YENEPOYA
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REGULATIONS AND CURRICULUM GOVERNING

B.Sc. RENAL DIALYSIS TECHNOLOGY PROGRAM

Implemented in Academic Year 2015-16

Revised in 2018

Amended up to 2025

Name of the Constituent Unit: Yenepoya School of Allied Health Sciences



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Deralakatte, Mangalore, Karnataka.

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NOTIFICATION FROM THE UNIVERSITY

Sl.no	ACM with date	Decisions / approvals
1	18th ACM 18.10.2014	Starting of BSc course in Renal Dialysis Technology from the academic year 2015-2026 under faculty of allied health and basic sciences
2	21st ACM 31.07.2015	Board of studies for B.Sc. (Tech courses) Renal Dialysis Technology
3	25th ACM 22.08.2016	Increase in the annual intake Bachelor of Renal Dialysis Technology (B.Sc. Tech.) from 12 -20
4	25th ACM 22.08.2016	B.Sc. Technical Programs amendment to examination regulations B.Sc. Renal Dialysis Technology
5	27th ACM 09.01.2017	Conduct of supplementary examination for B.Sc. Programs
6	32nd ACM 11.08.2018	Amendment to the B.Sc. Technology Course (Revision of Syllabus)
7	38th ACM 27.04.2020	All the Undergraduate programs offered by the Faculty of Allied and Healthcare Professionals approved for the Credit Based Semester System from the Academic year 2020-21.
8	39th ACM 27.08.2020	To start the Yenepoya institute of Allied Health sciences Reallocation of existing / proposed course under the respective faculties faculty of allied and healthcare professions
		Increase in intake of seats for BSc courses: BSc Renal Dialysis Technology from 30-40
		Starting of MSc Renal dialysis Technology
9	44th ACM 05.10.2021	Proposal for Introduction of Choice Based Credit System in all the Undergraduate programs offered by the Yenepoya Institute of Allied Health Sciences from the academic year 2021-22.

10	48th ACM 05.11.2022	Increase the intake of seats for BSc Tech Program BSc RDT: 20-50
11	49th ACM 13.12.2022	Curriculum of B.Sc. –M.Sc. Integrated UG –PG Program with NEP regulations have approved for the implementation from the Academic Year 2022-23.
12	51st ACM 16.05.2023	Introduction of New National Credit Framework (NCRF) for all UG under YAHP (2023 – 24)
13	54th ACM 20.11.2023	Increase in the Intake of B.Sc. RDT from 50 to 120
14	61st ACM 13.02.2025	Redistribution of credit to meet the semester wise credit distribution as per NCRF Shifting of Human Rights & Gender Equity from IV Semester to I Semester
15	61st ACM 13.02.2025	Amendment in the syllabus of the course Pathology and Microbiology II of the B.Sc. Technology Program
16	61st ACM 13.02.2025	Change in the title of the courses of B.Sc. Renal Dialysis Technology Program was approved • Systemic Pathology changed to Renal Pathology • Applied Microbiology changed to Renal Microbiology
17	64th ACM 14.08.2025	Implementing the ability enhancement course (AEC) (English Communication) in all BSc Technology Programs • English and Communication – Part I – to be introduced in I Semester (3 Credit) • English and Communication – Part II – to be introduced in II Semester (3 Credit)

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1. Preamble

Health care sector has become one of the largest employment generation sectors in India and abroad. Rapidly changing and expanding horizon of the health care sector demands formal training programs in all its allied areas. Advanced complex instrumentation & equipment require technologists not only to operate but also to care & maintain these instruments and equipment. These technologists should possess a strong scientific foundation to be able to perform these tasks at a much higher level than the traditionally trained technicians of the past used to perform. The students who are trained in the technological aspects of medical care with a good scientific foundation will be in a position to competently assist the Physician or Surgeon. Hence to prepare the students to meet the demands of the healthcare sector and in accordance with Ministry of Human Resource Development (HRD), Govt. of India education system introduced National higher education quality framework (NHEQF), the program is designed in a way the curriculum is student centric having flexible choice based credit system with value based holistic multidisciplinary approach.

B.Sc. Renal Dialysis Technology is an undergraduate Program which is an integral branch of healthcare, addresses the critical need for specialized professionals who play a fundamental role in the well-being of individuals with renal diseases.

This program is designed to provide students with a comprehensive understanding of renal function, the principles of hemodialysis, peritoneal dialysis, and related technologies. It equips them with the skills, knowledge, and ethical values required to excel in the field of Renal Dialysis Technology.

The mission of this Program is to nurture dedicated and compassionate healthcare professionals who can effectively operate and maintain dialysis equipment, monitor patients, and ensure the delivery of high-quality renal care. We aim to instill in our students a commitment to patient safety, effective communication, and continuous improvement, all while adhering to the highest ethical standards.

The B.Sc. Renal Dialysis Technology program is dedicated to fostering critical thinking, problem-solving, and clinical competence. We endeavor to create professionals who will contribute significantly to the healthcare sector, improving the lives of those affected by renal

diseases. This program is enriched with hands-on clinical experience, enabling students to apply theoretical knowledge in real-world healthcare settings. Through a carefully crafted curriculum and dedicated faculty, we aim to produce graduates who are well-prepared to meet the evolving challenges of renal care.

As graduates of this program, the students will emerge as skilled renal dialysis technologists who can make a positive impact on the lives of patients and contribute to the greater good of society.

Several institutes in India, conduct certificate programs, diploma, graduate and post-graduate programs in Renal Dialysis Technology. These programs are regulated by Universities and paramedical boards. Whereas, the certificate and diploma programs offer training at the basic level, both theoretical and practical, the graduate and post-graduate degrees have advanced training of the students in all aspects of Renal Dialysis Technology.

Choice based Credit System is a flexible system of learning. The distinguishing features of CBCS are following:

- It permits students to learn at their own pace.
- Choose Electives from a wide range of Elective courses offered by the other departments/university.
- Undergo additional courses acquire more than the required number of credits.
- Adopt an Inter-disciplinary and Intra-disciplinary approach in learning.
- Make best use of the available expertise of the faculty across the departments or disciplines.
- Has an inbuilt evaluation system to assess the analytical and creative skills of students in addition to the conventional domain knowledge assessment pattern.

2. Definitions

2.1 **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.

2.2 **Semester System/ Choice Based Credit System**: The Semester system accelerates the teaching- Learning process. The Credit based Semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The Choice- Based Credit system provides a cafeteria type approach in which the students can take courses of their choice, undergo additional courses and

acquire more than the required credits, and adopt an interdisciplinary approach to learning

2.3 Course: Usually referred to, as "papers" is a component of a Program. The courses shall define learning objectives and learning outcomes. A course shall comprise lectures/ tutorials/ laboratory work/ field work/ outreach activities/ project work/ vocational training/viva/ seminars/ term papers/assignments/ presentations/ self-study etc. or a combination of these. The courses can be of the following types ie, Core, Ability Enhancement, Skill enhancement, Value added courses, Multidisciplinary Elective and Internship.

2.4 Credits: Credit defines the quantum of contents/syllabus prescribed for a course and determines the number of hours of instruction required per week. Thus, normally in each of the courses, credits will be assigned on the basis of the number of lectures/tutorial laboratory work and other forms of learning required, to complete the course contents in a 15-20week schedule: One credit =1 hour of lecture per week/ two hours of Laboratory or practical/three hours of clinical rotation, field work/posting. All courses need not carry the same credits.

	Lecture-L	**Tutorial-T**	**Practical–P**	**Clinical Training/Rotation**
1 Credit	1 Hour	1 Hour	2 Hours	3-5 Hours

2.4.1 Credit Hours for different types of Courses:

Each course may have only a lecture component or a lecture and tutorial component or a lecture and practicum component or a lecture, tutorial, and practicum component, or only practicum component. For example, a three-credit lecture course in a semester means three one-hour lectures per week with each one-hour lecture counted as one credit. In a semester of 15 weeks' duration, a three-credit lecture course is equivalent to 45 hours of teaching.

One credit for tutorial work means one hour of engagement per week. In a semester of 15 weeks' duration, a one-credit tutorial in a course is equivalent to 15 hours of engagement.

A one-credit course in practicum or lab work, community engagement and services, and fieldwork in a semester mean two-hour engagement per week. In a semester of 15 weeks duration, a one-credit practicum in a course is equivalent to 30 hours of engagement.

A one-credit of Seminar or Internship or Studio activities or Field practice/projects or Community engagement and service means two-hour engagements per week. Accordingly, in a semester of 15 weeks' duration, one credit in these courses is equivalent to 30 hours of engagement.

A course can have a combination of lecture credits, tutorial credits, and practicum credits. For example, a 4–credit course with three credits assigned for lectures and one credit for practicum shall have three 1-hour lectures per week and one 2-hour duration field-based learning/project or lab work, or workshop activities. In a semester of 15 weeks duration, a 4-credit course is equivalent to 45 hours of lectures and 30 hours of practicum. Similarly, a 4 – credit course with 3- credits assigned for lectures and one credit for tutorial shall have three 1-hour lectures per week and one 1-hour tutorial per week. In a semester of 15 weeks' duration, a four-credit course is equivalent to 45 hours of lectures and 15 hours of tutorials.

Experiential learning credit is equal to 3-hour duration per week. For example, 1 credit for experiential learning will mean 45 hours of learning. The credits assigned to the course is indicated as L: T: P format. For example, for a 4credit course format could be: 4:0:0 or 1:2:1 or 3:1:0 or 0:0:4etc.

2.5 Program: An educational Program leading to award of a degree, diploma or certificate.

The following types of courses/activities constitute the Programs of study. Each of them will require a specific number of hours of teaching/guidance and laboratory/studio/workshop activities, field-based learning/projects, internships, and community engagement and service

a. Lecture courses: Courses involving lectures relating to a field or discipline by an expert or qualified personnel in a field of learning, work/vocation, or professional practice.

b. Tutorial courses: Courses involving problem-solving and discussions relating to a field or discipline under the guidance of qualified personnel in a field of learning, work/vocation, or professional practice.

c. Practicum or Laboratory work: A course requiring students to participate in a project or practical or lab activity that applies previously learned/studied principles/theory related to the chosen field of learning, work/vocation, or professional practice under the supervision of an expert or qualified individual in the field of learning, work/vocation or professional practice.

d. Seminar: A course requiring students to participate in structured discussion/conversation or debate focused on assigned tasks/readings, current or historical events, or shared experiences guided or led by an expert or qualified personnel in a field of learning, work/vocation, or professional practice.

e. Internship: A course requiring students to participate in a professional activity or work experience, or cooperative education activity with an entity external to the education institution, normally under the supervision of an expert of the given external entity. A key aspect of the internship is induction into actual work situations. Internships involve working with local industry, government or private organizations, business organizations, artists, crafts persons, and similar entities to provide opportunities for students to actively engage in on-site experiential learning.

f. Studio activities: Studio activities involve the engagement of students in creative or artistic activities. Every student is engaged in performing a creative activity to obtain a specific outcome. Studio-based activities involve visual- or aesthetic focused experiential work.

g. Field practice/projects: Courses requiring students to participate in field-based learning/projects generally under the supervision of an expert of the given external entity.

h. Community engagement and service: Courses requiring students to participate in field-based learning/projects generally under the supervision of an expert of the given external entity. The curricular component of 'community engagement and service' will involve activities that would expose students to the socio-economic issues in society so that the theoretical learnings can be supplemented by actual life experiences to generate solutions to real-life problems.

i. Experiential learning activities: Field project work / Day out learning activities etc are considered as experiential activities.

2.6 **Grade Point**: It is a numerical weight allotted to each letter grade on a 10-point scale.

2.7 **Credit Point**: It is the product of grade point and number of credits for a course.

2.8 **Letter Grade:** It is an index of the performance of students in a said course. Grades are denoted by letters: O, A+, A, B+, B, C, P, F, AB.

2.9 **Cumulative Grade Point Average (CGPA)**: It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

2.10 **Semester Grade Point Average (SGPA):** It is a measure of performance of work done in a semester. It is ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.

2.11 **Transcript or Grade Card or Certificate:** Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester.

2.12 **Academic Bank Account:** means an individual account with the Academic Bank of Credits opened and operated by a student, to which all academic credits earned by the Student from course(s) of study are deposited, recognized, maintained, accumulated,

transferred, validated or redeemed for the purposes of the award of degree/diploma/certificates etc. by an awarding institution.

2.13 Academic Bank of Credits: means the provision for innovative and interchangeable curricular structures to enable creative combinations of Courses or Programs in Disciplines of study leading to Degree or Diploma or Post Graduate Diploma or Certificate of Study offering multiple entry and multiple exit facilities, while removing rigid curricular boundaries and creating new possibilities of life-long learning;

2.14 Credit-accumulation: means the facility created by Academic Bank of Credits in the Academic Bank Account opened by students in order to transfer and consolidate the credits earned by them by undergoing Courses;

2.15 Credit-redemption: means the process of commuting the accrued credits in the Academic Bank Account of the students maintained in ABC for the purpose of fulfilling the credits requirements for the award of Degrees or Diplomas or Certificates or Course work for Ph.D. Program etc., by the registered degree-awarding Higher Educational Institutions;

2.16 Credit-transfer: Means the mechanism by which the Registered Higher Educational Institutions are able to receive or provide prescribed credits to individual Academic Bank Accounts in adherence to the University Grants Commission credit norms for the 'course/s' undertaken by students enrolled in any Registered Higher Education Institution within India.

An academic year shall consist of two semesters;

Odd Semester 1st, 3rd, 5th& 7th	September/October to February/March
Even semester 2nd, 4th, 6th& 8th	March/April to August/September

3.Eligibility for admission

To be eligible for admission in Bachelor of Renal Dialysis Technology, a candidate should have passed two-years Pre University examination/ Pre Degree examination/ two years after ten years of schooling or its equivalent as recognized by the Yenepoya (Deemed to be) University with Physics, Chemistry and Biology as principal courses of study.

