the University in Rules/ Regulations of Graduate Medical Courses shall automatically apply to the Rules/ Regulations of the Mahatma Gandhi University of Medical Sciences & Technology.
2. The University reserves the right to make changes in the syllabus/ books/ guidelines, fee-structure or any other information at any time without prior notice. The decision of the University shall be binding on all.
3. The jurisdiction of all court cases shall be Jaipur Bench of Hon'ble Rajasthan High Court only.

RULES & REGULATIONS& SYLLABUS OF  
**B.Sc. Renal Sciences and Dialysis Technology**  
(3 Years Degree Course)

**COURSE OBJECTIVES:**

1. Basic objective of the course is designed to prepare students to administer hemodialysis treatments to patients with renal failure under the supervision of a physician.
2. This programme of frequently includes basic anatomy & physiology, dialysis preparation, dialysis prescription interpretation, dialyzer set – up, maintenance, taking vital signs.
3. Dialysis technicians also called hemodialysis technicians & they work with the people, whose kidney no longer work – dialysis technician help patients fall comfortable during the procedure & keep the machine in good working condition.
4. Advantage at this course is employability factor. You will get multiple good job opportunities.
5. After completion of the course they can have jobs regarding ensuring the proper functioning of dialysis machine instructing patients & families about in home dialysis Rx with appropriate referral and supervision of specialist in the respective field.
6. Designation of jobs – clinical coordinator, dialysis technician, dialysis therapists, lab technician, medical technician, teacher& lecturer.
7. Applicants willing to have specific technical knowledge & skills & an understanding of principals & concepts related to chronic kidney disease.

**NAME OF THE COURSE:**

B.Sc. Renal Sciences and Dialysis Technology (B.Sc. RSDT)

**DURATION OF COURSE:**

The course shall be of 3 years duration from the date of commencement of academic session

**MEDIUM OF INSTRUCTION**

English shall be the medium of instruction.

**ELIGIBILITY FOR ADMISSION:**

Candidate should have passed 10+2 (12th standard) or equivalent examination with science stream i.e. Physics, Chemistry, Biology and English with 45% marks in the aggregate of all the subjects prescribed for the examination for general and 40% for SC/ST/OBC candidate.

**SELECTION OF CANDIDATES:**

Selection for B.Sc. Renal Sciences & Dialysis Technology Courses shall be done by an Admission Board strictly on merit judged on the basis of University Entrance Examination conducted in the month of June / July every year.

**RESERVATION:**

Reservation of seats shall be applicable in accordance with Rajasthan State Government reservation policy.

## COMMENCEMENT OF THE COURSE

The Course shall commence from the 1<sup>st</sup> August of every Academic year.

### ENROLMENT:

Every candidate who is admitted to B.Sc. Renal Sciences & Dialysis Technology Courses in Mahatma Gandhi Medical College & Hospital shall be required to get himself/herself enrolled with the Mahatma Gandhi University of Medical Sciences & Technology after paying the prescribed eligibility/enrolment fees.

The candidate shall have to submit the application form duly filled in and forwarded to the University through Principal of the College for the enrolment/eligibility along with the original documents with the prescribed fees (up-to November 30 of the year of admission without late fees and up-to December 31 of the year of admission with late fees)

### ATTENDANCE:

75% in theory and 75% in practical/clinical in each year. Any one failing to achieve this, shall not be allowed to appear in the University examination.

### CONDUCTION OF THE UNIVERSITY EXAMINATION:

University examination shall be conducted twice in a year; that is Main and Supplementary Examination

### SYLLABUS:

The curriculum and the scheme of examination for the course shall be as prescribed by the University from time to time.

The aim and objectives of the B.Sc. Renal Sciences & Dialysis Technology curriculum is to educate and train a student as a qualified B.Sc. Renal Sciences & Dialysis Technology who will be able to impart health services safely and effectively to community in terms of health promotion, functional, prevention and treatment of dysfunction in different fields of medical science.

## SCHEME OF EXAMINATION

### 1. Theory

- Each Theory paper examination shall be of 3 hours duration and of maximum marks 70.
- Internal assessment shall be of 30 marks for Each Theory paper.
- The number of question papers shall be in accordance with the different subjects/areas covered during each of the B.Sc. three years course. The number of question papers shall vary from course to course as per the subjects covered in different disciplines of the B.Sc. Renal Sciences & Dialysis Technology Courses as under:

Papers	Theory		Paper Set & Evaluated
	Total Marks	Pass Marks	
Ist Year 5 Question Papers	500	250	5 Internal Paper Setters

IIndYear 5 Question Papers	500	250	5 Internal Paper Setters
IIIrd Year 2 Question Papers	200	100	1 Internal & 1External Paper Setters

- (d) For the First and Second year examinations – these respective above question papers shall be set by the Internal Examiners covering their respective areas of syllabus. For each question paper there shall be a separate Internal Examiner. The answer books shall be evaluated by the concerned Internal Examiners (Papers Setters).
- (e) In Third (Final) Year examination, out of two examiners one of the papers shall be set and evaluated by an External Examiner. The External Examiner (Paper Setter) shall evaluate his/her paper.
- (f) The Paper Setter shall set the questions within the prescribed course of study of the concerned paper. There will be a set pattern of question papers duly approved by Academic Council. Model question paper is annexed herewith.
- (g) It is to be noted that the Internal and External Examiners of all the three years (First, Second and Third year) shall be appointed by the President of the University. This exercise shall be conducted through the office of the Controller of the Examinations of the University. The External Examiner of Third year shall also be appointed by the President out of the panel of names submitted by the Concerned Head of Department of the course through the Dean faculty of medicine to the Controller of Examinations for appointment of Examiners by the President of the University.
- (h) Passing Marks: A candidate will have to obtain at least 50% marks in each Theory paper including internal assessment to pass. This means that he will have to score 50% marks in each paper. This shall include the marks obtained in Theory paper of 70 marks and internal assessment for that paper of 30 marks (Marks obtained in Theory paper + Marks obtained in internal assessment = the Total Marks obtained in respect of each paper).

#### **PAPER SETTER/EXAMINER**

1. All the examiners, paper setters, theory examination answer books evaluators, Internal and External Examiners for Practical examinations shall be appointed by the President of the University.
2. **Qualification of the Paper setter / Examiner:** Master degree (M. Sc RSDT) with full time teaching experience from recognized university or B. Sc. RSDT with full time 5 year teaching experience from recognized university for renal dialysis should have senior demonstrator and above. Medical papers the examiner should have 3 years of teaching experience after doing post- graduate qualification in the relevant/ broad specialty.

#### **Duration, distribution of marks and pattern of question papers**

1. The question paper shall cover the entire syllabus of the subject
2. Pattern of question papers  
All question papers shall be required to be attempted; there may be internal choice in the questions

**A. Paper carrying 70 Marks**

- Long answer question ((3 out of 6) 3X10=30
- Short answer question (6 out of 8) 6X5=30
- Answer one line (attempt all 5 questions) 5X2=10

**Marks Total – 70**

**B. Each section of Paper carrying 35 Marks**

- Long answer question (1out of 3) 1X10=10
- Short answer question (3 out of 5) 3X5=15
- Answer one line (attempt all 5 questions) 5X2=10

**Marks Total - 35**

3. Paper setter can be an examiner

**2. Practical and Viva-Voce Examination**

(a) First year there is no practical and viva-voce examination. Second & third year there shall be one practical and viva-voce examination. It shall be conducted after the Theory examination is over.

(b) The pattern of practical examination shall be as follows –

<b>B. Sc. RSDT</b>	<b>Practical</b>		<b>Practical Examiners</b>
	<b>Total Marks</b>	<b>Pass Marks</b>	
First Year	-	-	No Practical Examination
Second Year	200	100	2 Internal Examiners ( <b>Both examiners from department of nephrology</b> )
Third Year	200	100	1 Internal & 1 External Examiner

(c) It shall be left to the examiners – Internals and the External, as the case may be, to examine and evaluate the students in practical in the way they wish and award the marks without giving any specific details. The total marks obtained by the candidate in the practical examination shall be the aggregate of the marks awarded by all the examiners put together as one figure. This shall then be submitted to the University.

**3. Result:**

1. A candidate will have to obtain at least 50% marks separately in each Theory paper including internal assessment and a minimum of 50% marks in the practical examination for him to be declared pass.
2. A Candidate who has failed in theory paper/s will reappear in respective theory papers/s in supplementary examination.
3. Candidate who has failed in Practical examination only will reappear only in practical examination in Supplementary examination.

**4. Supplementary Examination:**

(a) Eligibility for the failed candidates to appear at the supplementary examination shall be as below –

- i. Failed in Theory Paper(s) and failed in Practical – shall reappear in the respective failed Theory paper(s) and Practical examination.

- ii. Failed in Theory paper/papers and passed in Practical examination – shall reappear only in the concerned failed Theory paper(s).
  - iii. Passed Theory papers but failed in Practical – shall reappear only in the Practical Examination.
- (b) There shall be a supplementary examination within two months of the declaration of the result of the main examination. Internal assessment marks obtained in main examination in the concerned failed paper/papers shall be carried forward for working out the result of supplementary Theory paper(s) examination. Such candidate who has secured less than 50% marks in the internal assessment will be allowed to improve his internal assessment marks in the repeat supplementary internal assessment examination.
- (c) Marks secured by the candidate in passed main examination/supplementary examination Theory paper(s) and/or practicals, as the case may be, will be carried forward for working out his result.
- (d) Result:
- i. A candidate obtaining at least 50% marks in the supplementary Theory paper(s) and 50% marks in the supplementary practical examination, as the case may be, shall be declared successful.
  - ii. A candidate who has failed in supplementary theory paper(s) examination shall have to reappear only in the failed theory paper(s) at the subsequent examination.
  - iii. A candidate who has failed in supplementary practical examination shall have to reappear both in theory (all papers) and practical at the next main examination.

**5. Promotion to Second/Third Year**

A candidate failed in theory paper(s) /Practical examination only shall be promoted to next year.

- (b) A candidate will be allowed to appear for the Final (3<sup>rd</sup>)year examination only when the backlog of all papers (theory and practical) of 1<sup>st</sup> and 2<sup>nd</sup> year Exams is cleared
- (c) The student is required to complete the course within 6 years from the joining of the course

**6. Result - Division:** Successful candidates will be categorized as under-

1.	Those, securing 50% and above but less than 60% in the aggregate marks of First, Second & Third year taken together	Pass
2	Those, securing 60% and above but less than 75% in the aggregate marks of First, Second & Third year taken together	Pass with I Division
3	Those, securing 75% and above in the aggregate marks of First, Second & Third year taken together	Pass with Honors

**AWARD OF GRACE MARKS**

- 1. A student who appears in the whole examination in first attempt and obtains the required minimum pass marks in the total aggregate of an examination but fails to obtain the minimum pass marks in one subject (in theory and / or practical as the case may be) will be

awarded the grace marks up to a maximum of 05 marks according to the following scale, provided the candidate passes the examination by award of such grace marks:

<b>Marks obtained by the candidate above the required minimum aggregate pass marks</b>		<b>Grace marks can be given up to</b>
Up to 6 marks	-	02
Up to 12 marks	-	03
Up to 18 marks	-	04
19 marks and above	-	05

- No grace marks would be awarded to a candidate who appears in part/ supplementary/remand examination. Non appearance of a candidate in any part of the examination on account of any reason will make him ineligible for grace marks.
- A candidate who passes the examination after the award of grace marks in a paper/practical or the aggregate will be shown in the marks sheet to have passed the examination by grace. Grace marks will not be added to the marks obtained by a candidate from the examiners.
- A candidate who is awarded grace marks in any subject to pass the examination will not be entitled for distinction in any subject.

### **REVALUATION / SCRUTINY**

Re-evaluation of Theory paper answer books and scrutiny of marks shall be permissible as per University Rules.

Permission for revaluation / scrutiny

- In 1<sup>st</sup> Attempt – Revaluation shall be permitted in 25% of the appeared papers. Scrutiny shall be permitted for all the papers.
- In 2<sup>nd</sup> Attempt – Only scrutiny shall be permitted in all the papers. Revaluation shall not be permitted.
- Revaluation shall also be permitted in 25% of such papers in which a candidate appears for the 1<sup>st</sup> time irrespective of his attempt in the whole examination.
- For determining the attempt, following criteria shall be followed -

<b>S. No.</b>	<b>Situation</b>	<b>Attempt in next examination</b>	
1.	Candidate is detained in all subjects	His attempt in all the subjects in the next examination will be treated as	1 <sup>st</sup> Attempt
2.	Candidate permitted in all subjects But did not appear in all permitted subjects	His attempt in the next examination will be treated as	1 <sup>st</sup> Attempt
3.	Candidate is detained in one / few subjects Permitted for the rest of the subjects Appeared in permitted subjects	His attempt in the detained subject(s) in the next examination will be treated as	2 <sup>nd</sup> Attempt
4.	Candidate is detained in one / few subjects Permitted in the rest of the subjects Did not appear in the permitted subjects	His attempt in the next examination In detained subject(s) will be treated as In permitted subject(s) will be treated as	1 <sup>st</sup> Attempt



5.	Candidate permitted in all subjectsBut did not appear in few subjects	His attempt in the permitted subjects in the next examination will be treated as	2 <sup>nd</sup> Attempt
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**AWARD OF DEGREE:** The degree shall be awarded by the University only after submission of Internship completion certificate and application forwarded to the university by the Principal of the College.

**MIGRATION /TRANSFER OF CANDIDATES:**

The migration/transfer will not be entertained in the middle of academic year. Migration of a candidate from this University to another University shall not be considered.

**VACATION:** The Principal of the College may declare vacation in an academic year to the students as per the academic calendar.

## CURRICULUM OF B. Sc RENAL SCIENCES AND DIALYSIS TECHNOLOGY

**Table - I Distribution of Teaching Hours in B. Sc. RSDT- First Year Subjects**

**Main subjects**

S. No	Subject	Theory No. of Hours	Practical No. of Hours	Total No. of Hours
1	Human Anatomy	80	20	100
2	Human Physiology	80	20	100
3	Biochemistry	80	20	100
4	Pathology (Clinical Pathology, Haematology & Blood Banking)	80	20	100
5	Microbiology	80	20	100
	<b>Total</b>	<b>400</b>	<b>100</b>	<b>500</b>

**Subsidiary Subjects**

English	25 Hours
Health-Care	40 Hours
Clinical/Lab posting	470 hours

**Table - II Distribution of Teaching Hours in B. Sc. RSDT- Second Year Subjects**

**Main Subjects**

S. No	Subjects	Theory No. of Hours	Practical No. of Hours	Clinical Postings	Total No. of Hours
1	Applied anatomy & physiology related to dialysis technology	80 (40+40)	30 (15+15)	--	110
2	Pharmacology related to dialysis technology	40	10	--	50
3	Concepts of renal disease & its management	50	100	630	780
4	Applied aspects of pathology & microbiology	80 (40+40)	30 (15+15)	--	110
5	Basics in Renal Dialysis Technology	80	120	--	200
	<b>Total</b>	<b>330</b>	<b>290</b>	<b>630</b>	<b>1250</b>

**Subsidiary Subjects:**

Sociology	20 Hours
Constitution of India	10 Hours
Environmental Science & Health	10 Hours
Nutrition	20 Hours

**Table - III Distribution of Teaching Hours in B. Sc. RSDT-Third Year Subjects****Main Subjects**

Sl. no	Subjects	Theory No. of Hours	Practical No. of Hours	Clinical Posting	Total No. of Hours
1	Applied Dialysis Technology Paper I	125	100	300	525
2	Applied Dialysis Technology Paper II	125	100	300	525
	<b>Total</b>	<b>250</b>	<b>200</b>	<b>600</b>	<b>1050</b>

**Subsidiary Subjects:**

Ethics, Database Management	50 Hours
Research & Biostatistics	20 Hours
Computer application	10 Hours
Basic Sciences	35 Hours

**B. Sc Renal Sciences and Dialysis Technology****(Marks Distribution)****B. Sc Renal Sciences and Dialysis Technology- I Year**

The University examination for 1st year shall consist of only theory examination and there shall be no University Practical Examination.

Code No	Subject	Written-100			Grand Total
		Theory	I.A. Theory	Total Theory	
7341	Paper- I Human Anatomy	70	30	100	100
7342	Paper- I Human Physiology	70	30	100	100
7343	Paper- III Biochemistry	70	30	100	100
7344	Paper- IV Pathology	70	30	100	100
7345	Paper- V Microbiology	70	30	100	100
<b>Total</b>		<b>350</b>	<b>150</b>	<b>500</b>	<b>500</b>

**Subsidiary subjects: Examination for subsidiary subjects shall be conducted by respective colleges.**

S No	Subject	Written-100			Grand Total
		Theory	I.A. Theory	Total Theory	
1	English	70	30	100	100
2	Health Care	70	30	100	100
<b>Total</b>		<b>140</b>	<b>60</b>	<b>200</b>	<b>200</b>

### B. Sc Renal Sciences and Dialysis Technology- II Year

Paper Code	Subject	Theory	I.A. Theory	Total Theory	Practical + Oral	I.A. Practical	Total Practical	Grand Total
7346	Paper-I Applied anatomy & physiology related to dialysis technology	70	30	100	-	--	--	100
7347	Paper-II Pharmacology related to dialysis technology	70	30	100	-	--	--	100
7348	Paper-III Concepts of Renal Disease and its Management	70	30	100	-	--	--	100
7349	Paper-IV Applied aspects of pathology & microbiology	70	30	100	70	30	100	200
7350	Paper-V Basics in Renal Dialysis Technology	70	30	100	70	30	100	200
Total		350	150	500	140	60	200	700

**Practical Code = 7351 and 7352**

**Distribution of Subsidiary Subjects and marks for Second Year Examination of B.Sc. Renal Sciences and Dialysis technology**

**Subsidiary subjects: Examination for subsidiary subjects shall be conducted by respective colleges.**

S. No	Subject	Written-100			Grand Total
		Theory	I.A. Theory	Total Theory	
1	Sociology	70	30	100	100
2	Constitution of India	70	30	100	100
3	Environmental Science & Health	70	30	100	100
4	Nutrition	70	30	100	100
<b>Total</b>		<b>280</b>	<b>120</b>	<b>400</b>	<b>400</b>

### B. Sc Renal Sciences and Dialysis Technology - III Year

Code No	Subject	Written-200			Practical-100			Grand Total
		Theory	I.A. Theory	Total Theory	Practical + Oral	I.A. Practical	Total Practical	
7353	Paper-I Applied Dialysis Technology-I	70	30	100	70	30	100	300
7354	Paper – II Applied Dialysis Technology-II	70	30	100				
<b>Total</b>		<b>140</b>	<b>60</b>	<b>200</b>	<b>70</b>	<b>30</b>	<b>100</b>	<b>300</b>

**Practical Code = 7355**

**Distribution of Subsidiary Subjects and marks for Third Year Examination of B.Sc. Renal Sciences and Dialysis Technology**

**Subsidiary subjects: Examination for subsidiary subjects shall be conducted by respective colleges.**

S. No	Subject	Written-100			Grand Total
		Theory	I.A. Theory	Total Theory	
1	Ethics, Database Management	70	30	100	100
2	Research & Biostatistics	70	30	100	100
3	Computer Application	70	30	100	100
4	Basic sciences	70	30	100	100
<b>Total</b>		<b>280</b>	<b>120</b>	<b>400</b>	<b>400</b>

# FIRST YEAR B.SC RENAL SCIENCES AND DIALYSIS TECHNOLOGY

## Paper-I HUMAN ANATOMY

### 1. Introduction: human body as a whole

Theory:

Definition of anatomy and its divisions

Terms of location, positions and planes

Cell and its organelles

Epithelium-definition, classification, describe with examples, function

Glands- classification, describe serous & mucous glands with examples Basic tissues – classification with examples

#### **Practical:**

Histology of types of epithelium

Histology of serous, mucous & mixed salivary gland

### 2. Locomotion and support

Theory:

Cartilage – types with example & histology

Bone – Classification, names of bone cells, parts of long bone, microscopy of compact bone, names of all bones, vertebral column, intervertebral disc, fontanelles of fetal skull Joints – Classification of joints with examples, synovial joint (in detail for radiology)

Muscular system: Classification of muscular tissue & histology

Names of muscles of the body

#### **Practical:**

Histology of the 3 types of cartilage

Demo of all bones showing parts, radiographs of normal bones & joints

Histology of compact bone (TS & LS)

Demonstration of all muscles of the body

Histology of skeletal (TS & LS), smooth & cardiac muscle

### 3. Cardiovascular system

Theory:

Heart-size, location, chambers, exterior & interior

Blood supply of heart

Systemic & pulmonary circulation

Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery

Peripheral pulse

Inferior venacava, portal vein, portosystemic anastomosis

Great saphenous vein

Dural venous sinuses

Lymphatic system- cisterna chyli & thoracic duct

Histology of lymphatic tissues

Names of regional lymphatics, axillary and inguinal lymph nodes in brief

#### **Practical:**

Demonstration of heart and vessels in the body

Histology of large artery, medium sized artery & vein, large vein  
Microscopic appearance of large artery, medium sized artery & vein, large vein pericardium

Histology of lymph node, spleen, tonsil & thymus

Normal chest radiograph showing heart shadows

Normal angiograms

#### 4. **Gastro-intestinal system**

Theory:

Parts of GIT, Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Waldeyer's ring)

Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas  
Radiographs of abdomen

#### 5. **Respiratory system**

Theory:

Parts of RS, nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments

Histology of trachea, lung and pleura

Names of paranasal air sinuses

**Practical:**

Demonstration of parts of respiratory system.