Candidate needs to secure 40% or above marks in the qualifying examination to be eligible for admission. For SC/ST/OBC candidate's minimum marks required in the qualifying exam is 35% marks.

4.Duration of the program

The duration of the Program shall extend over 8 semesters (three academic years with one-year internship) each semester comprising minimum of 15 weeks with the minimum of 90 actual working days of instruction in each semester. The successful completion of the Undergraduate program, along with internship as applicable will lead to Bachelor of Science in Renal Dialysis Technology (B.Sc. RDT).

5.Maximum period for completion of the program

A candidate shall complete six semesters (Three Years) Program within Six years from the date of admission. Hence, the maximum period for completion of the Program is seven years.

6.Aim of the Program

To prepare competent entry-level Renal Dialysis Technology professionals with strong scientific knowledge in nephrology and dialysis sciences, capable of safely assessing, preparing, and managing patients requiring hemodialysis and peritoneal dialysis across acute, chronic, and critical care settings. Graduates will demonstrate proficiency in operating and maintaining dialysis equipment, monitoring patient responses, identifying complications, and providing culturally sensitive and ethical patient care. They will communicate effectively, function collaboratively within multidisciplinary healthcare teams, uphold infection control and quality standards, and remain committed to continuous learning and community-focused kidney health promotion.

7.Outcomes of the program

Program Outcomes(PO): (Knowledge-K, Skill-S, Attitude-A, Communication-C) Upon successful completion of the undergraduate course, students will have developed a broad knowledge in the field of evaluation, diagnosis and management of different conditions of the renal system. In particular, they will be:

PO 1: Apply core discipline knowledge to perform dialysis procedures safely and accurately, following evidence-based practices and current international standards. (K)

PO 2: Apply principles of dialysis and competently operate hemodialysis equipment, alternate dialysis procedures, and essential unit equipment, including routine maintenance, troubleshooting, and minor repairs. (K, S)

PO 3: Assess patients before, during, and after dialysis, identify complications, monitor intradialytic events, and report appropriately to the nephrologist or physician**.** (K, S, C)

PO 4: Respond effectively to the physical, emotional, and psychosocial needs of dialysis patients, providing culturally sensitive and ethically appropriate care. (A, C)

PO 5: Access, interpret, and use relevant technological and scientific information to stay updated on current dialysis concepts and communicate findings in written and oral formats. (K, C)

PO 6: Communicate clearly and appropriately with patients, caregivers, and healthcare teams, considering age, health conditions, and cultural backgrounds. (A, C)

PO 7: Demonstrate professionalism, ethical conduct, accountability, awareness of medico-legal boundaries, and the ability to guide or mentor colleagues when required. (A, C)

PO 8: Participate actively in the planning, scheduling, and delivery of hemodialysis treatments and support management of dialysis- and patient-related issues in coordination with the nephrology team. (S)

PO 9: Support advanced dialysis procedures (CRRT, pediatric dialysis, ICU dialysis, plasmapheresis, hemoperfusion, SCUF, MARS), and assist in patient education, nutritional counselling, and overall care. (S, C)

PO 10: Adhere strictly to infection control, quality control, dialysis unit policies, and contribute to patient safety, patient satisfaction, and overall outcome improvement. (A, C)

Program structure:

	Broad category of course	Hours/Credits	Course (Title)
1.	**Discipline-Specific Courses**		
a)	Theory	**I Semester**	
		60 hours / 4 Credits	Human anatomy and Physiology – I
		60 hours / 4 Credits	Pathology and Microbiology – I
		60 hours / 4 Credits	Dialysis Therapy- I
		60 hours / 4 Credits	Biochemistry
		II Semester	
		60 hours / 4 Credits	Human anatomy and Physiology – II
		60 hours / 4 Credits	Pathology and Microbiology – II
		60 hours / 4 Credits	Dialysis Therapy II
		III Semester	
		60 hours / 4 Credits	Renal Pathology
		60 hours / 4 Credits	Renal Microbiology
		60 hours / 4 Credits	General Pharmacology
		60 hours / 4 Credits	Applied Anatomy and Physiology
		60 hours / 4 Credits	Renal Disease - I

	Broad category of course	Hours/Credits	Course (Title)
		IV Semester	
		60 hours / 4 Credits	Dialysis Therapy- II
		60 hours / 4 Credits	Renal Disease – II
		60 hours / 4 Credits	Applied Pharmacology
		60 hours / 4 Credits	Renal Nutrition
		V Semester	
		60 hours / 4 Credits	Applied Dialysis Technology- I
		60 hours / 4 Credits	Applied Dialysis Technology - II
		60 hours / 4 Credits	Hemodialysis Guidelines
		60 hours / 4 Credits	RDT related with Laboratory, Cardiology, & Imaging technology
		VI Semester	
		60 hours / 4 Credits	Advanced Dialysis Technology–I
		60 hours / 4 Credits	Advanced Dialysis Technology-II
		60 hours / 4 Credits	Renal Transplantation
b)	Practical (SEC)*	–	–

	Broad category of course	Hours/Credits	Course (Title)
c)	Clinical (SEC)*	**III Semester**	
		120 hours/ 4 credits	Clinical Dialysis I
		IV Semester	
		120 hours/ 4 credits	Clinical Dialysis II
		V Semester	
		120 hours/ 4 credits	Clinical Dialysis III
		VI Semester	
		120 hours/ 4 credits	Clinical Dialysis IV
d)	Simulation-based (SEC)*	–	–
2.	**Curriculum Enrichment Courses**		
a)	Field Visit	–	–
b)	Community Posting	–	–
c)	Industry / Clinical Internship	**VII Semester**	
		40 hours/ week/20 credits	Internship I
		VIII Semester	
		40 Hours/ week/20 credits	Internship II
d)	Research Project	–	–

	Broad category of course	Hours/Credits	Course (Title)
3.	**Electives**		
a)	Discipline-Specific Electives	–	–
b)	Interdisciplinary Courses	45 Hours / 3 Credits per year	Coursera/Swayam/NSS/Red cross
c)	Ability Enhancement Courses • Soft skills development • Language and communication skill development • Analytical skill development • Personality and professional development • Employability skill development	**I Semester**	
		45 hours / 3 credits	English and Communication – I
		II Semester	
		45 hours / 3 credits	English and Communication – II
		30 hours/ 2 credits	Kannada
d)	Value Added Courses	**I Semester**	
		30 hours/ 2 credits	Constitution of India
		III Semester	
		30 hours/ 2 credits	Human Rights and Gender Equity

SEC: Skill Enhancement Course

8.Attendance

8.1 Each course (theory, practical, clinical etc.) shall be treated as an independent unit for the purpose of attendance. Candidates having minimum 80% attendance in each of the Courses can only qualify to appear for the Semester End Examination. The Candidates with less than 80% of attendance shall be required to repeat that Course by attending the semester.

8.2 There shall be no provision for con-donation of shortage of attendance.

8.3 For SWAYAM/MOOC/NPTEL it shall be as per the regulations governing the courses of implementing authority.

8.4 The HOD/Course Coordinator through the Dean of Faculties shall announce the names of the candidates who will not be eligible to take the Semester End- Examinations (SEE) in the various courses and send a copy of the same to the Controller of Examinations (COE) Office. Registrations of such candidates for those courses shall be treated as cancelled

9.Teaching-Learning Methods Course wise:

Teaching - Learning method	**Courses**
Experiential learning	Dialysis Therapy I Dialysis Therapy II Clinical Dialysis I Clinical dialysis II
Integrated/Inter-disciplinary learning	RDT related to Cardio, Lab and imaging technology Biostatics Environmental sciences
Participatory learning	Hemodialysis Guidelines
Problem-solving methodologies	Advance dialysis Technology I Advance dialysis Technology II
Self-directed learning	Dialysis Therapy I

Teaching - Learning method	Courses
Patient-centric and Evidence-based learning	Renal Transplantation Applied Dialysis I Applied dialysis II
The Humanities	Human rights and gender equity
Project-based learning	Advance dialysis Technology I Advance dialysis Technology II
Role-play	Applied dialysis technology I Applied dialysis technology II
Team-work	Systemic pathology Applied anatomy and physiology
Reflective writing	Dialysis Therapy I

10. Scheme of Examination

- Evaluation of a course shall be done based on continuous internal assessment (CIA) mode followed by Semester End University Examination (SEE) for each core, SEC, AEC & VAC. The evaluation of Multidisciplinary elective offered by Yenepoya (Deemed to be) University shall be done based on formative assessment.
  - The components of CIA (Continuous Internal Assessment) may include sessional tests, Seminar, Assignment/ Social involvement and other activities as determined by the respective speciality.
  - The marks for CIA shall be 50% and SEE shall be 50%.
  - The minimum marks for CIA shall be 40% and SEE shall be 40% for a pass, but the minimum marks for pass per course shall be 50% CIA and SEE added together.
  - There shall be examinations at the end of each semester ordinarily during February/March for odd semesters and during August/September for even semesters.
  - The SEE duration shall be 60 minutes for 25 marks paper and 120 minutes for 50 marks paper.
  - The various Formative assessment methods include Assignments, reports, Quiz, Group discussion; Open Book Exam, Mind Mapping, Minute paper etc.

10.1 Examination structure:

The Examination structure shall vary depending on the course, however, broadly divided as follows:

Examination/Assessment	**Core/SEC/AEC(English)**	**AEC(Hindi & Kannada) /VAC**
Continuous Internal Assessment	50 Marks	25 Marks
Semester End Examination	50 Marks	25 Marks
Total	100 Marks	50 arks

Multidisciplinary Elective will be assessed through Continuous and Comprehensive assessment throughout the Semester (50 Marks).

10.1.1 Parameters for CIA

Internal Assessment Components	Core/SEC/AEC(English)	AEC(Hindi & Kannada) /VAC
Internal Assessment tests	20	10
Assignment	10	05
Continuous and Comprehensive assessment	20	10
Total Marks	**50**	**25**

Assessment Methods

1	Quiz	6	Role Play
2	Group Discussion	7	Peer to Peer Assessment
3	Open Book Exam	8	Mind Mapping
4	Think-Pair-Share	9	Minute paper
5	Presentations	10	Case Study

10.1.2 Question Paper Pattern for Core course (Internal Assessment & Semester End Examination)

	MAXIMUM MARKS = 50				**Duration**
Type of question	**Number of questions**	**To be Answered**	**Marks for each question**	**Total**	120 minutes
LONG ESSAY TYPE	02	01	10	10	
SHORT ESSAY TYPE	07	05	04	20	
SHORT ANSWERS	12	10	02	20	
			Total	**50**	

	MAXIMUM MARKS = 50				Duration
PART A					
Type of question	**Number of questions**	**To be Answered**	**Marks for each question**	**Total**	120 Minutes
LONG ESSAY TYPE	02	01	10	10	
SHORT ESSAY TYPE	02	01	05	05	
SHORT ANSWERS	06	05	2	10	
PART B					
LONG ESSAY TYPE	02	01	10	10	
SHORT ESSAY TYPE	02	01	05	05	
SHORT ANSWERS	06	05	2	10	
			Total	**50**	

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10.1.3 Question Paper Pattern for Ability Enhancement Compulsory (AEC) Course

	MAXIMUM MARKS = 25				Duration
Type of question	**Number of questions**	**To be Answered**	**Marks for each question**	**Total**	
ESSAY	05	03	05	15	60 minutes
SHORT ANSWERS	07	05	02	10	
			Total	**25**	

10.1.4 Question Paper Pattern for Value Added (VAC) Course

	SUBJECTS HAVING MAXIMUM MARKS = 25				Duration
Type of question	**Number of questions**	**To be Answered**	**Marks for each question**	**Total**	
ESSAY	05	03	05	15	60 minutes
SHORT ANSWERS	07	05	02	10	
			Total	**25**	

10.1.5 Practical examination (SEC)

SI.NO	Components	Marks
1	Spotters	10
2	Case scenario/Stations	20
3	Viva Voce	20
Total Marks		50

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- Practical examination will be aimed at examination of clinical skills and competence of the candidates for undertaking independent work as a specialist.
- Viva- Voce examination shall aim at assessing depth of knowledge, logical reasoning, confidence &oral communication skills.
- OSCE/OSPE- shall have minimum of 4 stations.

11.Eligibility to appear for University Examination

On successful completion of all the courses (Core, AEC, SEC & ME) of three Academic year comprising of Six semesters with total 132 credits and 1 year of internship (40 Credits) to be eligible for Bachelor of Science Degree in Renal Dialysis Technology (B.Sc. RDT)

Note: Candidate who wishes to acquire honors degree can register for B.Sc. RDT (Honors) subject to average CGPA 7.5 in all the Six Semesters

12.Criteria for passing

a. A candidate shall be declared to have passed the UG Program if he/she secures at least CGPA of 5.0 (Course Alpha-Sign Grade P) in the aggregate of both Internal Continuous Assessment and Semester End Examination.

b. The results of the candidates who have passed the sixth semester examination but not passed the lower semester examinations shall be declared as NCL (Not Completed Lower semester examinations). Such candidates shall be eligible for the degree only after completion of all the lower semester examinations.