Normal radiographs of chest

Histology of lung and trachea

#### 6. **Peritoneum**

Theory: Description in brief

**Practical:**

Demonstration of reflections

#### 7. **Urinary system**

Kidney, ureter, urinary bladder, male and female urethra

Histology of kidney, ureter and urinary bladder

Practical: demonstration of parts of urinary system

Histology of kidney, ureter, urinary bladder

Radiographs of abdomen-IVP, retrograde cystogram

#### 8. **Reproductive system**

Theory:

Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology)

Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology)

Mammary gland – gross

**Practical:**

Demonstration of section of male and female pelvis with organs in situ

Histology of testis, vas deferens, epididymis, prostate, uterus, fallopian tubes, ovary

Radiographs of pelvis – hysterosalpingogram

#### 9. **Endocrine glands**

Theory:

Names of all endocrine glands in detail on pituitary gland, thyroid gland, parathyroid gland, suprarenal gland – (gross & histology)

**Practical:**

Demonstration of the glands

Histology of pituitary, thyroid, parathyroid, suprarenal glands

## 10. Nervous system

Theory: Neuron

Classification of NS

Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (gross & histology)

Meninges, Ventricles & cerebrospinal fluid, Names of basal nuclei, Blood supply of brain

Cranial nerves, Sympathetic trunk & names of parasympathetic ganglia

### **Practical:**

Histology of peripheral nerve & optic nerve

Demonstration of all plexuses and nerves in the body

Demonstration of all part of brain

Histology of cerebrum, cerebellum, spinal cord

### **Sensory organs:**

Theory:

Skin: Skin-histology

Appendages of skin

Eye: Parts of eye & lacrimal apparatus

Extra-ocular muscles & nerve supply

Ear: parts of ear- external, middle and inner ear and contents

### **Practical:**

Histology of thin and thick skin

Demonstration and histology of eyeball

Histology of cornea & retina

### **Embryology:**

Theory:

Spermatogenesis & oogenesis

Ovulation, fertilization

Fetal circulation

Placenta

### **REFERENCE BOOKS:**

1. William Davis (P) understanding Human Anatomy and Physiology – McGraw Hill
2. Chaurasia- A Text Book of Anatomy
3. T. S. Ranganathan- A Text Book of Human Anatomy
4. Fattana, Human Anatomy (Description and applied)- Saunder's & C P Prism Publishers, Bangalore
5. ESTER. M. Grishcimer- Physiology & Anatomy with Practical Considerations, J. P. Lippin Cott. Philadelphia
6. Bhatnagar- Essentials of Human Embryology- Revised Edition. Orient Blackswan Pvt. Ltd.



**Paper-II**  
**HUMAN PHYSIOLOGY**

**1. Composition and function of blood**

Red blood cells — Erythropoiesis, stages of differentiation function, count physiological Variation.

Haemoglobin —structure, function, concentration physiological variation, White blood cells . types & functions & immunity.

Platelets — Normal count, functions.

Plasma Proteins — Concentration, types, albumin, globulin, Fibrinogen, Prothrombin functions.

Haemostasis — Definition, normal haemostasis, clotting factors, mechanism of clotting, disorders of clotting factors.

**2. Blood Bank**

Blood groups — ABO system, Rh system Blood grouping & typing

Crossmatching

Rh system — Rh factor, Rh incompatibility.

Blood transfusion — Indication, universal donor and recipient concept.

Selection criteria of a blood donor. Transfusion reactions

Anticoagulants — Classification, examples and uses

Anaemias : Classification — morphological and etiological. Effects of anemia on body

Blood indices — Colour index, MCH, MCV, MCHC

Erythrocyte sedimentation Rate (ESR) and Packed cell volume

Normal values, Definition. Determination

Lymph

Body fluid compartments, function of lymph

**3. Cardiovascular system**

Heart ~ Properties of Cardiac muscle

Cardiac cycle-systole, diastole

Cardiac Output — Definition & Normal value

Heart sounds- Normal heart sounds Areas of auscultation, Causes

Blood Pressure — Definition, normal value, Physiological variations, regulation of BP, cardiac shock, hypotension, hypertension. Triple response

Electrocardiogram (ECG) —significance.

**4. Digestive System - Physiological anatomy of Gastro intestinal tract**

Salivary glands - Functions

Deglutition —stages

Stomach — Functions

Gastric secretion – Composition, function,phases of gastric secretion.

Pancreas — Function, composition of pancreatic juice.

Liver — functions of liver.

Bile composition, bile salts function, Bilirubin metabolism, types of bilirubin, Vandernberg reaction, Jaundice- types, significance.

Gall bladder — functions.

Intestine — small intestine and large intestine.

Digestion and absorption of Carbohydrates, Proteins, Fats, Lipids.

## 5. Respiratory system

Functions of Respiratory system, Physiological Anatomy of Respiratory system, Respiratory tract,

Respiratory Muscles, Respiratory organ-lungs, Alveoli, Respiratory membrane, stages of respiration.

Mechanism of normal intra pulmonary / pleural pressure, surfactant.

Transportation of Respiratory gases: Transportation of Oxygen: Direction, pressure gradient, Forms of transportation, Oxy-Hb dissociation curve. Quantity of Oxygen transported. CO<sub>2</sub> transport forms, chloride shift.

**Spirogram** - Lung volumes and capacities. Regulation of respiration what? Why? How? Mechanisms of Regulation, nervous and chemical regulation. Respiratory centre.

Applied Physiology and Respiration : Hypoxia, Cyanosis, Asphyxia, Dyspnea, Dysbarism, Artificial Respiration, Apnoea.

## 6. Endocrine System —

Thyroid gland hormone — Physiological function, regulation of secretion. Disorders — hypo and hyper secretion of hormone with features.

**Adrenal gland** – Physiological functions of hormones secreted, hypo & hyper secretion of hormones with features.

Pituitary hormones — Anterior and posterior pituitary hormones, function.

Pancreas — Hormones of pancreas. Insulin — secretion, regulation, function and action.

Diabetes mellitus — Regulation of blood glucose level.

Parathyroid gland — function, action, regulation of secretion of parathyroid hormone.

Calcitonin — function and action

## 7. Special senses

Vision — structure of eye. Function of different parts.

Structure of retina, Optic pathway, Refractive errors of eye.

Hearing structure and mechanism of hearing

Functions of middle ear.

Taste — Taste buds functions.

Smell physiology, Receptors.

## 8. Nervous system

Functions of Nervous system, Neuron structure, classification & properties. Neuroglia, conduction of impulses continuous and salutatory and factors affecting. Synapse — structure, types, properties.

Receptors — Definition, enumerate properties. Reflex action — unconditioned properties of reflex action. Spinal cord nerve tracts. Name of the pathway & its function, course not needed.

Pyramidal tracts — Extrapyramidal tracts. Functions of Hypothalamic, disorders. Cerebral cortex lobes and functions, Sensory cortex, Motor cortex, functions of Cerebellum. Basal ganglion-functions. EEG.

Cerebro Spinal Fluid(CSF) : formation, circulation, properties, composition and functions lumbar puncture.

Autonomic Nervous System: Sympathetic and parasympathetic distribution and functions and comparison of functions.

## 9. Excretory System

Excretory organs

Kidneys: Functions of kidneys structural and functional unit nephron, vasarecta, cortical and juxtamedullary nephrons — Comparision, Juxta Glomerular Apparatus —Structure and function.

Mechanism of Urine formation: Define of GFR, Normal value, factors affecting GFR, Determination. Determination of GFR — sites & mechanism of reabsorption, Na<sup>+</sup>, H<sub>2</sub>O, Glucose.

Properties and composition of normal urine, urine output. Abnormal constituents in urine. Mechanism of urine concentration — Current Mechanisms

Micturition, innervation of Bladder, Cystourethrogram. Diuretics : Water, Diuretics, osmotic diuretics, Artificial kidney, Renal function tests — plasma clearance.

#### **10. Reproductive system**

Function of Reproductive system, Puberty

Male reproductive system- Functions of testes, spermatogenesis site.

Androgens — Testosterone and functions.

Female reproductive system, Functions of estrogen & progesterone, Ovulation, menstrual cycle. pregnancy test.

#### **11. Muscle nerve physiology**

Classification of muscle, structure of skeletal muscle, Sarcomere contractile proteins, Neuromuscular junction. Transmission across, Neuromuscular junction. Excitation contraction coupling. Mechanism of muscle contraction muscle tone, fatigue Rigour mortis.

#### **12. Skin—Functions of skin**

Body temperature measurement,Regulation of body Temperature by physical chemical and nervous mechanisms .Role of Hypothalamus, Hypothermia

### **PRACTICALS – ONLY DEMONSTRATION**

1. Haemoglobinometry
2. White Blood Cell count
3. Red Blood Cell count
4. Determination of Blood Groups
5. Leishman's staining and Differential WBC count
6. Determination of packed cell Volume
7. Erythrocyte sedimentation rate [ESR]
8. Calculation of Blood indices
9. Determination of Clotting Time, Bleeding Time
10. Blood pressure Recording
11. Auscultation for Heart Sounds
12. Artificial Respiration
13. Determination of vital capacity

### **REFERENCE BOOKS:**

Guyton (Arthur) Text Book of Physiology. Latest Ed. Prism Publishers  
Chatterjee (CC) Human Physiology Latest Ed. Vol. 1, Medical Allied Agency  
Choudhari (Sujith K) Concise Medical Physiology Latest Ed. New Central Book  
Ganong (William F) Review of Medical Physiology. Latest Ed. Appleton  
A K Jain MLT Venkatesh Sudakar

## Paper- III BIOCHEMISTRY

### 1. **Introduction to Laboratory apparatus**

Pipettes- different types (Graduated, volumetric, Pasteur, Automatic etc.,)

Calibration of glass pipettes

Burettes, Beakers, Petri dishes, depression plates.

Flasks - different types) Volumetric, round bottmed, Erlemeyer conical etc.,)

Funnels – different types (Conical, Buchner etx.,)

Bottles – Reagent bottles – graduated and common, Wash bottles – different type Specimen bottles etc.,

### 2. **Measuring cylinders, Porcelain dish**

Tubes – Test tubes, centrifuge tubes, test tube draining rack

Tripod stand, Wire gauze, Bunsen burner.

Cuvettes, significance of cuvettes in colorimeter, cuvettes for visible and UV range, cuvette holders Racks – Bottle, Test tube, Pipette

Dessicator, Stop watch, rimers, scissors

Dispensers – reagent and sample

Any other apparatus which is important and may have been missed should also be covered

Maintenance of lab glass ware and apparatus:

Glass and plastic ware in Laboratory

\*use of glass: significance of boro silicate glass ; care and cleaning of glass ware, different cleaning solutions of glass

\* care and cleaning of plastic ware, different cleaning solutions

### 3. **Instruments (Theory and demonstration) Diagrams to be drawn**

Water bath: Use, care and maintenance

Oven & Incubators : Use, care and maintenance.

Water Distillation plant and water deionisers. Use, care and maintenance

Refrigerators, cold box, deep freezers – Use, care and maintanance

Reflux condenser : Use, care and maintenance

Centrifuges (Theory and demonstration) Diagrams to be drawn

Definition, Principle, svedberg unit, centrifugal force, centrifugal field rpm, rcf. Conversion of G to rpm and vice versa.

Different types of centrifuges

Use care and maintenance of a centrifuge

Laboratory balances [Theory & Practicals) Diagrams to be drawn

Manual balances: Single pan, double pan, trip balance

Direct read out electrical balances.

Use care and maintenance. Guideline to be followed and precautions to be taken while weighing

Weighing different types of chemicals, liquids. Hygroscopic compounds etc. Colorimeter and spectrophotometer(Theory and Practicals) Diagrams to be drawn

Principle, Parts Diagram.

Use, care and maintenance.

pH meter (Theory & practicals) Diagrams to be drawn

principle, parts, Types of electrods, salt bridge solution.

Use, care and maintenance of Ph meter and electrodes

Guidelines to be followed and precautions to be taken while using pH meter

#### **4. Safety of measurements**

#### **5. Conventional and SI units**

#### **6. Atomic structure**

Dalton's theory, Properties of electrons, protons, neutrons, and nucleus, Rutherford's model of atomic structure, Bohr's model of atomic structure, orbit and orbital, Quantum numbers, Heisenberg's uncertainty principle.