13.Grading and Classification

The results of successful candidates at the end of each semester shall be declared in terms of Grade Point Average (GPA) and Alpha-Sign Grade. The results at the end of the sixth semester shall be classified on

the basis of the Cumulative Grade Point Average (CGPA) obtained in all the six semesters and the corresponding overall alpha sign grade.

a. Letter Grades and Grade Points:

i. The Deemed to be University would be following the absolute grading system, where the marks are compounded to grades based on pre-determined class intervals.

ii. The UGC recommended 10-point grading system with the following letter grades are given below:

Letter Grade	Marks	Grade Point
O (Outstanding)	90-100	10
A+ (Excellent)	80-89	9
A (Very Good)	70-79	8
B+ (Good)	60-69	7
B(Above Average)	55-59	6
P (Pass)	50-55	5
F (Fail)/ RA (Reappear)	Below 50	0
Ab (Absent)		0

*The Marks with 0.5 shall be rounded up to the next whole number.

iii. A student obtaining Grade RA/ Ab shall be considered failed and will be required to reappear in the end semester examination.

b. The Semester Grade Point Average (SGPA)

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). The SGPA is the weighted average of the grade points obtained in all the courses by the student during the semester.

For example, if a student takes five (Theory/Practical) in a semester with credits C1, C2, C3, C4 and C5 and the student's grade points in these courses are G1, G2, G3, G4 and G5, respectively, and then students' SGPA is equal to:

$$SGPA = \frac{C1G1 + C2G2 + C3G3 + C4G4 + C5G5}{C1 + C2 + C3 + C4 + C5}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and ABS grade awarded in that semester. For example if a student has a F or ABS grade in program 4, the SGPA shall then be computed as:

$$SGPA = \frac{C1G1 + C2G2 + C3G3 + C4 * ZERO + C5G5}{C1 + C2 + C3 + C4 + C5}$$

c. Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the VI semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all VI semesters and their courses. The CGPA shall reflect the failed status in case of F grade(s), till the course(s) is/are passed. When the program(s) is/are passed by obtaining a pass grade on subsequent examination(s) the CGPA shall only reflect the new grade and not the fail grades earned earlier. The CGPA is calculated as:

$$CGPA = \frac{C1S1+C2S2+C3S3+C4S4+C5S5+C6S6}{C1+C2+C3+C4+C5+C6}$$

where C1, C2, C3,…. is the total number of credits for semester I,II,III and S1, S2, S3….is the SGPA of semester I,II,III,.

Calculation of GPA & CGPA: An example (1st semester)

Program Code	Course	Credits (a)	Grade Obtained	Credit Value (b)	Grade Points (axb)
	Course 1	4	B	8	32
	Course 2	4	B	8	32
	Course 3	4	O	10	40
	Course 4	2	C	7	14
	Course 5	2	A	9	18
	Total	16	-	-	136

1st Semester GPA = Total Grade Points / Total Credits = 136 / 16 = 8.5 2nd Semester GPA = 7 with respect to 18 Credits

Then 1st Year CGPA = (8.5 x 16) + (7 x 18) / 16 + 18 = 7.7

14.Any other Information

14.1. Progression criteria

The students are allowed to carry over any number of courses till sixth semester. But student is eligible to appear for the End semester exam of sixth semester if he/she has cleared all the Courses both Core, AEC, SEC & VAC of first, second, third & fourth semesters. If student has any pending course of first to fourth semesters, he/she is not eligible to appear for the end semester exam of the sixth semester. However, fifth semester courses are allowed to club with

sixth semester end examination. But, all the Core, AEC, SEC & VAC of first to fourth semester should be completed to be eligible for sixth semester End Semester Examination.

- Candidate should clear all Courses (Core, AEC, SEC, VAC & ME) of all the semester, to be eligible to start the one year of mandatory internship.
- A fail in any one Course will mean the candidate has to reappear for the exam in that Course only.
- A candidate who passes the semester examinations in parts is eligible for only CGPA and letter grade but not for award/medal from the University.

14.2. Re- entry after break of the study:

a. Candidates admitted to a program abstaining for more than 3 months must seek readmission into the appropriate semester.
b. The candidate shall follow the syllabus in vogue (currently approved/is being followed) for the program.
c. All re-admissions of candidates are subject to the approval of the University.

14.3 Evaluation:

a. Each theory examination shall have single evaluation. There shall be provision for re-evaluation on a payment of a fee. An external examiner shall value the paper, if the difference is more than 15% of previous marks the answer script shall be sent for third evaluation. In such an event, the average of the best two out of the three scores will be taken as the final score.
b. Practical examination shall be jointly conducted and evaluated by one internal examiner and one external examiner.

14.4. Internship

A candidate has to mandatorily complete 1 year (2 semesters) of internship. The total credit per semester is 20 and for two semesters it is 40.

Eligibility

A candidate should have passed in all the courses (Core, AEC, VAC and Multidisciplinary Electives) amounting to 131 number of credits before entering in to internship.

Internship guidelines

Each semester of Internship shall be minimum of 20 credits. The credits are calculated based on 1 credit = 3 to 5 hours of practical training. There shall be an exit exam at the end of the each semester at the college level.

Components of Exit Exam

SI. No.	Components	Marks
1	Spotters	30
2	Case scenario/Stations	30
3	Viva Voice	40
Total Marks		100

Particulars of Practical, Viva-Voce

- Practical examination will be aimed at examination of clinical skills and competence of the candidates for undertaking independent work as a Dialysis Therapist
- Viva- Voce examination shall aim at assessing, i.e., depth of knowledge, logical reasoning, confidence &oral communication skills.
- OSCE/OSPE- shall have minimum of 3 stations.

SEMESTER I

HUMAN ANATOMY& PHYSIOLOGY I

Course: Core

Credits: 04 **Number of hours: 60**

PART A- HUMAN ANATOMY

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: To identify and locate each of the body systems to apply anatomical knowledge to perform minor technical procedural skills.

CO2: To know the normal disposition of the structures in the body while clinically examining a patient and while conducting clinical procedures.

CO3: To know the anatomical basis of disease and injury

CO4: To discuss the interrelationship of systems in maintaining homeostasis.

CO5: To describe the structure of each body system

COURSE CONTENTS

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	4hrs	Introduction: Human body as a whole 1.1 Definition of anatomy and its divisions 1.2Terms of location, positions, and planes 1.3 Cell and its organelles. 1.4Epithelium: definition, classification, describe with examples, function. 1.5 Glands: classification, describe serous & mucous glands with examples. 1.6 Basic tissues: classification with examples 1.7Demonstration: Histology of types of epithelium. Histology of serous, mucous & mixed salivary gland.	√			10%	SE & SA

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit II	5hrs	Locomotion and support 2.1Bone: classification, names of bone cells, parts of long bone, microscopy of compact bone, names of all bones, vertebral column, inter-vertebral disc, fontanelles of fetal skull. 2.2 Joints: classification of joints with examples, synovial joint (in detail for radiology). 2.3Muscular system: classification of muscular tissue & histology, names of muscles of the body. 2.4 Demonstration: Bones & joints. Histology of compact bone (TS & LS). Demonstration of all muscles of the body. Histology of skeletal, smooth &cardiac muscle (TS & LS). Histology of the 3 types of cartilage. Demo of all bones showing parts, radiographs of normal.	√			15%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit III	5hrs	Cardiovascular system 3.1Heart: size, location, chambers, exterior & interior, blood supply of heart 3.2 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 vena cava, portal vein, Porto-systemic anastomosis, great saphenous vein, Dural venous sinuses. 3.3 Lymphatic system: cisterna chyli& thoracic duct, histology of lymphatic tissues, names of regional lymphatics, axillary and inguinal lymph nodes in brief. 3.4Demonstration of heart and vessels in the body. Histology of large artery, medium sized artery & vein, large vein. Histology of lymph node, spleen, tonsil & thymus. Normal chest radiograph showing heart shadows.	√			25%	LE, SE, SA
Unit VI	2hrs	Embryology 6.1Spermatogenesis & oogenesis. Ovulation, fertilization. Fetal circulation. Placenta, Demonstration of models.		√		5%	SE, SA

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit IV	10hrs	Gastro-intestinal system 4.1 Parts of GIT, oral cavity, lip, tongue, dentition, pharynx, esophagus, stomach, small and large intestine, liver, gall bladder, pancreas. 4.2 Tonsil, salivary glands extrahepatic biliary apparatus, Waldeyer's ring 4.3Demonstration of parts of gastro intestinal system. Normal radiographs of gastro intestinal system. Histology of gastro intestinal system.	√			30%	LE, SE, SA
Unit V	4hrs	Respiratory system 5.1 Parts of RS, nose, nasal cavity, larynx, trachea, lungs, broncho-pulmonary segments, histology of trachea, lung and pleura, names of paranasal air sinuses. 5.2 Demonstration of parts of respiratory System Normal radiographs of chest. -Histology of lung and trachea.	√			15%	LE, SE, SA
Unit VI	2hrs	Embryology 6.1Spermatogenesis & oogenesis. Ovulation, fertilization. Fetal circulation. Placenta, Demonstration of models.		√		5%	SE, SA

- **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

- **Recommended books:**

1. Priya Ranganath, Leelavathy Basics in Human Anatomy for BSc Paramedical Courses, Revised and updated edition, The Health
2. Chaurasia BD. Human anatomy. CBS Publisher; 2004.
3. Vishram Singh, Textbook of Anatomy, Revised and updated edition, Elsevier
4. Waugh A, Grant A., Ross &Wilson Anatomy and physiology in health and illness E-book. Elsevier Health Sciences; 2014 Jun 25.
5. Inderbir S. Textbook of human histology with color atlas. New Delhi: Jaypee Brothers Medical Publishers. 2006.

PART B – PHYSIOLOGY

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: To demonstrate the understanding of physiological structure of Renal system, endocrine system, Nervous system and special senses.

CO2: To broadly identify the clinical abnormalities of organs and its clinical physiological implications

- **COURSE CONTENT:**

Unit	Hours	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit I	2hrs	**General Physiology** 1.1 Introduction to physiology 1.2 Homeostasis: Definition, Positive feedback, negative feedback. PH 1.3 Body Fluid Compartments	√	√		15%	SE, SA
Unit II	5hrs	**Muscle Nerve physiology** 2.1.1Introduction, Classification and structure of muscle, sarcomere 2.2Neuromuscular junction, Transmission across neuromuscular junction. 2.3 Excitation contraction coupling. Mechanism of muscle contraction, rigor mortis.	√	√		20%	LE, SE, SA

Unit	Hours	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit III	7hrs	**Blood** 3.1 Introduction: composition and function of blood. 3.2 Blood Cells: types, Normal Count 3.3 Red blood cells: function. Erythropoiesis: Definition, Stages, Factors affecting 3.4 Hemoglobin: Function, concentration Physiological variation of RBC Count and Hb 3.5 White blood cells: different types, functions, normal count, differential count 3.6 Platelets: origin, normal count, functions. 3.7 Hemostasis: definition, steps, clotting factors, mechanism of clotting, disorders of clotting 3.8 Blood groups: ABO system, Rh system: Rh factor, Rh incompatibility. 3.9 Blood grouping & typing, cross matching. 3.10 Blood transfusion: indication, universal donor and recipient concept. Selection criteria of a blood donor, transfusion reactions. 3.11 Anemias: definition, Symptoms and signs (brief).	√	√		25%	LE, SE, SA

Unit	Hours	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
		3.12 Blood indices: colour index, MCH, MCV, MCHC (def and Normal Values). 3.13 ESR and PCV: normal values, definition, determination (methods). 3.14Plasma proteins: types and concentration, functions of albumin, globulin, fibrinogen, prothrombin. 3.15 Blood volume: normal value, determination of blood volume					

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit IV	8hrs	**Cardiovascular system** 4.1 Heart: physiological anatomy, nerve supply. 4.2Properties of cardiac muscle PH 4.3Cardiac cycle: definition, systole, diastole, phases, JVP(brief) 4.4Cardiac output, stroke volume, EDV (only definitions). 4.5 Heart sounds, normal heart sounds, mechanism and features, areas of auscultation. 4.6 Blood pressure: definition, normal value, clinical measurement of blood pressure, hypotension, hypertension 4.7Heart rate: Physiological variations, regulation (brief), radial pulse 4.8Electrocardiogram (ECG): Definition, Normal ECG, Causes of ECG waves, Uses of ECG. 4.9Cardiac shock: Definition, Types (brief), Triple response.	√	√		20%	LE, SE, SA

Unit	Hours	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit V	6hrs	**Respiratory system** 5.1Introduction: Functions of respiratory system, physiological anatomy of respiratory system, respiratory tract 5.2Respiratory organs: lungs, alveoli, respiratory membrane 5.3Mechanism of breathing: Inspiration and Expiration, muscles involved, Mechanism. 5.4Surfactant: Composition, Function, 5.5Transport of oxygen: forms of transport, Oxygen Hemoglobin Curve. 5.6Lung volumes and capacities: Spirogram, Definitions and normal Volumes. 5.7Regulation of respiration: Nervous and chemical regulation, respiratory centre, Herring Breur reflexes. 5.8Hypoxia: Def, Classification, Description (in brief). 5.9 Cyanosis, Asphyxia, Dyspnea, Dysbarism, Artificial Respiration, Apnea.(Definition Only)	√	√		20%	LE, SE, SA

LE- Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books**

1. Guyton (Arthur): Text Book of Physiology. Latest Ed. Prism publishers.
2. Ganong William F: Review of Medical Physiology. Latest Ed. Tata McGraw Hill

PATHOLOGY & MICROBIOLOGY-I

Course: Core

Credits: 4 **No of Hours: 60 Hours**

PART A- PATHOLOGY

- **Course Outcome:**

At the end of the course, the student should be able to:

CO1: Explain the blood cells structure, functions & its formation.

CO2: Enumerate the methods of estimating cell counts.

CO3: Demonstrate blood collection by various methods

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit I	2 hrs	Introduction to Pathology		√		05%	SA
Unit II	12 hrs	Hematology 2.1. Normal constituents of Blood, their structure and functions. 2.2. Collection of Blood samples. 2.3. Various anticoagulants used in hematology. 2.4. Hemoglobin estimation, different methods and normal values. 2.5. RBC count. 2.6. WBC count. 2.7. Platelet count.	√			35%	LE,SE, SA

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit III	10 hrs	Blood Bank 3.1. Introduction to blood banking. 3.2. Blood group system: ABO & Rh system. 3.3. Methods of blood grouping: Forward & Reverse. 3.4. Donor selection criteria. 3.5. Collection and processing of blood for transfusion.	√			30%	LE,SE, SA
Unit IV	6 hrs	Clinical Pathology 4.1. Collection, transport, preservation and processing of various clinical specimens. □ Urine. □ CSF. □ Stool. □ Sputum. □ Body fluids. 4.2. Urine examination-collection and preservation, Physical, chemical and microscopic examination for abnormal constituents.	√			30%	LE,SE, SA

LE- Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books**

1) Makroo RN. Blood Transfusion Reactions. In: Compendium of transfusion medicine.2nd ed. 2009;332-345
2) Dr. Ramdas Nayak, text book of Hematology and Clinical pathology.
3) Godkar PB, Godkar DP. Textbook of medical laboratory technology. Bhalani; 2003

PART B- MICROBIOLOGY

- **Course Outcome:**

At the end of the course, the student should be able to:

CO1: The general criteria for microbial classification, Types of culture medias and methods.

CO2: Identify key concepts of immunology.

CO3: Implement the common sterilization and disinfection methods.

CO4: Outline and practice general biomedical waste management.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit I	**5Hrs**	**Introduction** 1.1 Introduction & history of Microbiology 1.2 Classifications of microorganisms & structure of bacteria 1.3 Microscopy and types of microscope	✓			**10%**	**LE, SE**
Unit II	**3 Hrs**	**Growth & Nutrition** 2.1 Nutrition, growth and multiplication of bacteria, Bacterial Growth Curve 2.2 Culture medias 2.3 Culture methods	✓			**10%**	**LE, SE,SA**

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit III	**4 Hrs**	**Sterilization & Disinfection** 3.1 Classification of Sterilization and Disinfection 3.2 Sterilization: Different methods of sterilization, Principles and use of equipment's of sterilization- Hot Air oven &Autoclave in detail 3.3 Disinfection: Commonly used chemical disinfectants and their uses	✓			**30%**	**LE, SE**
Unit IV	**9 Hrs**	**Immunology** 4.1 Immunity-Classification and types 4.2 Antigen 4.3 Antibody 4.4 Antigen antibody reactions 4.5 Hypersensitivity reactions 4.6 Immunization schedule	✓			**30%**	**LE, SE, SA**
Unit V	**4 Hrs**	**Infection** 5.1 Infection- Definition, types, sources and mode of transmission 5.2 Hospital acquired infections 5.3 Types of infectious diseases- outbreak, endemic, epidemic, pandemic	✓			10%	**SE,SA**

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit VI		**Applied Microbiology** 6.1 Biomedical Waste Management: Principles & Practices 6.2 Standard precautions 6.3 Hand hygiene technique and body fluids spill management 6.4 Needle stick injury management-1	✓			**10%**	**SE,SA**

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books:**

1. Baveja CP. Textbook of microbiology. Arya Publications; 2005.
2. Ananthanarayan R. Ananthanarayan and Paniker's textbook of microbiology. Orient Blackswan; 2006.
3. Owen JA, Punt J, Stanford SA, Jones PP, KubyJ.Kuby immunology. Seventh edition, International edition. Basingstoke: Macmillan Higher Education; 2013

BIOCHEMISTRY

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

  At the end of the course, students will be able to:

  CO1: Have knowledge and understanding of procedures of specimen collection, reagent preparation of specimens, performing biochemical tests, interpreting results, and managing biomedical waste effectively.

  CO2: Understand the basic procedures in specimen collection, reagent preparation, and testing in a clinical laboratory

  CO3: Demonstrate the knowledge of properties of biomolecules and their function.

  CO4: Have knowledge of the importance of nutrition in health and diseases.

- **Course Content:**

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions

Unit I	5hrs	**Introduction to Biochemistry and Clinical Laboratory** **1.1 Specimen collection:** Pre-analytical, variables, collection of blood, Urine, CSF, and other body fluids, anticoagulants and preservatives **1.2 Dilutions:** Dilution of solutions (Preparation of 0.1 N NaCl from 1 N NaCl), Preparation of percent solutions, Preparing working standard from stock standard, Specimen dilutions, Serial dilutions, and Reagent dilution **1.3 Special investigations:** Normal values, methods, and interpretation of biochemical parameters. Preparation of patients for special investigations, and interfering substances **1.4Quality control:** Definition, types, IQAS and EQAS, Calculation of mean, standard deviation and percentage of coefficient variation **1.5Safety measures, Conventional and SI units1.6Bio Medical waste management**	✓ ✓ ✓ ✓	✓		15%	LE,SA,SE

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit II	10hrs	**Carbohydrate and Lipid chemistry** **2.1**Introduction, Definition, Properties of carbohydrates, Classification with suitable examples. **2.1.1**Biomedical importance of carbohydrates. **2.2**Introduction, Definition, Functions, and Classification of Lipids. Definition and Classification of fatty acids, Essential fatty acids with examples.	✓ ✓ ✓			25%	LE,SE,

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit III	5hrs	**Protein chemistry and Plasma Proteins** **3.1**Introduction, Definition, and Classification of amino acids with examples. **3.1.1**Peptides: definition & biologically important peptides with examples **3.1.2**Introduction, Definition, and Classification of Proteins with examples **3.1.3**Functions of amino acids and Proteins **3.2**Introduction, types, functions, and biological reference range of plasma proteins. **3.2.1**Immunoglobulins	✓ ✓ ✓ ✓ ✓ ✓			15%	LE,SE,SA

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit IV	5hrs	**Enzymes** **4.1**Introduction, Definition, classification with suitable examples, Active site of enzyme, Factors influencing enzyme activity, **4.1.1**Definition of Cofactor, Coenzyme, And isoenzymes with examples.	✓ ✓			10%	LE,SE,SA
Unit V	10hrs	**Vitamins and Minerals** **5.1**Introduction, Definition, classification, Fat soluble and water-soluble vitamins: Sources, RDA, Biological functions and deficiency disorders. **5.2**Introduction, Definition and classification of macro and micro minerals with examples **5.2.1**Calcium, Phosphorous, iron, Sodium, Potassium: Sources, RDA, Reference ranges, Functions and Disorders of deficiency and excess	✓ ✓ ✓			20%	LE,SE

Unit	Hrs	Content	Must Know	to Know	Desirable to Know	Weightage	Type Of Questions
Unit VI	10hrs	**Nutrition** **6.1**Calorific values of carbohydrates, proteins, and fats **6.2**Nutritional importance of Carbohydrates, lipids, proteins, and Essential amino acids **6.3**SDA: Definition, values for major macronutrients, Significance of SDA **6.4**Basal metabolic rate (BMR): Definition, Reference range of BMR in men and women, Factors affecting BMR **6.5**Dietary fibers: Definition, functions, importance and their daily requirements Balanced diet **6.6**Essential fatty acids: Definition, functions and deficiency manifestations **6.7**Define the classes of protein-energy malnutrition: marasmus and kwashiorkor.	✓ ✓ ✓ ✓ ✓			15%	LE.SA,SE

LE- Long Essay**, SE**- Short Essay**, SA**- Short Answer

- **Recommended Books**

1) Vasudevan DM, Sreekumari S, Vaidyanathan K. Textbook of Biochemistry for medical students. Jaypee Brothers Medical Publishers; 2019 Sep 30.
2) Satyanarayana U and U Chakrapani. 2013. Biochemistry (version 4th ed). 4th ed. New Delhi: Elsevier Health Sciences APAC.

DIALYSIS THERAPY - I

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

  At the end of the course, students will be able to:

  CO 1 Understand the principles of dialysis.

  CO 2 Comprehend the indications of Hemodialysis & Peritoneal Dialysis.

  CO 3 Understand the functioning and management of Hemodialysis apparatus.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit I	20hrs	**Introduction to dialysis** 1.1. History of Dialysis 1.2. Types of Dialysis 1.3 Principle of Dialysis 1.4 The nature of the solutions 1.5 Semi permeable membrane 1.6 Types of solute transport & factors affecting solute transport	✓ ✓ ✓		✓ ✓	30%	SA. SE, LE,

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit II	15hrs	**Hemodialysis Part 1** 2.1. Introduction to Hemodialsyis 2.2. Types of hemodialysis 2.3.Indications, contraindications, advantages and disadvantages	✓ ✓ ✓			15%	SA, SE, LE
Unit III	15hrs	**Peritoneal Dialysis Part 1** 3.1. Introduction to Peritoneal Dialysis 3.2. Peritoneum 3.3. Peritoneal Dialysis Procedure, Indications, contraindications, advantages and disadvantages	✓ ✓		✓	15%	SE, SA E
Unit IV	10hrs	**Hemodialysis Apparatus** 4.1. Dialyser 4.2. Dialysate	✓ ✓			40%	LE, SE, SA

LE- Long Essay**, SE**- Short Essay**, SA**- Short Answer

- **Recommended Books:**

1. Hand book of dialysis therapy- Allen R. Nissenson& Richard N. Fine- 4th edition- Saunders , Elsevier
2. Oxford handbook of dialysis-2nd edition- Jeremy Levy, Julie Morgan, Edwina Brown
3. Dialysis therapy 3rd edition- Nissenson. Fine Review of Hemodialysis for Nurses and Dialysis Personnel – by Judith Z Kallenbach

ENGLISH AND COMMUNICATION – PART - 1

Course: AEC

Credits: 3 **No of Hours: 45 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: Acquire the LSRW (Listening, Speaking, Reading, and Writing) skills. Through Cambridge Interchange Fifth Edition, students will develop real world communication skills- enhancing fluency in speaking, listening, reading and writing – wile mastering grammar, expanding vocabulary and improving pronunciation with supportive digital tools.

CO2: Learn to appreciate Literature.

CO3: Be aware of social responsibilities.

CO4: Enhance the analytical skill

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit I	10hrs	**UNIT 1: Cambridge: Interchange Fifth Edition** 1.1 Good Memories 1.2 Life in the City 1.3 Making Changes 1.4 Have you ever tried it? 1.5 Hit the Road. 1.6 Sure. I will do it. 1.7 What do you use this for? 1.8 Time to Celebrate	√			23%	SA

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit II	8hrs	**UNIT- II: PHONETICS** 2.1 Brief Introduction 2.2 Classification of Vowels, Diphthongs and Consonants 2.3 Pronouncing the words phonemically and transcribing them into Phonetics 2.4 IPA	√			18%	SA
Unit III	11hrs	**UNIT – III: Grammar and Written Communication** 3.1 Parts of Speech 3.2 Verb Tenses 3.3 Articles 3.4 Capitalization and Punctuation 3.5 E-mail Drafts 3.6 Formal Letters 3.7 Essay Writing	√			24%	SA

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit IV	4hrs	**UNIT – IV: Prose** 4.1 Steev Jobs: Commencement Address 4.2 Mother Teresa's Award Winning Speech	√			9%	LE, SE
Unit V	6hrs	**UNIT – V: Poetry** 5.1 The Road Not Taken: Robert Frost 5.2 The Man with the Wooden Leg: Catherine Mansfield 5.3 Our Casuarina Tree : Toru Dutt	√			13%	LE, SE
Unit VI	6hrs	**UNIT – VI: Short Stories** 6.1 Gift of the Magi: O' Henry 6.2 Kabulivala: Rabindranath Tagore 6.3 The Blue Umbrella : Ruskin Bond		√		13%	LE, SE

LE- Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books:**

1. Cambridge: Interchange Fifth Edition
2. Contemporary English Grammar Structures & Composition by David Green
3. English Grammar and Composition: Wren & Martin
4. English Grammar in Use by Raymond Murphy

Constitution of India

Course: VAC

Credits: 2 **No of Hours: 30 Hours**

- **Course Outcome:**

At the end of this course, students will gain knowledge on

CO1: This course is to keep the students abreast with the knowledge of the Constitution of India.

CO2: To make the students understand the importance of human rights as citizens of India.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit I	5hrs	**Indian Constitution** • Meaning and Importance of Constitution • The Constituent Assembly • The Preamble • Salient Features of Constitution	√			**10%**	SE, SA

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit II	3hrs	**Fundamental Rights and Directive Principles** • Meaning and Differences between Fundamental Rights and Directive Principles • Fundamental Rights • Rights Information Act Meaning ,importance of RTI 2005	√			20%	LE, SE, SA
Unit III	4hrs	**Union Government** • The President of India- Election, Powers and Position • Prime Minister and Council of Ministers • Parliament –Loksabha ,Rajyasabha- Organisations and Powers	√			15%	LE, SE, SA
Unit IV	4hrs	**State Government** • The Governor • Chief Minister and Council of Ministers • State Legislature Vidhanasabha, Vidhanaparishad- Organisations and Powers	√			10%	SE, SA

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit V	2hrs	**Federalism in India** • Meaning Federal and Unitary Features	√			10%	SE, SA
Unit VI	2hrs	**The Judiciary** • The Supreme Court- Organization, Jurisdiction and Role • The High Court- Organization ,Jurisdiction and Role	√			10%	SE, SA
Unit VII	2hrs	**Electoral Process In India** • Election Commission – Organization ,Functions	√			10%	SE, SA
Unit VIII	2hrs	**Local Governments** • Rural and Urban- Organization ,Powers and Functions	√			5%	SE, SA
Unit IX	3hrs	**Human Rights** • Human Rights- Meaning • Universal Declaration of Human Rights • Remedies against Violation of Human Rights in India	√			5%	LE, SE, SA

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit X	3hrs	**Special Constitutional Provisions** • Special Rights created in the constitution for: Dalit's, Backwards, Women and Children and the Religious and Linguistic Minorities. • Constitution and Sustainable Development in India • Minority Commission in India	√			5%	SE, SA

❖ **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

➢ **Recommended Books**

- Basu, D.D, Constitution of India, New Delhi Himalaya Publication; 2001
- Dinesh Shelton, David P Stuart, International Human Rights in Nutshell. Thomas Burgenthel, West Nutshell Publisher; London; 2005.
- ParvathyAppaiah, Constitution of India, Mangalore DivyaDeepa Publication; 2005
- ParvathyAppaiah, Human Rights. DivyaDeepa Publication Mangalore; 2016
- RajRam. M, Constitution of India Himalaya Publication, New Delhi; 1999

SEMESTER II

HUMAN ANATOMY & PHYSIOLOGY II

Course: Core

Credits: 4 **No of Hours: 60 Hours**

PART A- HUMAN ANATOMY

- **Course Outcomes:**

  At the end of the course, students will be able to:

  CO1. To identify and locate each of the body systems to apply anatomical knowledge to perform minor technical procedural skills.