Electronic configuration – Aufbau principle, Pauli's exclusion principle, etc., Valency and bonds – different types of strong and weak bonds in detail with examples

Theory & Practicals for all the following under this section

Molecular weight, equivalent weight of elements and compounds, normality molarity

Preparation of molar solutions (mole/litre solution) eg: 1 M NaOH, 0.15 M NaCl 1 M NaOH, 0.1 M HCl, 0.1 M H<sub>2</sub>SO<sub>4</sub> etc.,

Preparation of normal solutions. eg., 1N Na<sub>2</sub>CO<sub>3</sub>, 0.1N Oxalic acid, 0.1 N HCl, 0.1N H<sub>2</sub>SO<sub>4</sub>, 0.66 N H<sub>2</sub>SO<sub>4</sub> etc.,

Percent solutions. Preparation of different solutions – v/v w/v (solids, liquids and acids)

Conversion of a percent solution into a molar solution

#### **7. Dilutions**

Diluting solutions: eg. Preparation of 0.1 N NaCl from 1 N NaCl from 2 N HCl etc.,

Preparing working standard from stock standard, Body fluid dilutions, Reagent dilution techniques, calculating the dilution of a solution, body fluid reagent etc.,

#### **8. Saturated and supersaturated solutions.**

Standard solutions. Technique for preparation of standard solutions eg: Glucose, urea, etc.,

Significance of volumetric flask in preparing standard solutions. Volumetric flasks of different sizes, Preparation of standard solutions of deliquescent compounds (CaCl<sub>2</sub>, potassium carbonate, sodium hydroxide etc.,)

Preparation of standards using conventional and SI units

#### **8. Acids, bases, salts and indicators.**

Acids and Bases: Definition, physical and chemical properties with examples. Arrhenius concept of acids and bases, Lowery – Bronsted theory of acids and bases classification of acids and bases. Different between bases and alkali, acidity and basicity, monoprotic and polyprotic acids and bases

Concepts of acid base reaction, hydrogen ion concentration, Ionisation of water, buffer, Ph value of a solution, preparation of buffer solutions using Ph meter.

Salts: Definition, classification, water of crystallization – definition and different types, deliquescent and hygroscopic salts

#### **9. Acid- base indicators: (Theory and Practicals)**

Theory – Definition, concept, mechanism of dissociation of an indicator, colour change of an indicator in acidic and basic conditions, use of standard buffer solution and indicators for Ph determinations, preparation and its application, list of commonly used indicators and their Ph range, suitable pH indicators used in different titrations, universal indicators Practicals – Titration of a simple acid and a base (Preparation of standard solution of oxalic acid and using this solution finding out the normality of a sodium hydroxide solution .

Acid to be titrated using this base) Calculation of normality of an acid or a base after titration, measurement of hydrogen ion concentration

## **10. Quality control :**

- Accuracy
- Precision
- Specificity
- Sensitivity
- Limits of error allowable in laboratory
- Percentage error
- Normal values and Interpretations
- Special Investigations: Serum Electrophoresis
- Immunoglobulins
- Drugs: Digitoxin, Theophyllines

## **11. Regulation of Acid Base status:**

- Henderson Hasselback Equations
- Buffers of the fluid
- pH Regulation
- Disturbance in acid Base Balance
- Anion Gap
- Metabolic acidosis
- Metabolic acidosis
- Metabolic alkalosis
- Respiratory acidosis
- Respiratory alkalosis
- Basic Principles and estimation of Blood Gases and pH
- Basic principles and estimation of Electrolytes
- Water Balance
- Sodium regulation
- Bicarbonate buffers
- Nutrition, Nutritional support with special emphasis on parental nutrition.
- Calorific Value
- Nitrogen Balance
- Respiratory Quotient
- Basal metabolic rate
- Dietary Fibers
- Nutritional importance of lipids, carbohydrates and proteins
- Vitamins

## **PRACTICALS**

- Analysis of Normal Urine
- Composition of urine
- Procedure for routine screening
- Urinary screening for inborn errors of metabolism
- Common renal disease Urinary calculus
- Urine examination for detection of abnormal constituents
- Interpretation and Diagnosis through charts
- Liver Function tests
- Lipid Profile

Renal Function test  
Cardiac markers  
Blood gas and Electrolytes  
Estimation of Blood sugar, Blood Urea and electrolytes  
Demonstration of Strips  
Demonstration of Glucometer

**Text Book References**

- Biochemistry –by U Sathyanarayana & U Chakrapani
- Textbook of Medical Biochemistry by D.M Vasudeva & Shrekumari.
- Textbook of Medical Biochemistry- by MN Chatterjea & Rana Shinde
- Textbook of Medical Laboratory technology by Godkar and Godkar.
- Biochemistry- by Pankaja Naik
- Medical Laboratory technology by Ramnik Sood.
- Manipal Manual of Clinical Biochemistry for medical laboratory and M.Sc., students- by Shivananda Nayak B
- Varley's Practical Clinical Biochemistry,

**Paper- IV**  
**PATHOLOGY**

(Histo-Pathology, Clinical Pathology, Haematology and Blood Banking)

**HistoPathology –**

1. Introduction to Histo Pathology
2. Receiving of Specimen in the laboratory
3. Grossing Techniques - Mounting Techniques – various Mountants
4. Maintenance of records and filing of the slides.
5. Use & care of Microscope
6. Various Fixatives, Mode of action, Preparation and Indication.
7. Bio-Medical waste management
8. Section Cutting
9. Tissue processing for routine paraffin sections
10. Decalcification of Tissues.
11. Staining of tissues - H& E Staining
12. Bio-Medical waste management

**Clinical Pathology –**

1. Introduction to Clinical Pathology
2. Collection, Transport, Preservation, and Processing of various clinical specimens
3. Urine Examination – Collection and Preservation of urine. Physical, chemical, Microscopic Examination
4. Examination of body fluids.
5. Examination of cerebro spinal fluid (CSF)
6. Sputum Examination.
7. Examination of feces

**Haematology**

1. Introduction to Haematology
2. Normal constituents of Blood, their structure and function.
3. Collection of Blood samples
4. Various Anticoagulants used in Haematology
5. Various instruments and glassware used in Haematology, Preparation and use of glassware
6. Laboratory safety guidelines
7. SI units and conventional units in Hospital Laboratory
8. Hb,PCV
9. ESR
10. Normal Haemostasis Bleeding Time, Clotting Time, Prothrombin Time, Activated Partial Thromboplastin Time.

**Blood Bank**

Introduction

Blood grouping and Rh Types

Cross matching



## **PRACTICALS**

1. Urine Examination.
2. Physical
3. Chemical
4. Microscopic
5. Blood Grouping Rh typing.
6. Hb Estimation, Packed Cell Volume[PCV], Erythrocyte Sedimentation rate{ESR}
7. Bleeding Time, Clotting Time.

## **REFERENCE BOOKS:**

1. Culling Histopathology techniques
2. Bancroft Histopathology techniques
3. Koss- Cytology
4. Winifred Diagnostic cytopathology
5. Orell Cytopathology
6. Todd and Sanford- clinical diagnosis by Laboratory Medicine
7. Dacie and Lewis- Practical Hematology
8. Ramnik SOOD. Lab technology, Methods and interpretation, 4 th edition JP Bros New Delhi, 1996

## **Paper- V Microbiology**

### **1. Morphology 4 hours**

Classification of microorganisms, size, shape and structure of bacteria. Use of microscope in the study of bacteria.

### **2. Growth and nutrition 4 hours**

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

### **3. Sterilisation and Disinfection 4 hours**

Principles and use of equipments of sterilization namely Hot Air oven, Autoclave and serum inspissator. Pasteurization, Anti septic and disinfectants.

Antimicrobial sensitivity test

### **4. Immunology 6 hours**

Immunity Vaccines, Types of Vaccine and immunization schedule

Principles and interpretation of commonly done serological tests namely Widal,

VDRL, ASLO, CRP, RF & ELISA. Rapid tests for HIV and HbsAg(Technical details to be avoided)

### **5. Systematic Bacteriology 20 hours**

Morphology, cultivation, diseases caused ,laboratory diagnosis including specimen collection of the following bacteria( the classification, antigenic structure and pathogenicity are not to be taught) Staphylococci, Streptococci, Pneumococci, Gonococci, Menigococci, C diphtheriae, Mycobacteria, Clostridia, Bacillus, Shigella, Salmonella, Esch coli, Klebsiella, Proteus,vibrio cholerae, Pseudomonas & Spirochetes

### **6. Parasitology 10 hours**

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

### **7. Mycology 4 hours**

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

### **8. Virology 10 hours**

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

### **9. Hospital infection Causative agents, transmission methods, investigation, prevention and control Hospital infection. 4 hours**

### **10. Principles and practice Biomedical waste management 4 hours**

#### **PRACTICAL 20 HOURS**

Compound Microscope.

Demonstration and sterilization of equipments – Hot Air oven, Autoclave, Bacterial filters.

Demonstration of commonly used culture media, Nutrient broth, Nutrient agar, Blood agar, Chocolate agar, Mac conkey medium, LJ media, Robertson Cooked meat media, Potassium tellurite media with growth, Mac with LF & NLF, NA with staph

Antibiotic susceptibility test

Demonstration of common serological tests – Widal, VRDL, ELISA.

Grams stain

Acid fast staining

Stool exam for Helminthic ova  
Visit to hospital for demonstration of biomedical waste management  
Anaerobic culture methods.

### **Reference Books**

1. Ananthanarayana & Panikar Medical Microbiology- University Press
2. Robert Cruickshank- Medical Microbiology- The Practice of Medical Microbiology
3. Chatterjee- Parasitology- Interpretation to Clinical Medicine
4. Rippon- Medical Mycology
5. Emmons- Medical Mycology
6. Basic Laboratory methods in Parasitology, J P Bros, New Delhi
7. Basic Laboratory procedures in clinical bacteriology, J P Bros, New Delhi
8. Medical Parasitology- Ajit Damle
9. Introduction to medical microbiology- Ananthanarayana- Orient Longman Pvt. Ltd

### **ENGLISH**

#### **1. UNIT - I: INTRODUCTION:**

Study Techniques: Organisation of effective note taking and logical processes of analysis and synthesis, Use of the dictionary, Enlargement of vocabulary, Effective diction

#### **2. UNIT - II: APPLIED GRAMMAR:**

Correct usage: The structure of sentences, The structure of paragraphs, Enlargements of Vocabulary

#### **3. UNIT - III: WRITTEN COMPOSITION:**

Precise writing and summarizing, Writing of bibliography, Enlargement of Vocabulary

#### **4. UNIT - IV: READING AND COMPREHENSION:**

Review of selected materials and express oneself in one's words. Enlargement of Vocabulary

#### **5. UNIT - V: THE STUDY OF THE VARIOUS FORMS OF COMPOSITION:**

Paragraph, Essay, Letter, Summary, Practice in writing

#### **6. UNIT - VI: VERBAL COMMUNICATION:**

Discussions and summarization, Debates, Oral reports, use in teaching

### **REFERENCE BOOKS**

1. English Grammar Collins, Birmingham University, International Language Data Base, Rupa & Co. 1993
2. Wren and Martin - Grammar and Composition, 1989, Chanda & Co, Delhi
3. Letters for all Occasions. A S Myers. Pub - Harper Perennial
4. Spoken English V. Shasikumar and P V Dhanija. Pub. By: Tata Mcgraw Hill, New Delhi
5. Journalism Made Simple D Wainwright
6. Writers Basic Bookself Series, Writers Digest series
7. Interviewing by Joan Clayton Platkon
8. Penguin Book of Interviews.