  CO2. To know the normal disposition of the structures in the body while clinically examining a patient and while conducting clinical procedures.

  CO3. To know the anatomical basis of disease and injury

  CO4. To discuss the interrelationship of systems in maintaining homeostasis.

  CO5. To describe the structure of each body system

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit I	5hrs	Urinary system 1.1 Kidney, ureter, urinary bladder, male and female urethra. 1.2 Demonstration of parts of urinary system. Histology of kidney, ureter, urinary bladder.	√			15%	LE, SE, SA

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit II	10hrs	Reproductive system 2.1Parts of male reproductive system, testis, vas deferens, epididymis, prostate 2.2 Parts of female reproductive system, uterus, fallopian tubes, ovary 2.3 Mammary gland: 2.4 Demonstration of section of male and female pelvis with organs in situ. Histology of male and female reproductive organs.	√			30%	LE, SE, SA
Unit III	3hrs	Endocrine glands 3.1Endocrine glands: pituitary gland, thyroid gland, parathyroid gland, suprarenal gland 3.2 Demonstration of the glands. Histology of pituitary, thyroid, parathyroid, suprarenal glands.		√		15%	SE, SA

Unit	Hours	Content	Must Know	to Know	Desirable to Know	Weightage	Type Of Questions
Unit IV	10 hours	Nervous system 4.1 Neuron, classification of nervous system, cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve, meninges, ventricles & cerebrospinal fluid, names of basal nuclei, blood supply of brain, cranial nerves. Sympathetic trunk& names of parasympathetic ganglia					
Unit V	2hrs	Sensory organs 5.1 Skin: histology, appendages of skin. 5.2 Eye: parts of eye & lacrimal apparatus. Extra-ocular muscles & nerve supply. 5.3 Parts of ear: external, middle, and inner ear and contents. 5.4 Histology of thin and thick skin. Demonstration and histology of eyeball. Histology of cornea & retina.		√		15%	SE, SA

LE- Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books**

1. Chaurasia BD. BD Chaurasia's Human Anatomy. CBS Publishers & Distributors PVt Ltd.; 2010.
2. Sampath Madhyastha, Manipal Manual of Anatomy for Allied Health Sciences, New Delhi: CBS publishers and distributors.
3. Waugh A, Grant A. Ross & Wilson Anatomy and physiology in health and illness E-book. Elsevier Health Sciences; 2014 Jun 25.
4. Dilly PN. Essentials of Human Embryology. Postgraduate Medical Journal. 1984 Jun;60(704):447.
5. Inderbir S. Textbook of human histology with color atlas. New Delhi: Jaypee Brothers Medical Publishers. 2006.
6. Priya Ranganath, Leelavathy N, Basics in Human Anatomy for BSc Paramedical Courses, Revised and updated edition, The Health

PART B- PHYSIOLOGY

- **Course Outcomes:**

  At the end of the course, students will be able to

  - CO1: To demonstrate the understanding of physiological structure of Renal system, endocrine system, Nervous system and special senses.
  - CO2: To broadly identify the clinical abnormalities of organs and its clinical physiological implication

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit I	5hrs	**Digestive System** 1.1 Introduction 1.2Physiological anatomy of gastro intestinal tract (All Structures in brief), functions of digestive system 1.3Functions of Saliva 14Deglutition: definition, stages 1.5Stomach: functions 1.6Gastric secretion: composition, function, Phases of secretion 1.7Pancreas: Functions (exocrine), pancreatic juice: composition and regulation. Secretin and CCK-PZ	√			15%	LE, SE, SA

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit I	5hrs	1.8Liver: Functions, Bile secretion, composition, function of bile; 1.9Bilirubin metabolism, types of bilirubin, Vandenberg reaction, Jaundice: types, significance. 1.10Gall bladder: Functions. 1.11Small intestine: functions, digestion and absorption, movements. (brief) 1.12Large intestine: functions, defecation reflex	√			15%	LE, SE, SA
Unit II	5hrs	**Renal system** 2.1 Introduction: Functions of kidneys, composition of urine, nephron, cortical and juxtamedullary nephrons (comparison), 2.2 Juxta Glomerular Apparatus: structure and function. 2.3 Mechanism of urine formation					

Unit	Hours	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit II	5 hrs	2.4 GFR: Definition, Normal Values, factors effecting GFR, Measurement (Creatine, Inulin Clearance). Tubular reabsorption, TMG, Tubular secretion (brief). 2.5Mechanism of urine concentration: Counter-current mechanisms, Role of ADH 2.6 Micturition, innervation of bladder, cystometrogram.	√	√		15%	LE, SE, SA
Unit III	2 hrs	**Skin and Body temperature** 3.1Structure and function of Skin 3.2 Body Temperature: physiological variation. 3.3 Regulatory mechanisms: Mechanisms Activated by Heat/Cold 3.4 Role of hypothalamus, and fever.	√	√		10%	SE
Unit IV	5 hrs	**Endocrine System** 4.1 Introduction: Definition, classification of endocrine glands & their hormones. 4.2 Hypothalamo-pitiutary Axis		√		15%	LE, SE, SA

Unit	Hours	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
Unit IV	5 hrs	4.3 Pituitary hormones: anterior and posterior pituitary hormones, Functions of Growth hormone, 4.4 Thyroid gland: Thyroid Hormones: physiological function, regulation of secretion, disorders: hypo and hyper secretion of hormone. 4.5Adrenal cortex: functions of Cortisol and Aldosterone 4.6 Adrenal medulla: functions of Adrenaline and Noradrenaline. 4.7Pancreas (Endocrine): Hormones of pancreas. 4.8Insulin: functions, regulation of blood glucose level, Diabetes mellitus 4.9 Regulation of Calcium Metabolism: Hormones involved, actions of PTH, Calcitonin, Vit D3		√		15%	LE, SE, SA
Unit V	5 hrs	5.1 Introduction, Function of reproductive system, Changes during puberty. 5.2 Male reproductive system: functions of testes Spermatogenesis: Definition, site, stages, factors influencing, Endocrine functions of testes	√	√		15%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Questions
Unit V	5 hrs	**Reproductive system** 5.3 Androgens: testosterone functions. 5.4 Female reproductive system 5.5Menstrual cycle: Definition, changes, ovulation 5.6 Functions of progesterone and estrogen 5.7 Physiological changes during pregnancy, Lactation(brief), milk ejection reflex	√	√		15%	LE, SE, SA
Unit VI	3 hrs	**Special senses** 6.1 Vision: Functions of different parts(brief) 6.2 Optic Pathway, Dark Adaptation, Colour vision. 6.3Hearing: Function of Middle Ear, Functions of inner ear, mechanism of hearing (brief). 6.4Chemical Senses: Taste: types, receptor, Smell: physiology, receptors.	√	√		15%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Questions
Unit VII	7 hrs	**Nervous system** 7.1 Introduction: Parts of CNS and PNS, Functions of nervous system 7.2Neuron: definition structure 7.3 Nerve Fiber: classification, conduction of impulses continuous and saltatory. 7.4Synapse: Definition, structure, types, properties (brief). Receptors: definition, classification, properties (brief). 7.5Reflex: Definition, Reflex Arc, Examples. 7.6Spinal cord nerve tracts: Diagram and Functions: Lateral Spino Thalamic Tract, Dorsal Column, Pyramidal Tract. 7.7Spinal cord nerve tracts: Diagram and Functions: Lateral Spino Thalamic Tract, Dorsal Column, Pyramidal Tract. 7.8Cerebro Spinal Fluid (CSF): site of formation, circulation (brief), functions. 7.9Autonomic Nervous System: Sympathetic and parasympathetic distribution and functions (brief).	√	√		15%	LE, SE, SA

- **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

➢ **Recommended Books**

1. Guyton (Arthur): Text Book of Physiology. Latest Ed. Prism publishers.
2. Ganong William F: Review of Medical Physiology. Latest Ed. Tata
    a. McGraw Hill
3. Chatterjee CC: Human Physiology Latest Ed. Vol-1, Medical Allied Agency. Choudhary Sujith K: Concise Medical Physiology Latest Ed. New Central Book.

PATHOLOGY & MICROBIOLOGY-II

Course: Core

Credits: 4 **No of Hours: 60 Hours**

PART A- PATHOLOGY

- **Course objectives:**
- CO1: To study fundamental aspects of different groups of microorganisms and their importance.
- CO2: To compute medically important infective organisms and their diagnosis.
- CO3: To enumerate the common infections of bacteria, virus, parasite and fungi.
- CO4: To understand fundamental analytical principles and process used in histopathology

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	e to Know	Weightage	Type of questions
Unit I	12 hrs	Histopathology 1.1 Introduction to histopathology 1.2. Grossing technique 1.3. Tissue processing (Fixation, Dehydration, Clearing & Impregnation) 1.4. Embedding technique 1.5. Section cutting 1.6. H&E staining	√			30%	LE,SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Questions
Unit II	6 hrs	Cytology 2.1. Introduction to cytology. 2.2 FNAC 2.3. PAP stain.	√			25%	SE, SA
Unit III	12 hrs	General Pathology 3.1. Cell injury: Agents causing cell injury, cellular adaptations (hypertrophy, atrophy, hyperplasia, metaplasia) reversible and irreversible injury. 3.2. Inflammation: Cardinal signs of inflammation, acute and chronic inflammation. Laboratory tests in inflammation. 3.3. Hemodynamic □ Edema & shock □ Thromboembolism & Infarction. 3.4. Neoplasia: Definition of neoplasm, differences between benign and malignant tumors, Carcinogenesis. 3.5. Genetic disorders: Introduction to genetic disease and classification of genetic disorder.	√			45%	LE,SE, SA

LE- Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books:**

1. Histopathology techniques and its management –by Dr. Ramdas Nayak
2. Ramnik Sood, Text book of Medical Laboratory Technology 6th Edition, Vol 1 & 2

PART B – MICROBIOLOGY

- **Course Outcomes**
  - CO1: To outline fundamentals aspects of microbiology including origin, evolution of microorganisms, different groups of microorganisms and their importance, microscopy principles and applications, morphology, and structure.
  - CO2: To explain microbiological media, isolation, cultivation and enumeration methods of microorganisms, microbial growth characteristics, maintenance, and preservation of microbial cultures
  - CO3: To develop knowledge on basic immunological concepts.
  - CO4: To develop knowledge on basic immunological concepts.
- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Should to Know	Weightage	Type of questions
Unit I	**11 Hrs**	**Systematic Bacteriology** **1.1** Overview of common bacterial infections & bacterial virulence factors and Antimicrobial sensitivity test **1.2** Morphology, pathogenesis and laboratory diagnosis of medically important bacteria (Staphylococcus aureus & MRSA, Pneumococcus. Enterobacteriaceae-Salmonella (Enteric fever), E. coli, Vibrio cholerae, Mycobacterium tuberculosis **1.3** Biochemical reactions and identification of bacteria.	✓			**30%**	**LE, SE,SA**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weigh tage	Types of Questions
Unit II	8Hrs	**Virology** 2.1 Nutrition, growth and multiplication of bacteria, Bacterial Growth Curve 2.2Morphology, pathogenesis and laboratory diagnosis of (HIV-1, Hepatitis viruses-Hepatitis B &Hepatitis C virus, Rabies-1, Arbo viruses-Dengue virus	✓			**30%**	**LE, SE,SA**
Unit III	4hrs	**Mycology** 3.1 Introduction to Mycology-1 3.2 Morphology, pathogenesis and laboratory diagnosis of (Dermatophytes, Candida, Cryptococcus)	✓			**20%**	**LE, SE,SA**
Unit IV	8hrs	**Virology** 2.1 Nutrition, growth and multiplication of bacteria, Bacterial Growth Curve 2.2Morphology, pathogenesis and laboratory diagnosis of (HIV-1, Hepatitis viruses-Hepatitis B &Hepatitis C virus, Rabies-1, Arbo viruses-Dengue virus	✓			**30%**	**LE, SE,SA**

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. Baveja CP. Textbook of microbiology. Arya Publications; 2005.
2. Ananthanarayan R. Ananthanarayan and Paniker's textbook of microbiology. Orient Blackswan; 2006

DIALYSIS THERAPY - II

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

  At the end of the course, students will be able to:

  CO1 Understand the hemodialysis unit design.

  CO 2 Improve skills in vital signs, BLS and water treatment plant.

  CO 3 Understand the mechanism of functioning and management of hemodialysis machines.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	10hrs	**Introduction to HD unit and Patient approach** 1.1 Hemodialysis Unit Design 1.2. Dialysis Team 1.3.Job Responsibility	✓ ✓ ✓			10%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit II	10 hrs	Blood 2.1 Blood Components 2.2 Blood Typing 2.3 Anemia 2.4 Blood Transfusion 2.5 Blood Coagulation 2.6 Factors necessary for coagulation 2.7 Process of coagulation	✓ ✓	✓	✓	10%	LE, SE
Unit III	5hrs	Vital Signs 3.1. Normal Values 3.2. Methods of Measurement 3.3. Hypotension, hypertension & stages, tachycardia, bradycardia, breathlessness & fever	✓ ✓ ✓				
Unit IV	5 hrs	**Basic Life Support (BLS)**	✓			10%	LE

Unit	Hrs	Content	Must Know	Good to Know	Desirable to know	Weightage	Type of questions
Unit V	5 hrs	**Dialysis machines: mechanism of functioning and management** 5.1. Hemodialysis Machine 5.2. Types 5.3. Hemodialysis machine alarms and switches 5.4. Blood Circuit alarms 5.5. Dialysate circuit alarms 5.6. Causes of alarms 5.7. Machine settings to avoid frequent false alarms 5.8. Peritoneal dialysis machine	✓	✓ ✓ ✓ ✓ ✓ ✓	✓	10%	SE
Unit VI	5 hrs	**Priming of dialysis apparatus**	✓			10%	LE
Unit VII	5 hrs	**Dialysate chemistry and composition**		✓		10%	LE
Unit VIII	5 hrs	**Water treatment plant**	✓			10%	LE

Unit	Hrs	Content	Must Know	Good to Know	Desirable to know	Weight age	Type of questions
Unit IX	5 hrs	**Hemodialysis Part 2** 9.1. Principles of Hemodialysis 9.2. Factors affecting solute clearance on hemodialysis 9.3. Vascular access for hemodialysis	✓	✓ ✓		10%	SE, LE
Unit X	5 hrs	**Peritoneal Dialysis** Part 2 10.1. Principles 10.2. Types and Regimens	✓		✓	10%	SE, LE

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books**

1. Best clinical practice Guidelines for chronic kidney disease in India
2. Hand book of Nephrology-Irfan K. Moinuddin, David J Leehey
3. Replacement of Renal Function by Dialysis – Edited by J.F Maher
4. Renal Nursing – by Nicola Thomas
5. Principles and Practice of Dialysis – by William L Henrich, MD
6. Review of Hemodialysis for Nurses and Dialysis Personnel – by Judith Z Kallenbach

ENGLISH AND COMMUNICATION – PART - II

Course: AEC **Course Code:** AH01RD2AE1

Credits: 3 **No of Hours: 45 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: Acquire the LSRW (Listening, Speaking, Reading, and Writing) skills. Through Cambridge Interchange Fifth Edition, students will develop real world communication skills- enhancing fluency in speaking, listening, reading and writing – wile mastering grammar, expanding vocabulary and improving pronunciation with supportive digital tools.

CO2: Learn to appreciate Literature.

CO3: Be aware of social responsibilities.

CO4: Enhance the analytical skill

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types Of Questions
Unit I	13hrs	**UNIT – I: Cambridge interchanges fifth edition** 1.1 Only Time Will Tell 1.2 I Like Working with People 1.3 It's Really Worth Seeing 1.4 It's a Long Story 1.5 That's Entertainment 1.6 Now I Get it 1.7 I wouldn't have done that 1.8 Making Excuses	√			29%	SA
Unit II	3hrs	**UNIT – II: Phonetics – IPA Transcription**	√			7%	SA
Unit III	13hrs	**UNIT – III: Grammar and Written Communication** 3.1 Reported Speech 3.2 Modals 3.3 Clauses 3.4 Gerunds 3.5 Active and Passive Voice 3.6 Synonyms and Antonyms 3.7 News Report Writing 3.8 Speech Writing 3.9 Dialogue Writing	√			29%	SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types Of Questions
Unit IV	4hrs	**UNIT – IV: PROSE** 4.1 Chicago Address by Swami Vivekananda 4.2 I have a Dream : Martin Luther King	√			9%	LE, SE
Unit V	6hrs	**UNIT – V: Poetry** 5.1 Still I Rise: Maya Angelou 5.2 The Raven: Edgar Allen Poe 5.3 Break, Break, Break : Alfred Lord Tennyson	√			13%	LE, SE
Unit VI	6hrs	**UNIT – VI: Short Stories** 6.1 The Luncheon: William Somerset Maugham 6.2 The Power of Prayer: APJ Abdul Kalam 6.3 The Necklace : Guy De Maupassant		√		13%	LE, SE

LE- Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books:**

5. Cambridge: Interchange Fifth Edition
6. Contemporary English Grammar Structures & Composition by David Green
7. English Grammar and Composition: Wren & Martin
8. English Grammar in Use by Raymond Murphy

KANNADA

Course: AEC

Credits: 2 **No of Hours: 30 Hours**

- **Course Outcome:**

- Enable students to learn alphabet, words and simple sentences in Kannada.
- Enable students to enhance speaking and writing communicative skills in Kannada and learn technical words related to medical science

- **COURSE CONTENT:**

Unit I: Kannada Letters (vowels, Consonant)

Unit II: Words, Phrases, formation of sentences, Letter Writing, Essay Writing. Treatment related Kannada words (from English to Kannada)

Unit III:

1) Possible communication in Kannada between Patients and Doctors.
2) Advising sentences to the possible questions of patients.
3) Some important sentences which enable to communicate with doctors and colleagues.

- **Recommended Books**

- Kannada Vyakarana – (8th ,9th and 10th Karnataka government text books)
- HSK, Vyavarahika Kannada

SEMESTER III

RENAL PATHOLOGY

Course: Core **Course Code: AH01RD3CC1**

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO 1 To be able to define the medical terms, define and classify disease and understand the concepts of the disease.

CO 2 Able to describe the causes and mechanism of kidney diseases that occur during the routine work and also changes seen in different individuals.

CO 3 Able to enumerate the laboratory tests eg: urine, blood, body fluids and its application on renal diseases.

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit I	10 hrs	**Approach to patient with renal failure** 1.1. Patient History 1.2. Physical assessment of the renal system 1.3. Urine analysis 1.4. Blood analysis 1.5. Clearance tests 1.6. Ultrasound Studies 1.7. Radionuclide tests 1.8. Computerized Axial tomography (CAT) 1.9. Angiogram 1.10. Roentgenogram of Kidney, Uterus and Bladder 1.11. Pyelography	✓ ✓	 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	 ✓	20%	SA, LE, SE

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit II	20 hrs	**Kidney Disease** 2.1. Nephrotic Syndrome 2.2. Nephritic Syndrome 2.3. Asymptomatic Urinary Abnormalities 2.4. Tumors of Kidney 2.5. Obstructive Uropathies 2.6. Nephrolithiasis 2.7. Extracorporeal Shock Wave Lithotripsy (ESWL) 2.8. Congenital & Inherited renal Disorders 2.9. Acute Kidney Injury (AKI) 2.10. Chronic Kidney Disease (CKD)	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓		20%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit III	30 hrs	**Manifestations of Renal Failure** 3.1. Systemic consequence of renal failure Alterations in following including signs, symptoms etiology& management.	✓				
		3.2. Uremia		✓			
		3.3. Fluid Balance		✓			
		3.4. Electrolyte and ion balance (sodium, potassium, calcium, phosphate, Magnesium, hydrogen, bicarbonate, aluminum)		✓			
		3.5. Acid – base balance (Metabolic acidosis)		✓			
		3.6. Cardiovascular system (Hyperkalemia, Hypertension, Pericarditis, Pericardial effusion, Pericardial tamponade)		✓			
		3.7. Respiratory System		✓			
		3.8. Gastrointestinal System		✓			
		3.9. Hematological system (Anemia, Platelet dysfunction)		✓			
		3.10. Endocrine function		✓			

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
		3.11. Neuromuscular function & sleep problems		✓			
		3.12. Skeletal system		✓			
		3.13. Psycho-social function		✓			
		3.14. Dermatological manifestation		✓			
		3.15. Renal problem in pregnancy			✓		
		3.16. Renal biopsy	✓				
		3.17. Congenital abnormalities of urinary system	✓				
		3.18. Acid-Base fluid and electrolyte disorder	✓				
		3.19. Disorders of Calcium, phosphorus, potassium metabolism and hemostasis	✓				
		3.20. Metabolic acidosis and Metabolic alkalosis	✓				
		3.21. Respiratory acidosis and alkalosis	✓				
		3.22. UTI	✓				

- **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answers

- **Recommended Books:**

1. Nayak R, Rai S, Gupta A. Essentials in hematology and clinical pathology. New Delhi: Jaypee Brothers Medical Publishers; 2012.

2. Mohan H. Textbook of pathology. 8th ed. New Delhi, India: Jaypee Brothers Medical; 2018.

RENAL MICROBIOLOGY

Course: Core **Course Code: AH01RD3CC2**

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO 1 To understand urinary tract and bloodstream infections

CO 2 To study viral infections of importance

CO 3 To learn infection control measures and to understand methods of sterilization and disinfection

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit I	40 hrs	**Bacteriology** 1.1. Microbiology of UTI 1.2. Opportunistic Infections 1.3. Microbiology of vascular access infection – Femoral, jugular, subclavian catheters. (Bacterial infection). 1.4. Sampling methodologies for culture & sensitivity. 1.5. Vancomycin resistant enterococci & other antimicrobial – resistant bacteria (Drug, resistant micro- organisms).	✓ ✓ ✓ ✓	✓		50%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
		1.6 Infections through contaminated HD equipment's or dialysate or errors in reprocessing. 1.7 Non infections agents in HD pts 1.8 Endotoxin 1.9 Endotoxin A 1.10 Other biological toxins 1.11 Infection control precautions for Dialysis units	✓	✓ ✓ ✓			
Unit II	10 hrs	**Virology** 2.1. Hepatotropic viruses in detail – mode of transfusion universal precautions, vaccinations. 2.2. HIV- Mode of transfusion, universal precautions.	✓ ✓			25%	LE, SE, SA
Unit III	10 hrs	**Sterilization and disinfection** 3.1. Sterilization and disinfection classification, principle, methods 3.2. Central sterile supply department		✓ ✓		25%	LE, SE, SA

LE- Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books:**

1. Anathanarayana&Panikar Medical Microbiology - University Press

2. Text book of Medical Microbiology for MLT students – C P Baveja

3. Hospital Infection Control Manual, YMCH

GENERAL PHARMACOLOGY

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

  At the end of the course, students will be able to:

  CO1. Know the basics of Pharmacology like, sources of drugs, routes of drug Administration and general principles

  CO2. Describe the principles of pharmacokinetics and pharmacodynamics

  CO3. To appreciate various adverse drug reactions

  CO4. To have a basic knowledge of drugs affecting various body systems

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit I	8hrs	**General Pharmacology** 1.1Introduction to Pharmacology 1.2 Routes of drug Administration 1.3Absorption & Distribution Metabolism Excretion 1.4 Pharmacodynamics - Mechanism of drug action-receptors 1.5 Factors modifying drug actions 1.6 Adverse drug reactions	√			15%	LE, SE, SA
Unit II	6hrs	**Autonomic Nervous System drugs** 2.1 Sympathomimetics 2.2 Alpha blockers 2.3 Beta-blockers 2.4 Cholinomimetics 2.5 Anticholinergics 2.6 Skeletal muscle relaxants	√			15%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit III	11hrs	**Central Nervous System** **3.1** Opioid analgesics 3.2 Non-opioid analgesics (Prostaglandins) 3.3 NSAIDs 3.4 Ethyl alcohol 3.5 Sedative hypnotics 3.6 Antiepileptic drugs 3.7 Local anesthetics-1 3.8 Local anesthetics-2 3.9 General anesthetics- I 3.10 G A – II (PAM) 3.11 CNS stimulants	√			20%	LE, SE, SA
Unit IV	9hrs	**Cardio Vascular System Drugs** 4.1 Diuretics 4.2 Vasodilators (CCB's, Drugs acting on RAS) 4.3 Antihypertensives 4.4 Antianginal drugs 4.5 Pharmacotherapy of shocks 4.6 Cardiac glycosides 4.7 Cardioplegic drugs 4.8 Antiarrhythmic drugs 4.9 Primary solutions	√			15%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit V	6hrs	**Blood** 5.1 Anemia, erythropoietin 5.2 Anticoagulants 5.3 Anti platelet drugs 5.4 Fibrinolytics, 5.5 Lipid lowering drugs 5.6 Vit.D and calcium, folic acid, phosphate binders			√	5%	SE, SA
Unit VI	1hrs	**Endocrines** 6.1 Corticosteroids			√	5%	SE, SA
Unit VII	9 hrs	**Chemotherapy** 7.1 General Principles of Chemotherapy 7.2 Sulfonamides 7.3 Penicillin 7.4 Cephalosporins 7.5 Broad spectrum antibiotics 7.6 Macrolides 7.7 Aminoglycosides 7.8 Chemotherapy of UTI 7.9 Drug Therapy of Tuberculosis	√			15%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit VIII	10 hrs	**Miscellaneous topics** 8.1 Antihistamines 8.2 Antiemetics 8.3 Drugs used in bronchial asthma 8.4 Drugs used in bronchial asthma-2 8.5 Cough 8.6 Inhalational gases and emergency drugs 8.7 I V fluids 8.8 Metabolic and electrolyte imbalance 8.9 Immunosuppressants 8.10 Antiseptics and disinfectants		√		10%	SE, SA

LE- Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books:**

1. ShanBhag T V, Shenoy S& Nayak V Pharmacology for Nurses, Elsevier; 3rd edition.2023.
2. Udaykumar P. Textbook of Pharmacology for Dental and Allied Sciences. Jaypee Brothers Publishers; 4th edition. 2017.
3. Clark AJ. General pharmacology. Springer Science & Business Media; 2012 Dec 6.