**HEALTH CARE:** Teaching Hours: 40

**Introduction to Health**

Definition of Health, Determinants of Health, Health Indicators of India, Health Team, Concept, National Health Policy, National Health Programmes (Briefly Objectives and scope), Population of India and Family welfare programme in India, Introduction to Nursing, What is Nursing? Nursing principles, Inter-Personnel relationships, Bandaging: Basic, turns; Bandaging extremities; Triangular Bandages and their application. Nursing Position, Bed making, prone, lateral, dorsal, dorsal re-cumbent, Fowler's positions, comfort measures, Aids and rest and sleep. Lifting And Transporting Patients: Lifting patients up in the bed. Transferring from bed to wheel chair. Transferring from bed to stretcher. Bed Side Management: Giving and taking Bed pan, Urinal : Observation of stools, urine. Observation of sputum, Understand use and care of catheters, enema giving. Methods of Giving Nourishment: Feeding, Tube feeding, drips, transfusion, Care of Rubber Goods, Recording of body temperature, respiration and pulse, Simple aseptic technique, sterilization and disinfection. Surgical Dressing: Observation of dressing procedures

**First Aid :**

Syllabus as for Certificate Course of Red Cross Society of St. John's Ambulance Brigade.

**Reference Books:**

**Preventive and Social Medicine** by J.Park

Text Book of P& SM by Park and Park, counseling & Communicate skills for medical and health, Bayne- Orient Longman Pvt. Ltd.

## SECOND YEAR B.SC RENAL SCIENCES AND DIALYSIS TECHNOLOGY

### Paper-I

#### **Applied Anatomy & Physiology related to Dialysis Technology**

##### **Anatomy**

Basic Anatomy of Urinary System – Structural Anatomy of Kidney, Bladder, Ureter, Urethra, Prostate, Histology of Kidney, Blood Supply of Kidney, Development of Kidney In Brief

Anatomy of Peritoneum Including Concept of Abdominal Hernias

Anatomy of Vasculat System

Upper Limb Vessels - Course, Distribution, Branches, Origin & Abnormalities,

Neck Vessels - Course, Distribution, Branches, Origin & Abnormalities

Femoral Vessels - Course, Distribution, Branches, Origin & Abnormalities

##### **Physiology**

Mechanism of Urine Formation, Glomerular Filtration Rate (gfr), Clearance Studies

Physiological Values - Urea, Creatinine, Electrolytes, Calcium, Phosphorous, Uric Acid, Magnesium, Glucose 24 Hours Urinary Indices - Urea, Creatinine, Electrolytes, Calcium, Magnesium, Physiology of Renal Circulation, Factors Contributing & Modifying Renal Circulation, Autoregulation

Hormones Produced by Kidney & Physiologic Alterations In Pregnancy

Haemostasis - Coagulation Cascade, Coagulation Factors, Auto Regulation, Bt, Ct, Pt, Ptt, Thrombin Time

Acid Base Balance - Basic Principles & Common Abnormalities Like Hypokalemia, Hyponatremia, Hyperkalemia, Hypermnatremia, Hypocalcemia, Hypercalcemia, Ph, Etc.

Basic Nutrition In Renal Diseases

**PAPER II**  
**Pharmacology Related to Dialysis Technology**

1. IV fluid therapy with special emphasis in renal diseases
2. Diuretics - classification, actions, dosage, side effects & contraindications
3. Anti hypertensive - classification, actions, dosage, side effects & contraindications, special reference during dialysis, vasopressors, drugs used in hypotension
4. Drugs & dialysis - dose & duration of administration of drugs
5. Dialyzable drugs - phenobarbitone, lithium, methanol etc.
6. Vitamin D & its analogues, phosphate binders, iron, folic acid & other vitamins of therapeutic value
7. Erythropoietin in detail
8. Heparin including low molecular weight heparin
9. Protamine sulphate
10. Formalin, sodium hypochlorite, hydrogen peroxide - role as disinfectants & adverse effects of residual particles applicable to formalin
11. Haemodialysis concentrates - composition & dilution (acetate & bicarbonates)
12. Peritoneal dialysis fluid in particular hypertonic solutions - composition
13. Potassium exchange resins with special emphasis on mode of administration

**PAPER-III**  
**Concept of Renal Disease and its Management**

**FOLLOWING DISEASES**

1. Acute renal failure
2. Nephrotic syndrome - primary & secondary
3. Nephritic syndrome
4. Uti - urinary tract infections
5. Asymptomatic urinary abnormalities
6. Chronic renal failure
7. Renal stone diseases
8. Obstructiveuropathies
9. Congenital & inherited renal diseases
10. Tumors of kidney
11. Pregnancy associated renal diseases
12. Renal vascular disorders & hypertension associated renal diseases

**PAPER IV**  
**Applied Aspects of Pathology & Microbiology**

**Pathology**

1. Congenital abnormalities of urinary system
2. Classification of renal diseases
3. Glomerular diseases - causes, types & pathology
4. Tubulointerstitial diseases
5. Renal vascular disorders
6. End stage renal diseases - causes & pathology
7. Pathology of kidney in hypertension, diabetes mellitus, pregnancy
8. Pathology of peritoneum - peritonitis - bacterial, tubular & sclerosing peritonitis dialysis induced changes
9. Pathology of urinary tract infections
10. Pyelonephritis & tuberculous pyelonephritis

**Microbiology**

1. Hepatotropic viruses in detail - mode of transfusion, universal precautions, vaccinations
2. Human immunodeficiency virus (HIV), mode of transfusion, universal precautions
3. Opportunistic infections
4. Microbiology of urinary tract infections
5. Microbiology of vascular access infection (femoral, jugular, subclavian catheters)
6. Sampling methodologies for culture & sensitivity



**PAPER-V**  
**Basics in Renal Dialysis Technology**

1. Dialysis team
2. Basic chemistry, body fluids and electrolytes
3. History of HD
4. Indications of dialysis
5. Types of hemodialysis
6. Principles of HD
7. Initiation of Dialysis Therapy
8. Water treatment unit [WTU]
9. HD equipment
10. Types of dialyzer
11. Dialyzer membrane
12. Composition of dialysate
13. Cannulation of vascular access in HD
14. Vascular access and its types and complication
15. Vascular access recirculation
16. Hemodialysis adequacy
17. Anti-coagulation
18. Methods and complications of dialyzer re-use
19. Infection control and universal precaution
20. Psychological aspect of dialysis patients
21. Drugs and dialysis
22. Anemia and erythropoietin use

**Subsidiary Subject:****Nutrition**

1. Definition
2. Food pattern and its relation to health
3. Factors influencing food habits, selection and food stuffs
4. Superstitions, culture, religion, income, composition of family, age, occupation, special group etc
5. Food selection, storage & preservation
6. Prevention of blood adulteration

**Classification of nutrients**

1. Macronutrients and micronutrients
2. Proteins - types, sources, requirements and deficiency of proteins
3. Carbohydrate sources, requirements & deficiency
4. Fats - types, sources, requirements and deficiency of fats
5. Water - sources of drinking water, requirements, preservation of water
6. Minerals - types, sources, requirements deficiencies of minerals
7. Vitamins - types, sources, requirements deficiencies of vitamins

**Planning diets**

1. Need for planning diets
2. Concept of a balanced diet
3. Food group & balanced diet
4. Influence of age, sex, occupation & physiological state
5. Recommended dietary intake in planning diet
6. Steps in planning balanced diet
7. Planning renal diet

**Introduction to cookery**

1. Purposes and methods of cooking
2. Effects of heat on cooking of foods
3. Preparation of basic recipes - clear fluids
4. Full fluids, vegetable preparation, egg recipes, fish and meat recipes, light puddings

**THIRD YEAR B.Sc RENAL SCIENCES AND DIALYSIS TECHNOLOGY**  
**PAPER I**  
**APPLIED DIALYSIS TECHNOLOGY- I**

1. Patient assessment
2. Acute complication
3. MARS
4. Plasmapheresis
5. Hemoperfusion
6. Nutrition in dialysis
7. Paediatric dialysis
8. Slow continuous therapies
9. High flux and high efficiency dialysis
10. Machine monitoring in dialysis
11. Lab data analysis
12. Quality assurance in HD
13. Dialysis Amyloidosis
14. Ascites in dialysis patients
15. Pregnancy in dialysis patients
16. Bone disease
17. Aluminum toxicity
18. Sleep disorder
19. GI disturbances in dialysis
20. CARE of HIV, HBV & HCV patients

**PAPER II**  
**APPLIED DIALYSIS TECHNOLOGY - II**

1. History of peritoneal dialysis
2. Physiology of PD
3. Indication and contraindication of chronic PD
4. PD apparatus
5. Access for CAPD
6. Catheter and exit-site care
7. PD process
8. Assessment of peritoneal membrane permeability
9. Adequacy of PD
10. PD therapies
11. Non-infectious complications
12. Infectious complications
13. Patient education
14. Types of renal donor and cadaver donor maintenance
15. Recipient and donor workup
16. Post-transplant management and follow up
17. Immunosuppression therapy
18. Urosurgical procedures
19. Principal of ICU care

**PRACTICAL SCHEDULE**

1. Setting up dialysis machine for dialysis
2. AV cannulation
3. AV fistula/a v graft cannulation
4. Initiation of dialysis through central venous catheters like internal jugular, femoral & subclavian vein
5. Packing & sterilization of dialysis trays
6. Closing of dialysis
7. Preparation of concentrates depending on the situations
8. Reuse of dialysis apparatus
9. Isolated ultra filtration
10. Performance of peritoneal dialysis exchange manually
11. Setting up of automated peritoneal dialysis equipment
12. First assistant in minor procedures
13. Skin suturing
14. CPR demonstrations

## **Subsidiary subjects**

### **BASIC SCIENCE**

1. Medical ethics & the relevant medicolegal aspects
  - Responsibilities & duties
  - Ethical behavior & conduct
  - Medicolegal aspects and its relation to consumer protection act
2. Biomedical waste & Its management
3. Cardiopulmonary resuscitation - basic cardiac life support & advanced cardiac life support
4. Critical care nephrology - management of renal failure in ICU
5. Basic principles of blood transfusion & fluid therapy
6. Sterilization - material & methods
7. Renal transplantation - principles, immunology, patients selection, surgical procedure, complications, post-transplant evaluation & management

**B. Sc. Renal Sciences and Dialysis Technology**  
**Part-I (Main) Examination Month Year**

**Paper - I**  
**Human Anatomy**

**Time: Three Hours**  
**Maximum Marks: 70**

Student shall be allowed to take only one supplementary copy along with one main answer book  
All the parts of one question should be answered at one place.  
Different part of one question should not be answered at different places in the answer book.