APPLIED ANATOMY & PHYSIOLOGY

Course: Core **Course Code: AH01RD3CC4**

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO 1 To understand the anatomy and physiology of the renal system.

CO 2 To comprehend the histology of a human kidney.

CO 3 To understand the mechanism of formation of urine.

CO 4 To understand the renal regulation of blood volume and extracellular fluid volume.

CO 5 To comprehend acid base balance.

COURSE CONTENT:

APPLIED ANATOMY

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit I	2 hrs	Anatomy of Kidney 1.1. Structural Anatomy of Urinary System 1.2. The Kidney 1.3. The Ureter 1.4. The Urinary Bladder 1.5 The Urethra 1.6 The Sphincters 1.7 The Prostate	 ✓ ✓ ✓	 ✓ ✓ ✓ ✓ 		10 %	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit II	2 hrs	Gross Anatomy of Kidney 2.1. Location of Kidney 2.2. Size 2.3. Protection 2.4. Blood Supply of Kidney 2.5. Nerve supply of Kidney 2.6. Lymphatic Flow	✓ ✓ ✓	✓ ✓ ✓		10%	LE, SE, SA
Unit III	3 hrs	Microscopic Anatomy of Kidney 3.1. Nephron 3.2. Interstitium 3.3. Juxta Glomerular Apparatus	✓ ✓ ✓			5%	LE, SE
Unit IV	6 hrs	Composition and Functions of Blood 4.1. Red blood cells: Erythropoiesis, stages of differentiation function, count physiological variation.			✓	10%	SE, SA,LE

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type of Questions
		4.2. Hemoglobin: structure, functions, concentration physiological variation methods of Estimation of Hb	✓				
		4.3. White blood cells: Production, function, life span, count, differential count		✓			
		4.4. Platelets: Origin, normal count, morphology functions.		✓			
		4.5. Plasma Proteins – Production, concentration, types, albumin, globulin, Fibrinogen, prothrombin functions		✓			
		4.6. Hemostasis& Blood coagulation: Hemostasis: Definition, normal hemostasis, clotting factors, mechanism of clotting, disorders of clotting factors.		✓			
		4.7. Blood Bank			✓		
		4.8. Blood Groups – ABO and Rh system			✓		
		4.9. Blood Grouping & Typing			✓		

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type of Questions
		4.10. Cross Matching – Rh system – Rh factor, Rh compatibility			✓		
		4.11. Blood transfusion – Indication, universal donor and recipient concept.		✓			
		4.12. Selection criteria of a blood donor. transfusion reactions Anticoagulants Classification, examples and uses	✓				
		4.13. Anemia's: Classification – morphological and etiological. Effects of anemia on body	✓				
		4.14. Erythrocyte sedimentation Rate (ESR) and Packed cell volume	✓				
		4.15. Blood Volume: Normal value, determination of blood volume and regulation of blood volume		✓			
		4.16. Body fluid: pH, normal value, regulation and variation		✓			
		4.17. Lymph: lymphoid tissue formation, circulation, composition and function of lymph		✓			

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit V	4 hrs	**Embryology and development of kidney in brief**	✓			5%	LE, SE, SA
Unit VI	3 hrs	**Anatomy of Peritoneum in general**	✓			2.5%	SE, SA
Unit VII	3 hrs	**Anatomy of Vascular system related to Hemodialysis** 7.1. Upper limb vessels: Course, distribution, branches, origin, and abnormalities. 7.2. Neck vessels: Course, distribution, branches, origin, and abnormalities. 7.3. Femoral vessels: Course, distribution, branches, origin, and abnormalities	✓ ✓ ✓			5%	LE, SE, SA

LE- Long Essay**, SE-** Short Essay**, SA-** Short Answer

APPLIED PHYSIOLOGY

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit VIII	6hrs	**Physiology of Kidney** 8.1. Functions of Kidney 8.2. Mechanism of formation of Urine 8.3. Physiology of bladder function 8.4. Micturition and types of bladder dysfunction 8.5. Clearance studies	✓	✓ ✓ ✓		10%	SE, SA,LE
Unit IX	3 hrs	**Major Functions of nephron and its components** 9.1. Glomerulus 9.2. PCT 9.3. Henle's Loop 9.4. DCT 9.5. Collecting Duct	✓ ✓ ✓ ✓			5%	LE, SE

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit X	4 hrs	Renal Regulatory mechanism a. Water regulatory mechanism b. Electrolyte Regulation (Sodium, Potassium, Chloride, Calcium, phosphate, magnesium) c. Regulation of Acid – base balance	✓ ✓ ✓			10%	LE, SE
Unit XI	3 hrs	**Physiological Values** 11.1. Urea, Creatinine, Electrolytes, Calcium, Phosphorus, uric acid, Magnesium, Glucose. 11.2. 24 hours urinary indices – urea, creatinine, electrolytes Ca, Mg		✓ ✓		5%	SE, SA
Unit XII	6 hrs	**Renal hormones & vit D, erythropoietin, Renin, Prostaglandins**		✓		5%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit XIII	3 hrs	**Hemostasis – basic principles** 13.1. Coagulation cascade 13.2. Coagulation factors 13.3. Regulation of procoagulants & anticoagulants BT, CT, PT, PTT, thrombin time		✓ ✓ ✓		2.5%	SE, SA
Unit XIV	3 hrs	Physiology of Peritoneum 14.1. Factors influencing solute transport 14.2. Peritoneal Permeability 14.3. Solute Characteristics 14.4. Concentration Gradient 14.5. Peritoneal blood flow 14.6. Dialysis solution temperature 14.7. Available membrane area	✓ ✓ ✓ ✓ ✓		✓ ✓	10%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit XV	3 hrs	Routes of solute transport 15.1. Intracellular 15.2. Extracellular		✓ ✓		5%	SE, SA
Unit XVI	3 hrs	**Factors that enhance diffusion** 16.1. Increased Dialysis Solution Flow 16.2. Increased blood flow 16.3. High Concentration Gradient 16.4. Pre-warmed Dialysis Solution 16.5. Osmotic Pressure		✓ ✓ ✓		5%	SA
Unit XVII	3 hrs	Osmosis through the peritoneal membrane 17.1. Ultrafiltration 17.2. Drug Transport	✓			5%	SA

LE- Long Essay**, SE-** Short Essay**, SA-** Short Answers

- **Recommended Books:**

1. Brenner and Rector's The Kidney – by Maarten W. Taal, Glenn M. Chertow, Philip A. Marsden, Karl Skorecki, Alan S. L. Yu, Barry M. Brenner

2. Human Anatomy – B.D. Chowrasia

3. Basics of Medical Physiology- Third edition by D. Venkatesh & H.H.Sudhakar

RENAL DISEASE I

Course: Core **Course Code: AH01RD3CC5**

Credits: 4 **No of Hours: 60 Hours**

Course Outcomes:

At the end of the course, students will be able to:

CO 1 To comprehend the types of kidney disease.

CO 2 To understand the pathogenesis AKI and CKD.

CO 3 To comprehend treatment options for kidney failure.

CO 4 To understand the conservative management in dialysis.

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit I	15 hrs	Acute Kidney Injury 1.1. Definition & Classification 1.2. Causes 1.3. Clinical features of AKI 1.4. Investigations of AKI 1.5. Treatment	✓ ✓ ✓ ✓			15%	LE, SE, SA
Unit II	15 hrs	Chronic Kidney Disease 2.1. Definition & Classification 2.2. Causes	✓ ✓			15%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
		2.3. Clinical features 2.4. Investigations 2.5. Treatment	✓ ✓ ✓				
Unit III	10 hrs	Treatment options for kidney failure 3.1. Treatment choices for AKI 3.2. Treatment choices for CKD			✓ ✓	10%	LE, SE
Unit IV	5 hrs	Indications for Dialysis		✓		15%	SE, SA
Unit V	5 hrs	Normal Kidney function compared to dialysis		✓		10%	SE
Unit VI	5 hrs	Conservative Management	✓			10%	LE, SE
Unit VII	5 hrs	Dialysis 7.1. Hemodialysis 7.2. Peritoneal Dialysis		✓		25%	LE, SE

LE- Long Essay**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. Primer on Kidney Diseases – 5th by Arthur Greenberg
2. Primer on kidney diseases – 6th Edition-Gilbert and weiner
3. Clinical Nephrology 3rd Edition-Woo
4. Renal and electrolyte disorders – 7th Edition-Robert W. Schrie

CLINICAL DIALYSIS I

Course: SEC

Credits: 4 **No of Hours: 120 Hours**

Course Outcomes:

At the end of the course, students will be able to:

CO 1 Knowledge in Dialysis unit procedures and patient assessment.

CO 2 Patient monitoring during dialysis and patientcare record documentation.

CO 3 Comprehend Hemodialysis procedure pre-setup.

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage
Unit I	30 hours	**Introduction to dialysis unit, dialysis unit procedures and patient assessment** 1.1. Infection control 1.2.Dialysis Unit Design 1.3. Aseptic techniques 1.4. Vital Signs 1.5. Patient approach & Assessment 1.6. Assisting dialysis room procedures 1.7. Preparation of dialysate	✓			35%

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage
Unit II	45 hrs	**Patient monitoring during dialysis & patient care record sheet documentation** 2.1. Importance of monitoring 2.2. Identification of sick person 2.3. Hyperkalemia 2.4. Pericarditis 2.5. Metabolic acidosis 2.6. Sepsis patients 2.7. Patients with cardiac problem 2.8. Bleeding 2.9. Cardiac arrest	✓			30%
Unit III	45 hrs	Patient monitoring and HD procedure pre setup 3.1. Patient monitoring during dialysis 3.2. Preparation of extracorporeal blood circuit 3.3. Dialysis preset up 3.4. Handling cardiac monitors, infusion pumps and ABG machine 3.5. Method of documentation	✓			35%

HUMAN RIGHTS AND GENDER EQUITY

Course: VAC **Course Code: AH01RD3VA1**

Credits: 2 **No of Hours: 30 Hours**

- **Course Outcome:**

  At the end of this course, students will gain knowledge on,

  CO1: Basic Knowledge of Human Rights and its function and authorities in society and industry women's status, issues and gender equity.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	5hrs	Human Rights 1.1 Human Rights –Meaning 1.2 Universal declaration of Human Rights	√			20 %	SE, SA
Unit II	5hrs	Human Rights Advocacy 2.1 Global Advocacy of Human Rights; Amnesty International and Other Organizations 2.2 People's Union for Civil Liberty (PUCL) 2.3 Human Rights Commission in India 2.4 Minority Commission in India 2.5 Remedies Against Violation of Human Rights in India	√			25%	SE, SA
Unit III	5hrs	Gender Equity Key Concepts- 3.1 Sex and Gender	√			20%	SA

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type Of Questions
		3.2 Masculinity and Femininity 3.3 Patriarchy, Matriarchy 3.4 Gender roles and Attributes, Gender Division of Labor 3.5 Gender Bias 3.6 Gender Stereotypes 3.7 Need for Gender Sensitization					
Unit IV	5hrs	Women's Status in India Important indicators-Sex Ratio,Education,Health, Nutrition, Maternal and Infant Mortality,Work Participation Rate,And Political Participation.	√			15%	SE, SA
Unit V	5hrs	Contemporary Women's Issues 5.1 Discrimination Against Girl Child 5.2 Violence Against Women 5.3 Problems of health and nutrition 5.4 Women's Education and Gender Bias in Education 5.5 Trafficking in women 5.6 Globalization and Impact on Women	√			15%	SE, SA
Unit VI	5hrs	State Initiatives for Gender Equity 6.1 Constitutional Rights of Women 6.2 Laws Pertaining to Women 6.3 The National and State Commissions for Women		√		05%	SE

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books:**

1. Parvathy Appaiah, Human Rights, Gender Equity and Environmental Studies, Shivam Books publishers, 2012.
2. Parvathy Appaiah, Human Rights, Gender Equity and Environmental Studies, Jai Bharath Prakashan publishers, 2016.
3. Parvathy Appaiah, Human Rights, Gender Equity and Environmental Studies, Jai BharathPrakashan publishers, 2018-19.
4. Nirmal Chiranjivi: Human Rights in India, New Delhi, OUP,2001.

SEMESTER IV

DIALYSIS THERAPY III

Course: Core

Credits: 4 **No of Hours: 60 Hours**

Course Outcomes:

At the end of the course, students will be able to:

CO 1 Understand the importance of priming extracorporeal blood circuit.

CO 2 Comprehend manual and automated dialyser reprocessing.

CO 3 Gain knowledge on different types of peritoneal access devices and PET test.

CO 4 Understanding and implementing infection control practices in dialysis setting.

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit I	20 hrs	Preparation of extracorporeal blood circuit 1.1. Components of extracorporeal blood circuit 1.2. Components of dialysate circuit 1.3. Pre-Dialysis alarms and safety checking 1.4. Parameter setting	✓		✓ ✓ ✓	20%	SA, LA, SE,
Unit II	5 hrs	Ultrafiltration Goal Calculation 2.1. Checking Patient Weight	✓			20%	LE, SE

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
		2.2. Assessment of Edema and dry weight 2.3. Patient assessment for calculating weight gain and setting UF goal 2.4. UF rate calculation-Kuf, TMP and negative pressure	✓				
Unit III	10 hrs	Dialyser reprocessing 3.1. Manual Dialyser Reprocessing 3.2. Automated Dialyser Reprocessing	✓			20%	LE, SE
Unit IV	20 hrs	Peritoneal Dialysis 4.1. Peritoneal Dialysis Access 4.2. Peritoneal Dialysis Fluids 4.3. PET test	✓			20%	LE, SE
Unit V	5 hrs	Infection Control 5.1. Infection in hemodialysis 5.2. Vaccination 5.3. Prevention of infection spreading	✓	✓ ✓		20%	LE, SE, SA

LE- Long Essay**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. Oxford handbook of dialysis-2nd Edition-Jeremy Levy, Julie Morgan, Edwina Brown
2. Hand Book of Hemodialysis – 5th edition – John T. Daugirdas, Peter G. Blake, Todd S. Ing

RENAL DISEASE II

Course: Core **Course Code: AH01RD4CC2**

Credits: 4 **No of Hours: 60 Hours**

Course Outcomes:

At the end of the course, students will be able to:

CO 1 Understand the various manifestations of renal failure, clinical features and management.