Draw diagrams wherever necessary

**Long answer question (Attempt any Three Questions out of SIX) 10X3= 30**

- Q.1 classify the bores, and give arterial supply of long bone 10
- Q.2 Classify muscular tissue with an examples each. 10
- Q.3 Name the chambers of heart & describe right a verm in detail. 10
- Q.4 Describe pour to carnal anal to mosses. 10
- Q.5 Describe parts functions and vascular supply of stomach. 10
- Q.6 Give functions of arterial supply of leadenly. 10

**Write Short answer question (Attempt any SIX Questions out of EIGHT) 6X5= 30**

- Q.7 Nasal septum 5
- Q.8 Bronchi pulmonary septum 5
- Q.9 IVP 5
- Q.10 Vasdifrens 5
- Q.11 Vretir 5
- Q.12 thyroid gland 5
- Q.13 Enumerate cranial nerves 5
- Q.14 Extra ocular muscles & nerve supply. 5

**Short answer one line (Attempt all Five Questions) 5X2= 10**

- Q.15 Name the parietal plume 2
- Q.16 Name the branches of arch of aorta 2
- Q.17 Name the different planes of body. 2
- Q.18 Where does great spheroids vein begin & laminable 2
- Q.19 Name the Para nasal sinuses. 2

B. Sc. Renal Sciences and Dialysis Technology  
Part-I (Main) Examination Month Year

**Paper - II**  
Human Physiology

**Time: Three Hours**  
**Maximum Marks: 70**

Student shall be allowed to take only one supplementary copy along with one main answer book  
All the parts of one question should be answered at one place.  
Different part of one question should not be answered at different places in the answer book.

Draw diagrams wherever necessary

**Long answer question (Attempt any Three Questions out of SIX) 10X3= 30**

- Q.1 Define erythropoiesis. Describe the various stages of the erythropoiesis  
Mention the factors affecting it 10
- Q.2 Mention the various blood groups. State the Landsteiner's Law. Add a note on Rh  
Incompatibility 10
- Q.3 Describe the composition & mention the functions of saliva. 10
- Q.4. Define Glomerular Filtration Rate (GFR). Give its normal value Describe its  
regulatory mechanism. 10
- Q.5 Enumerate the ascending tracts. Mention the functions of anterolateral spinothalamic  
tracts. 10
- Q.6 What are the different phases of menstrual cycle. Write in brief about the role of  
hormones responsible for each phase. 10

**Write Short answer question (Attempt any SIX Questions out of EIGHT) 6X5= 30**

- Q.7 Milk let down reflex 5
- Q.8 Flexor withdrawal reflex 5
- Q9 Mechanism of Respiration 5
- Q10 Errors of refraction 5
- Q11 Events occurring at neuromuscular junction 5
- Q12 Difference between upper motor and lower motor neuron lesions 5
- Q13 Active transport and its types 5
- Q14 Lung surfactant 5

**Short answer one line (Attempt all Five Questions) 5X2= 10**

- Q.15 Resting Membrane Potential 2
- Q.16 Edema 2
- Q.17 Bleeding Time 2
- Q.18 Oxygen debt 2
- Q.19 Cholecystokinin 2

B. Sc. Renal Sciences and Dialysis Technology  
Part-I (Main) Examination Month Year

**Paper - III**  
Biochemistry

**Time: Three Hours**  
Maximum Marks: 70

Student shall be allowed to take only one supplementary copy along with one main answer book  
All the parts of one question should be answered at one place.  
Different part of one question should not be answered at different places in the answer book.

Draw diagrams wherever necessary

**Long answer question (Attempt any Three Questions out of SIX) 10X3= 30**

- |      |  |    |
|------|--|----|
| Q.1  | Enumerate the different normal biochemical constituents of urine                   | 10 |
| Q.2  | give a detailed account of renal function test                                     | 10 |
| Q.3  | Describes blood buffers. What is difference between embolic & respiratory acidosis | 10 |
| Q.4. | Describe nutritional importance of lipids, carbohydrates and proteins              | 10 |
| Q.5  | What is immunoglobulin? Describe structure & functions of immunoglobulin's         | 10 |
| Q.6  | Describe chemistry, sources, RDA, biochemical, functional and deficiency           | 10 |

**Write Short answer question (Attempt any SIX Questions out of EIGHT) 6X5= 30**

- |      |   |   |
|------|---|---|
| Q.7  | Nitrogen balance                        | 5 |
| Q.8  | Cardiac markers                         | 5 |
| Q.9  | Spectrophotometer                       | 5 |
| Q.10 | Difference between accuracy & precision | 5 |
| Q.11 | Application of pH meter                 | 5 |
| Q.12 | Rickets                                 | 5 |
| Q.13 | Dietary fibers                          | 5 |
| Q.14 | Fat & water soluble vitamins            | 5 |

**Short answer one line (Attempt all Five Questions) 5X2= 10**

- |      |                                  |   |
|------|----------------------------------|---|
| Q.15 | Basal metabolic rate             | 2 |
| Q.16 | Common glassware                 | 2 |
| Q.17 | Vitamin A deficiency disorders   | 2 |
| Q.18 | Valiancy and bonds               | 2 |
| Q.19 | Enumerate parts of a colorimeter | 2 |



B. Sc. Renal Sciences and Dialysis Technology  
Part-I (Main) Examination Month Year

**Paper - IV**  
Pathology

**Time: Three Hours**  
Maximum Marks: 70

Student shall be allowed to take only one supplementary copy along with one main answer book  
All the parts of one question should be answered at one place.  
Different part of one question should not be answered at different places in the answer book.

Draw diagrams wherever necessary

**Long answer question (Attempt any Three Questions out of SIX) 10X3= 30**

- |     |  |    |
|-----|--|----|
| Q.1 | Write and explain about biomedical waste management                                    | 10 |
| Q.2 | Explain the process of tissue processing   | 10 |
| Q.3 | Write about physical examination of urine  | 10 |
| Q.4 | Write in detail about laboratory safety guidelines                                     | 10 |
| Q.5 | Explain about cross matching & mismatch transfusion reactions                          | 10 |
| Q.6 | Explain collection, transport, preservation & processing of various clinical specimens | 10 |

**Write Short answer question (Attempt any SIX Questions out of EIGHT) 6X5= 30**

- |      |   |   |
|------|---|---|
| Q.7  | H & E staining  | 5 |
| Q.8  | Parts and functions of parts of microscope                          | 5 |
| Q.9  | Examination of cerebrospinal fluid (CSF)                            | 5 |
| Q.10 | Write about erythrocyte sedimentation rate (ESR)                    | 5 |
| Q.11 | Mention SI units & conventional units used in hospital laboratory   | 5 |
| Q.12 | Clothing time & bleeding time                                       | 5 |
| Q.13 | Mention various blood group systems and write about ABO blood group | 5 |
| Q.14 | Write about methods of fixation                                     | 5 |

**Short answer one line(Attempt all Five Questions) 5X2= 10**

- |      |   |   |
|------|---|---|
| Q.15 | Define flexion of tissue                            | 2 |
| Q.16 | Name various tests to detect proteins in urine      | 2 |
| Q.17 | Define packed cell volume (PCV)                     | 2 |
| Q.18 | List four causes of anemia                          | 2 |
| Q.19 | Write four indications for doing sputum examination | 2 |

**B. Sc. Renal Sciences and Dialysis Technology**  
**Part-I (Main) Examination Month Year**

**Paper - V**  
**Microbiology**

**Time: Three Hours**  
**Maximum Marks: 70**

Student shall be allowed to take only one supplementary copy along with one main answer book  
All the parts of one question should be answered at one place.  
Different part of one question should not be answered at different places in the answer book.

Draw diagrams wherever necessary

**Long answer question (Attempt any Three Questions out of SIX) 10X3= 30**

- |      |  |    |
|------|--|----|
| Q.1  | Describe in detail the structure and functions of cell wall with the help of diagram.              | 10 |
| Q.2  | Define Sterilization & Disinfection. Discuss the principle, procedure and uses of Autoclave        | 10 |
| Q.3  | Describe the various environmental factors affecting the bacterial growth                          | 10 |
| Q.4. | Define & classify immunity, briefly explain the innate & acquired immunity                         | 10 |
| Q.5  | Enumerate the various causes of Hepatitis. Discuss in brief the lab diagnosis of Hepatitis B virus | 10 |
| Q.6  | Describe the types, color codes and methods of Biomedical waste management                         | 10 |

**Write Short answer question (Attempt any SIX Questions out of EIGHT) 6X5= 30**

- |      |                               |   |
|------|-------------------------------|---|
| Q.7  | Hot Air Oven                  | 5 |
| Q.8  | Candidacies                   | 5 |
| Q.9  | Hospital Acquired Infections  | 5 |
| Q.10 | Personal Protective equipment | 5 |
| Q.11 | Vaccination                   | 5 |
| Q.12 | ELISA                         | 5 |
| Q.13 | Culture Media                 | 5 |
| Q.14 | Principle of Gram Staining    | 5 |

**Short answer one line (Attempt all Five Questions) 5X2= 10**

- |      |  |   |
|------|--|---|
| Q.15 | Name any two Gram negative bacteria                    | 2 |
| Q.16 | Name any two organisms causing blood borne infections. | 2 |
| Q.17 | Name two Gaseous disinfectants                         | 2 |
| Q.18 | Give two examples of live vaccines                     | 2 |
| Q.19 | Write down the modes of transmission of HIV            | 2 |

**B.Sc.RSDT-II  
7346**

**Appl. Anat. & Phy. - I**

**B. Sc. Renal Sciences and Dialysis Technology  
Part-II (Main) Examination Month Year**

**Paper - I  
Applied Anatomy & Physiology Related to Dialysis Technology**

**Time: Three Hours  
Maximum Marks:70**

Student shall be allowed to take only one supplementary copy along with one main answer book  
All the parts of one question should be answered at one place.  
Different part of one question should not be answered at different places in the answer book.  
Draw diagrams wherever necessary

Use separate answer sheet for each section

**SECTION-A  
(Applied Anatomy)**

**LONG ANSWER QUESTIONS (Attempt any One out of Two) 10X1= 10**

- Q.1 Give basic structural anatomy of kidney 10  
Q.2 Give arterial & nerve supply of ureter 10

**SHORT ANSWER QUESTIONS (Attempt any Three out of Five) 3X5=15**

- Q.3 Urinary bladder 5  
Q.4 Urethral crest 5  
Q.5 Greater omentum 5  
Q.6 Histology & ureter 5  
Q.7 left renal vein 5

**Short answer one line (Attempt all Five Questions) 5X2= 10**

- Q.8 Name arteries in lesser omentum 2  
Q.9 Name nerves related to posterior surface of kidney 2  
Q.10 Name structures of hilum of kidney 2  
Q.11 what is capacity of renal pelvis 2  
Q.12 what is length of ureter 2

## SECTION-B

### (Applied Physiology)

**LONG ANSWER QUESTIONS (Attempt any One out of Two) 10X1= 10**

- Q.1 Define haemostasis .Describe the intrinsic clotting mechanism 10  
Q.2 Describe the counter current mechanism in urine formation. 10

**SHORT ANSWER QUESTIONS (Attempt any Three out of Five) 3X5=15**

- Q.3 Plasma clearance test 5  
Q.4 Peculiarities of renal circulation 5  
Q5. Metabolic acidosis 5  
Q.6 Aldosterone 5  
Q.7 Mechanism of glucose reabsorption in the kidney 5

**Short answer one line (Attempt all Five Questions) 5X2= 10**

- Q.8 Hyperkalemia 2  
Q.9 Tetany 2  
Q.10 Bleeding time. 2  
Q.11 Edema 2  
Q.12. Haemophilia B 2

**B. Sc. Renal Sciences and Dialysis Technology**  
**Part-II (Main) Examination Month Year**

**Paper - II**  
**Pharmacology Related to Dialysis Technology**

**Time: Three Hours**  
**Maximum Marks: 70**

Student shall be allowed to take only one supplementary copy along with one main answer book  
All the parts of one question should be answered at one place.  
Different part of one question should not be answered at different places in the answer book.

Draw diagrams wherever necessary

**Long answer question (Attempt any Three Questions out of SIX) 10X3= 30**

- Q.1 Classify describes describes the actions, dosage and adverse effects of furosemide. 10  
Q.2 Classify antihypertensive drugs. Describe the actions dosage and adverse effects of ACE inhibitors. 10  
Q.3 Explain how pharmacokinetics of drugs are affected in patients of renal failure write drug dosing. 10  
Q.4 Describe the types of IV fluids their indications and dosage calculation highlight special emphasis in renal diseases. 10  
Q.5 Describe the types of dialysis. Write the composition and dilution of dialysis. 10  
Q.6 classify types of disinfectants describe the role and adverse effect of formalin as disinfectant. 10

**Write Short answer question (Attempt any SIX Questions out of EIGHT) 6X5= 30**

- Q.7. Low molecular weight heparins. 5  
Q.8 Cryo-precipitation 5  
Q.9 Contraindications of loop and thiazide diuretics 5  
Q.10 Parenteral nutrition 5  
Q.11 Organs used in hypertension. 5  
Q.12 vitamin B and its analogues. 5  
Q.13 Composition of bicarbonate dialysis fluid 5  
Q.14 Anti hypertension contraindicated in dialysis patients. 5

**Short answer one line (Attempt all Five Questions) 5X2= 10**

- Q.15 Name two dialyzable drugs. 2  
Q.16 what is the role of calcium binders give example. 2  
Q.17 Name two drugs causing hyperkalemia. 2  
Q.18 Write the mode of administration of potassium exchange resins. 2  
Q.19 What is the role of procaine sulphate? 2

B. Sc. Renal Sciences and Dialysis Technology  
Part-II (Main) Examination Month Year

**Paper - III**  
**Concept of Renal Disease and Its Management**

**Time: Three Hours**  
**Maximum Marks: 70**

Student shall be allowed to take only one supplementary copy along with one main answer book  
All the parts of one question should be answered at one place.  
Different part of one question should not be answered at different places in the answer book.

Draw diagrams wherever necessary

**Long answer question (Attempt any Three Questions out of SIX) 10X3= 30**

- |      |   |    |
|------|---|----|
| Q.1  | What is acute kidney injury and its management  | 10 |
| Q.2  | Deffrence both nephritic and nephrotic syndrome | 10 |
| Q.3  | Pathogenesis of UTI and its Etiology management | 10 |
| Q.4. | Define renovascular HTN and etiology site       | 10 |
| Q.5  | Discuses anatomy of renal vasculature           | 10 |
| Q.6  | Approach to patient with hypocalcaemia          | 10 |

**Write Short answer question (Attempt any SIX Questions out of EIGHT) 6X5= 30**

- |      |   |   |
|------|---|---|
| Q.7  | Management of idiopathic nephritic syndrome                           | 5 |
| Q.8  | Role of magnesium in health   | 5 |
| Q.9  | List few of the congenital renal diseases                             | 5 |
| Q.10 | What is ADPKD and its treatment                                       | 5 |
| Q.11 | Discuses chronic kidney diseases and its various stages               | 5 |
| Q.12 | Discuses and list classification of nephritic syndrome                | 5 |
| Q.13 | Define nephritic nephritic syndrome and discuses the treatment of IGA | 5 |
| Q.14 | List pregnancy associated renal diseases                              | 5 |

**Short answer one line (Attempt all Five Questions) 5X2= 10**

- |      |   |   |
|------|---|---|
| Q.15 | List the tumors of kidney                         | 2 |
| Q.16 | Discuses the various types stone and its etiology | 2 |
| Q.17 | Management of hyponatrmlia                        | 2 |
| Q.18 | Discuses pregnancy associated Aki                 | 2 |
| Q.19 | Methods to determine the GFR                      | 2 |

**B. Sc. Renal Sciences and Dialysis Technology**  
**Part-II (Main) Examination Month Year**

**Paper - IV**  
**Applied Aspects of Pathology & Microbiology**

**Time: Three Hours**  
**Maximum Marks: 70**

Student shall be allowed to take only one supplementary copy along with one main answer book  
All the parts of one question should be answered at one place.  
Different part of one question should not be answered at different places in the answer book.

Draw diagrams wherever necessary

**SECTION-A**  
**(Applied Pathology)**

**LONG ANSWER QUESTIONS (Attempt any One out of Two) 10X1= 10**

- Q1.Enumerate classification of renal diseases 10  
Q2.Describe in detail nephritis syndrome 10

**SHORT ANSWER QUESTIONS (Attempt any Three out of Five) 3X5=15**

- Q.3 Write about renal calculi 5  
Q.4 Renal artery stenosis 5  
Q.5 Malignant nephrosclerosis 5  
Q.6 Myeloma kidney 5  
Q.7 Write gross and histology finding in diabetic nephropathy 5

**Short answer one line (Attempt all Five Questions) 5X2= 10**

- Q.8 Define nephritic syndrome 2  
Q.9 Define azotemia 2  
Q.10 what is end stage renal disease 2  
Q.11 Define chronic kidney disease 2  
Q.12 List various types of renal stone 2

**SECTION-B**

**(Applied Microbiology)**

**LONG ANSWER QUESTIONS (Attempt any One out of Two)**

**10X1= 10**

- Q1. Classify Hepatitis Virus. Describe laboratory diagnosis of infection caused by Hepatitis B Virus      10  
Q2. What are the universal precautions? What are the various rules of UP.      10

**SHORT ANSWER QUESTIONS (Attempt any Three out of Five)**

**3X5=15**

- Q.3 Opportunistic infections in HIV patients      5  
Q.4 Transmission of Hepatitis B      5  
Q.5 Gram Staining      5  
Q.6 Hand Hygiene      5  
Q.7 Vascular access infections      5

**Short answer one line (Attempt all Five Questions)**

**5X2= 10**

- Q.8 Name any two common Hospital Acquired infections      2  
Q.9 Name any two Gram positive bacteria      2  
Q.10 Name two blood borne pathogens      2  
Q.11 Give two examples of killed vaccines      2  
Q.12 Write down the Full form of DPT      2



**B. Sc. Renal Sciences and Dialysis Technology  
Part-II (Main) Examination Month Year**

**Paper - V**

**Basic in Renal Dialysis Technology**

**Time: Three Hours**

**Maximum Marks: 70**

Student shall be allowed to take only one supplementary copy along with one main answer book

All the parts of one question should be answered at one place.

Different part of one question should not be answered at different places in the answer book.

Draw diagrams wherever necessary

**Long answer question (Attempt any Three Questions out of SIX) 10X3= 30**

- |      |   |    |
|------|---|----|
| Q.1  | Explain in detail about nutrition management of a dialysis patient  | 10 |
| Q.2  | Explain in detail the various clinical and social aspects involvement in the self management of patient who is under Hemodialysis | 10 |
| Q.3  | Mention causes of anemia in CRF and its treatment   | 10 |
| Q.4. | Discusses management of hyponatremia In detail  | 10 |
| Q.5  | Electrolytes management in dialysis   | 10 |
| Q.6  | Discusses the methods and complication of dialyzer reuse  | 10 |

**Write Short answer question (Attempt any SIX Questions out of EIGHT) 6X5= 30**

- |      |   |   |
|------|---|---|
| Q.7  | What are the infection control and universal precaution to be taken for CKD patient on Hemodialysis | 5 |
| Q.8  | Discusses the various types of dialyzer used for Hemodialysis                                       | 5 |
| Q.9  | What is the water treatment unit discusses briefly  | 5 |
| Q.10 | Mention briefly the history of Hemodialysis   | 5 |
| Q.11 | Briefly mention the various indications of Hemodialysis   | 5 |
| Q.12 | Discusses the management of hypokalemia   | 5 |
| Q.13 | Note on heparin few dialysis  | 5 |
| Q.14 | Discusses briefly about vascular access recirculation   | 5 |

**Short answer one line (Attempt all Five Questions) 5X2= 10**

- |      |  |   |
|------|--|---|
| Q.15 | Discusses anti-coagulation in Hemodialysis   | 2 |
| Q.16 | ECG change in Hyperkalemia                   | 2 |
| Q.17 | Mention the non dialyzable drug              | 2 |
| Q.18 | What is EPO and its use                      | 2 |
| Q.19 | Cannulation of an AV fistula and its methods | 2 |

**B. Sc. Renal Sciences and Dialysis Technology  
Part-III (Main) Examination Month Year**

**Paper - I  
Applied Dialysis Technology– I**

**Time: Three Hours  
Maximum Marks: 70**

Student shall be allowed to take only one supplementary copy along with one main answer book  
All the parts of one question should be answered at one place.  
Different part of one question should not be answered at different places in the answer book.

Draw diagrams wherever necessary

**Long answer question (Attempt any Three Questions out of SIX) 10X3= 30**

- |      |   |    |
|------|---|----|
| Q.1  | Management of HIV positive CKD patient and Precaution to be taken care of during Hem dialysis | 10 |
| Q.2  | Dialysis Adequacy disease in detail   | 10 |
| Q.3  | Method of Plasmapheresis  | 10 |
| Q.4. | Sleep disorder in CKD Patient   | 10 |
| Q.5  | Note on CKD MBD   | 10 |
| Q.6  | Note on High flux and high Efficiency Hem dialysis  | 10 |

**Write Short answer question (Attempt any SIX Questions out of EIGHT) 6X5= 30**

- |      |   |   |
|------|---|---|
| Q.7  | Nutrition care in a CKD patient on Hem dialysis     | 5 |
| Q.8  | What is SLED?                                       | 5 |
| Q.9  | Mention symptoms of uremia                          | 5 |
| Q.10 | Define reverse osmosis                              | 5 |
| Q.11 | Mention causes of anemia in CRF patient             | 5 |
| Q.12 | Electrolyte Management in Dialysis                  | 5 |
| Q.13 | Bleeding I dialysis                                 | 5 |
| Q.14 | Mention acute complication of chronic renal failure | 5 |

**Short answer one line (Attempt all Five Questions) 5X2= 10**

- |      |  |   |
|------|--|---|
| Q.15 | What is SLED?                                | 2 |
| Q.16 | Cause of hypotension in Hemodialysis         | 2 |
| Q.17 | Management of hypotension in Hemodialysis    | 2 |
| Q.18 | Care of HBV positive patient on Hemodialysis | 2 |
| Q.19 | Aluminum toxicity                            | 2 |

B. Sc. Renal Sciences and Dialysis Technology  
Part-III (Main) Examination Month Year

**Paper - II**  
Applied Dialysis Technology - II

**Time: Three Hours**  
**Maximum Marks: 70**

Student shall be allowed to take only one supplementary copy along with one main answer book  
All the parts of one question should be answered at one place.  
Different part of one question should not be answered at different places in the answer book.

Draw diagrams wherever necessary

<b>Long answer question (Attempt any Three Questions out of SIX)</b>		<b>10X3= 30</b>
Q.1	Briefly Mention History of peritoneal Dialysis	10
Q.2	Explain in detail the principles procedure follow-up & complications of peritoneal Dialysis	10
Q.3	Compare and contrast the normal kidney function with dialysis	10
Q.4.	Mention the concentration of peritoneal dialysis fluids	10
Q.5	Discuss peritoneal dialysis	10
Q.6	Complications of peritoneal dialysis	10
<b>Write Short answer question (Attempt any SIX Questions out of EIGHT)</b>		<b>6X5= 30</b>
Q.7	Discuss adequacy of peritoneal dialysis	5
Q.8	Note on catheter and exit – site care	5
Q.9	Mention adequacy of peritoneal dialysis over Heamodialysis	5
Q.10	Write briefly about dialyzer reprocess	5
Q.11	Note on recipient and donor workup	5
Q.12	Note on CAPD access	5
Q.13	Structure of nephron with a neat diagram	5
Q.14	Discusses counter mechanism	5
<b>Short answer one line (Attempt all Five Questions)</b>		<b>5X2= 10</b>
Q.15	Types of renal donor	2
Q.16	Cadaver Donor management	2
Q.17	List infectious & non infectious complication in a CKD patient on Heamodialysis	2
Q.18	Care of catheter and exit – site care	2
Q.19	Indications of peritoneal dialysis	2

**Elective Paper- Non – University Examination**  
**DISASTER MANAGEMENT**

Theory Hours: 45hrs  
Practical 15hrs  
**Total =60 hrs**

**Introduction to Disasters**

- a. Concepts, and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks)
- b. Disasters
- c. Classification Causes, Impacts (including social, economic, political, environmental, health, psychosocial, etc.)
- d. Differential impacts- in terms of caste, class, gender, age, location, disability Global trends in disasters. urban disasters, pandemics, complex emergencies, Climate Change

**Approaches to Disaster Risk reduction**

- a. Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- non structural ensures, roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre, and other stake- holders.

**Inter-relationship between Disasters and Development**

- a. Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources

**Disaster Risk Management in India**

- a. Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management institutional Arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation).

**Project Work: (Field Work, Case Studies)**

- a. The project /fieldwork is meant for students to understand vulnerabilities and to work on reducing disaster risks and to build a culture of safety. Projects must be conceived creatively based on the geographic location and hazard profile of the region where the college is located

**Suggested Reading list:**

- Alexander David, Introduction in 'Confronting Catastrophe', Oxford University Press, 2000

- Andharia J. Vulnerability in Disaster Discourse, JTCDM, Tata Institute of Social Sciences Working Paper no. 8, 2008
- Blaikie, P, Cannon T, Davis I, Wisner B 1997. At Risk Natural Hazards, Peoples' Vulnerability and Disasters, Routledge.
- Coppola P Damon, 2007. Introduction to International Disaster Management,
- Cuny, F. 1983. Development and Disasters, Oxford University Press.

## **INFORMATION AND COMMUNICATION TECHNOLOGY IN HEALTH EDUCATION**

Theory Hours: 45hrs

Practical 15hrs

**Total =60 hrs**

### **Learning objectives**

Upon successful completion of this subject, students should

1. To obtain the basic knowledge on computer, devices used in computers.
2. To know the uses of computers like MS office, Power point Presentations, Excel documents.
3. To know about uses of internet, its advantages in regular updating the knowledge in Occupational therapy profession.

### **SYLLABUS**

#### **Introduction**

1. Introduction to computers-History of Computer, Generation of Computer, Classification of Computers, Input Devices, Output Devices, Central Processing Unit, Components of CPU, Memory Unit, Peripheral Devices
2. Introduction to M.S. Windows
3. Internet and its applications
4. MGUMST web forum & portal
5. Google Applications
6. Introduction to M.S. Office - Word, Power Point, Excel,
7. Publisher

#### **The Digital Age**

Computer and communications, the five operations of a computer-and communication system-input, processing, output, storage and communications as well as the corresponding categories of hardware, five major categories of computers, development I communication Technology.

#### **Applications Software**

Applications and systems software, ethics of copying software, four types of applications software, entertainment education and reference, productivity and business and specialized, key functions of word processors, spreadsheets, database managers, graphics programs and suites, group-ware, and internet web browsers.

**Storage Devices**

Units of storage capacity, primary and secondary storage, data compression, data storage on diskette, hard disks, optical disks, and magnetic tape and describe the purposes of storage media.

**Communications**

Usage of communications technology, telephone-related services, online information services, the internet

**Multimedia**

What is multimedia – Multimedia PC– Multimedia Hardware - Central processor – color display, Multimedia accessories – CD ROM – Digital Audio – Audio speakers  
– Digital video– MIDI – deodisc Read/write storage device- Multimedia software

**Radio propagation:**

Use of computers in physical therapy – Application Packages used in statistical analysis.

**Recommended books**

1. Free T. Hotstetter, —Multimedia Literacy|| McGraw Hill,
2. Simon J. Gibbs, Dinoysios C. Tsihriziz, —Multimedia programming||, Addison Wesley
3. John F.Koefgel Buford, —Multimedia Systems||, Addison Wesley
4. John Vince, —Virtual Reality Systems|| Addison Wesley.
5. AndressF.Molisch, —Wideband Wireless digital communication|| Pear Education Asia

## **CLINICAL NUTRITION**

Theory Hours: 45hrs  
Practical 10hrs  
**Total = 55 hrs**

### **COURSE OBJECTIVE:**

The objective of this course is that after 30 hours of L, D, P the student shall be able to understand the basic knowledge about Diet, balanced diet, metabolism, malnutrition, under nutrition, over nutrition, deficiency disease.

### **COURSE OUTCOME:**

1. Become familiar about the nutritive values of food.
2. Explain about the food sources from which we obtain vitamins.
3. Become familiar with various compositions of food.
4. Well versed with digestion at each stages of digestive system.
5. Become familiar with different cooking methodologies.
6. Know and explain about food preparations by food manufacturer.
7. Explain thoroughly about the advantages and disadvantages of various convenience foods.

### **UNIT ISOURCES OF FOOD**

1. Nutritive value of foods,
2. Food Sources from which key vitamins are derived

### **UNIT II DIGESTIVE SYSTEM**

1. Digestion and absorption –Digestion at each stage of the digestive system
2. Dietary guidelines- Factors affecting food requirements. Planning and serving of family meals. Meals for all ages and occupations.

### **UNIT III COMPOSITION OF FOOD**

Composition and value of the main foods in the diet - Milk, meat, fish, cheese, eggs, margarine and butter cereals (wheat, rice, maize, millets, oats) fruits and vegetables

#### **UNIT IV PROCESSING OF FOOD**

1. Cooking of food -Transfer of heat by conduction, convection and radiation.
2. Principles involved in the different methods of cooking – boiling, stewing, grilling, baking, roasting, frying, steaming, pressure cooking, cooking in a microwave oven.

#### **FOOD PREPARATION**

1. Convenience foods- Foods partly or totally prepared by a food manufacturer – dehydrated, tinned, frozen, ready to eat. Intelligent use of these foods.
2. Advantages and disadvantages

#### **Text Book:**

1. Agarwal, Textbook of human nutrition, JP, 1 Ed, 2014

#### **Reference:**

1. Kenneth F. Kiple, Kriemhild Coneè Ornelas, The Cambridge world history of food, Cambridge University Press, 1st ed, 2000



## **EFFECTIVE ENGLISH**

Theory Hours: 60 hrs

**Total =60 hrs**

### **Course Objective:**

The objectives of this course is that after 40 hours of lectures, demonstrations and practicals the student will be able to Speak fluently, intelligibly and appropriately to teachers, Colleagues, Doctors, Patients and friends at the college, Hospital and hostel etc. about academic or (occupational) areas of interest. Course Outcome:

1. Students can gain knowledge about the various traditions writer and followed in English
2. Individuals can gain self – confidence in their own voice and speak out their opinions with confidence
3. Students will gain the ability to become a accomplished active readers
4. Helps to build the knowledge and understanding simultaneously through listening and give their point of view
5. Students will be able to write effectively in variety of professional and social setting
6. Acquire the ability to read and understand the literature and have the ability to identify the topics and formulate questions
7. Good communication skills which helps in easy rapport between the patient and therapist
8. Gain the fluency in speaking which helps in easy teaching method and presentation

### **UNIT – I INTRODUCTION**

1. History of the language
2. Regional distribution
3. Variation in dialect and accent

## **UNIT – II PHONOLOGY**

1. Consonants and vowels
2. Phontactics
3. Stress, rhythm and intonation
4. Regional variation

## **UNIT – III GRAMMER**

1. Noun, Pronoun
2. Verb, Tense
3. Adjuncts
4. Adjectives

## **UNIT – IV SYNTAX**

1. Clause syntax
2. Auxillary verbs
3. Vocabulary
4. Word formation
5. Pronunciation

## **UNIT – V PRESENTATION**

1. Oral presentation & Panel discussion
2. Interview preparation
3. Clarity and specificity

### **Text Book:**

1. O' Connor, I.D., Better English Pronunciation - Cambridge, Cambridge University.2009

### **Reference:**

1. Water F.V.A , Proficiency Course in English – Hodder and Stronghton, London.1994
2. Tone Daniel, I.M. , English Pronouncing Dictionary –Dent and sons Ltd. London.2004

## **HEALTH CARE**

Theory Hours: 50hrs

**Total = 50 hrs**

### **Introduction to Health**

1. Definition of Health, Determinants of Health, Health Indicators of India, Health Team Concept.
2. National Health Policy
3. National Health Programmes (Briefly Objectives and scope) Population of India and Family welfare programme in India

### **Introduction to Nursing**

1. What is Nursing? Nursing principles. Inter-Personnel relationships. Bandaging: Basic turns; Bandaging extremities; Triangular Bandages and their application.
2. Nursing Position, Bed making, prone, lateral, dorsal, dorsal re-cumbent, Fowler's positions, comfort measures, Aids and rest and sleep.
3. Lifting and Transporting Patients: Lifting patients up in the bed. Transferring from bed to wheel chair. Transferring from bed to stretcher.
4. Bed Side Management: Giving and taking Bed pan, Urinal: Observation of stools, urine. Observation of sputum, understand use and care of catheters, enema giving.
5. Methods of Giving Nourishment: Feeding, Tube feeding, drips, transfusion Care of Rubber Goods

6. Recording of body temperature, respiration and pulse, Simple aseptic technique, sterilization and disinfection. Surgical Dressing: Observation of dressing procedures

**First Aid:**

1. Syllabus as for Certificate Course of Red Cross Society of St. John's Ambulance Brigade.

**Reference Books:**

1. Preventive and Social Medicine by J.Park
2. Text Book of P & SM by Park and Park
3. Counseling & Communicate skills for medical and health, Bayne- Orient Longman Pvt. Ltd.

**Constitution of India**

Theory Hours: 40hrs

**Total = 40 hrs**

Unit-I: Meaning of the term 'Constitution'. Making of the Indian Constitution 1946- 1950.

Unit-II: The democratic institutions created by the constitution Bicameral system of Legislature at the Centre and in the States.

Unit-III: Fundamental Rights and Duties their content and significance.

Unit – IV: Directive Principles of States Policies the need to balance Fundamental Rights with Directive Principles.

Unit – V: Special Rights created in the Constitution for: Dalits, Backwards, Women and Children and the Religious and Linguistic Minorities.

Unit-VI: Doctrine of Separation of Powers legislative, Executive and Judicial and their functioning in India.

Unit – VII: The Election Commission and State Public Service commissions.

Unit – VIII: Method of amending the Constitution.

Unit – IX: Enforcing rights through Writs:

Unit – X: Constitution and Sustainable Development in India.

**Reference Books:**

1. J. C. Johari: The Constitution of India- A Politico-Legal Study-Sterling Publication, Pvt. Ltd. New Delhi.
2. J. N. Pandey: Constitution Law of India, Allahbad, Central Law Agency, 1998.
3. Granville Austin: The Indian Constitution – Corner Stone of a Nation-Oxford, New Delhi, 2000.