CO 2 Gain knowledge in renal stone and pregnancy associated renal disease

CO 3 Understand the renal vascular disorders and hypertension

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit I	10 hrs	Renal Assessment 1.1. Purpose 1.2. Assessment Steps 1.3. Investigations		✓ ✓ ✓		20%	SA,SE
Unit II	20 Hrs	Manifestations of renal failure, its clinical features& management 2.1. Uremic solutes –Types and molecular weight, 2.2. Medical terminology related to clinical features of renal manifestations 2.3. Uremia		✓ ✓	✓	10%	LE, SE, SA

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type of Questions
		2.4. Azotemia 2.5. Oliguria 2.6. Uremic encephalopathy 2.7. Hematuria 2.8. Proteinuria 2.9. Edema 2.10. Pericarditis 2.11. Hyperkalemia 2.12. Metabolic acidosis 2.13. Metabolic alkalosis			✓		
Unit III	10 hrs	Renal Manifestations 3.1. Fluid, Electrolyte and Acid – base disorders 3.2. Bone disease and disorders of calcium and phosphate metabolism 3.3. Cardiovascular disorders	✓ ✓ ✓			30%	LE, SE, SA

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type of Questions
		3.4. Gastro intestinal disorders 3.5. Nutritional abnormalities 3.6. Hematologic disorders 3.7. Renal anemia-definition, signs and symptoms, causes, investigation and treatment Options 3.8. EPO therapy-EPO drugs, dosage, monitoring, iron therapy, reasons for EPO resistance, advantages, disadvantages and adverse effects. 3.9. Skin disorders 3.10. Neuromuscular disorders 3.11. Endocrine-metabolic disturbances	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓				
Unit IV	5 hrs	Renal Stone Disease	✓			15%	LE, SE, SA
Unit V	5 hrs	Pregnancy Associated Renal Disease	✓			10%	LE, SE, SA
Unit VI	10 hrs	Renal vascular disorders and hypertension associated renal diseases	✓			10%	LE, SE, SA

❖ **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. Essentials of nephrology-2nd edition- Editor-R Kasi Visweswaran-BI publications Pvt Ltd
New Delhi.
2. Clinical management of chronic kidney disease- 1st Edition-William M. McClellan.
3. Oxford handbook of dialysis-2nd Edition-Jeremy Levy, Julie Morgan, Edwina Brown.
4. Primer on kidney diseases -5th & edition- editor -Arthur Greenberg- NKF- Saunders, Elsevier.
5. Management of acute kidney problems –Jorres, Ronco, Kellum.

APPLIED PHARMACOLOGY

Course: Core **Course Code: AH01RD4CC3**

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

  At the end of the course, students will be Knowledgeable in the following aspects of pharmacology:

  CO1 Understanding the various pharmacological agents used in dialysis patients, route of administration, side effects, toxicity and its uses.

  Co 2 Understanding pharmacotherapeutic interventions and their interactions with patient recover process.

  CO 3 Comprehend utilization of dialysis fluid composition and various disinfectants used in dialysis procedures.

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Nice to Know	Weightage	Type of Questions
Unit I	5 hrs	**IV fluid therapy with special emphasis in renal disease.**	✓			**5%**	LE, SE
Unit II	5hrs	**Diuretics** 2.1 Classification 2.2 Actions 2.3 Dosage 2.4 Side Effects 2.5. Contraindications	✓			**10 %**	LE, SE, SA
Unit III	5 hrs	Antihypertensive 3.1. Classifications	✓			10%	LE, SE, SA

Unit	Hrs	Content	Must Know	Should to Know	Nice to Know	Weightage	Type of Questions
		3.4. Side Effects 3.5. Contraindications 3.6. Special Reference during dialysis 3.7. Vasopressors	✓				
Unit IV	5 hrs	Drugs & Dialysis 4.1. Dose and Duration of administration of drugs	✓			5%	LE, SE
Unit V	5 hrs	Dialysable Drugs 5.1. Phenobarbitone 5.2. Lithium 5.3. Methanol	✓			5%	SE SE SE
Unit VI	5 hrs	Vitamins 6.1. Vitamin D & Its analogues 6.2. Phosphate Binders 6.3. Iron 6.4. Folic Acid	✓			10%	SE, SA
Unit VII	5 hrs	Erythropoietin in detail			✓	5%	LE, SE, SA
Unit VIII	2 hrs	Heparin including low molecular weight heparin		✓		5%	LE, SE, SA
Unit IX	1 hrs	Protamine Sulphate		✓		5%	SE, SA
Unit X	5 hrs	Disinfectant Agents 10.1. Glutaraldehyde 10.2 Sodium hypochlorite		✓		5%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
		10.2. Sodium hypochlorite 10.3. Hydrogen peroxide role as disinfectants 10.4. Adverse effects of residual particles applicable to glutaraldehyde		✓ ✓ ✓			
Unit XI	1 hr	Hemodialysis Concentrates 11.1. Composition and Dilution (Acetate & Bicarbonate)			✓	5%	LE, SE, SA
Unit XII	1 hr	PD fluid in particular hypertonic solutions composition 12.1. Dextrose 12.2. Icodextrin			✓ ✓	5%	SE, SA
Unit XIII	2 hrs	Potassium exchange resins with special emphasis on mode of administration	✓			5%	LE, SE, SA
Unit XIV	10 hrs	Ionotropic Drugs 14.1. Dopamine 14.2. Dobutamine 14.3. Adrenaline	✓ ✓ ✓			10%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weight age	Type of Questions
		14.4. Isoprenaline 14.5. Noradrenaline	✓ ✓				
Unit XV	3 hrs	Vasodilator 15.1. Nitroglycerine 15.2. Nitroprusside			✓ ✓	10%	SE, SA

LE- Long Essay**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. K.D. Tripathi, Essentials of Medical Pharmacology, 6th edition, Jaypee brothers medical publishers (P) Ltd

RENAL NUTRITION

Course: Core **Course Code: AH01RD4CC4**

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

  At the end of the course, students will be Knowledgeable in the following aspects of pharmacology:

  CO 1 Understanding the concepts of nutrition and diet requirements in renal disorder and ESRD patients.

  CO 2 Gain knowledge in renal nutrition and psychological issues of ESRD.

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit I	15 hrs	**Introduction to nutrition** 1.1. Definition 1.2. Food pattern and its relation to health 1.3. Factors influencing food habits 1.4. Superstitions, culture, religion, income, composition of family, age, occupation, special groups etc 1.5. Food selection, storage and preservation 1.6. Prevention of food adulteration 1.7. Food selection, storage and preservation 1.8. Prevention of food adulteration		✓		**10%**	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
		1.9. Food selection, storage and preservation 1.10. Prevention of food adulteration		✓			SE, SA SE, SA
Unit II	15 hrs	Classification of Nutrition 2.1. Micronutrients and Macronutrients 2.2. Sources, requirements and deficiency of carbohydrates 2.3. Types, sources, requirements and deficiency of fats 2.4. Types, sources, requirements and deficiency of proteins 2.5. Sources, requirements and storage of drinking water 2.6. Types, sources, requirements and deficiency of minerals 2.7. Types, sources, requirements and deficiency of vitamins	✓			10%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit III	15 hrs	Planning of Diets 3.1. Need for planning of diets 3.2. Concepts of balanced diet 3.3. Food groups and balanced diet 3.4. Influence of age, sex, occupation and physiological state 3.5. Recommended dietary intake for dialysis patients 3.6. Steps in planning balanced diet 3.7. Concepts of balanced diet for dialysis patients 3.8. Planning diet for dialysis patients 3.9. Steps in planning balanced diet for dialysis patients	√ √ √ √	✓ ✓ ✓ ✓		40%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit IV	15 hrs	Renal nutrition and psychological issues of ESRD 4.1. Components of nutrition 4.2. Malnutrition 4.3. Diet in Chronic Kidney Disease 4.4. Diet in Acute Kidney Injury	✓ √ √	✓		40%	LE, SE, SA

LE- Long Essay**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1.B. Sreelakshmi, food science, 5th ed. 2012, new age international Limited, publishers. New
Delhi.
2. Dr. M Sawaminathan, hand book on food and nutrition, 1st edition, 2004, Ganesh publishers.

CLINICAL DIALYSIS II

Course: SEC

Credits: 4 **No of Hours: 120 Hours**

- **Course Outcomes:**

  At the end of the course, students will be able to:

  CO 1 Comprehend extracorporeal blood circuit priming procedures.

  CO 2 Understanding Dialysis Catheters.

  CO 3 Knowledge on disinfectants used in dialysis unit and its adverse effects.

- **COURSE CONTENT:**

Unit	Hrs.	Content	Must Know	Good to Know	Desirable to Know	Weightage
Unit I	30 hrs.	Extracorporeal blood circuit priming & recirculation 1.1. Purpose 1.2. Assembling 1.3. Steps of Priming	✓			25%
Unit II	30 hrs.	Dialysis Catheters 2.1. Types & Design 2.2. Catheter care 2.3. Starting dialysis with catheters	✓			25%
Unit III	30 hrs.	Disinfection 3.1. Introduction 3.2. Types of disinfectants used in dialysis & adverse effects	✓			25%
Unit IV	30 hrs.	Blood circuit priming and handling dialysis catheters 4.1. Blood Circuit priming 4.2. Dialysis Catheters handling dressing and removal	✓			25%

ENVIRONMENTAL STUDIES

Course: VAC **Course Code: AH01RD4VA1**

Credits: 2 **No of Hours: 30 Hours**

At the end of the course, students will be able to:

CO1: Student will be able to learn about environment, factors affecting it, environmental ethics and its protection.

CO2: Student will be able to describe a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, ethical, political, health and safety, manufacturability and sustainability

CO3: Student will be able to critically analyze technical subject matter (Written/ oral) for scientific merit apply learnt environmental knowledge and understanding to solve technical or research problems in new contexts

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Question type
Unit I	2 hrs	**Multidisciplinary nature of Environmental Studies** • Multidisciplinary nature of Environmental Studies Environment definition, Components of environment, Scope of environmental studies. Four spheres of earth (Hydrosphere, Atmosphere, Lithosphere and Biosphere) • Concept of sustainability and sustainable development (Brundtland Commission), pillars of sustainability; Sustainable Development Goals (SDGs). • International Agreements: Montreal protocol, Kyoto protocol, Convention on Biological Diversity (CBD)	✓			**5%**	**SE, SA**
Unit V	8 hrs	**Environmental Pollution** Definition • Cause, effects and control measures/management of: - a. Air pollution b. Water pollution c. Soil pollution d. Light pollution e. Noise pollution	✓			15%	**SE, SA**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Question type
Unit II	6 hrs	**Ecosystems** What is an ecosystem? Ecological units. Structure of an ecosystem; biotic and abiotic components, and function of an ecosystem; energy flow in the ecosystem; biogeochemical cycle, biological interactions, food chains, food webs, ecological pyramids and ecological succession. Types of ecosystems: a. Terrestrial Forest ecosystem – tropical evergreen, tropical deciduous, temperate evergreen, temperate deciduous and Taiga/Boreal Grassland ecosystem – Savannas and Temperate grasslands (Steppes, Pampas, Prairies, Veldt and Downs. Desert ecosystem – hot and dry, semi-arid, coastal and cold. Plant and animal adaptations. b. Aquatic ecosystems – Marine, Freshwater (lentic and lotic) and Estuarine; Pond as an ecosystem. Ecosystem services	✓			10%	**SE, SA**

Unit	Hrs.	Content	Must Know	to Know	ble to Know	Weightage	Question type
Unit III	7 hrs.	**Natural Resources** Classification of natural resources - Renewable and Non-renewable resources Forest resources: Uses (timber, medicinal, food, economic importance, prevent soil erosion, control floods, religious and cultural practices) and overexploitation (Deforestation, timber extraction, mining, construction of dams). Water resources: Uses (domestic, agricultural, industrial, electricity and transport) and over utilization of surface and ground water Land resources: Land as a resource; Land degradation, earthquake, landslides, soil erosion and desertification. Energy resources: Renewable and non-renewable energy sources, growing energy needs, use of alternate energy sources, case studies (Kochi – first solar powered airport, Tamilnadu – windmills, Gujarat – tidal energy) Conservation of forest, water, land and energy resources.	✓			15%	**SE, SA**

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Question type
Unit IV	7 hrs.	**Biodiversity and its conservation** • Introduction; Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Global biodiversity hotspots • India as a mega-biodiversity nation; Endangered and endemic species of India • Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; • Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. • Ecosystem and biodiversity services: ecological, economic, social, ethical, aesthetic and informational value. • Human wildlife conflicts in Indian – People and wildlife	✓			15%	**SE, SA**

Unit	Hrs.	Content	Must Know	to Know	ble to Know	Weightage	Question type
Unit V	8 hrs	**Environmental Pollution** Definition • Cause, effects and control measures/management of: - a. Air pollution b. Water pollution c. Soil pollution d. Light pollution e. Noise pollution f. Thermal pollution g. Radiation pollution Pollution case studies Climate change, Greenhouse effect, Global warming, Acid rain, Ozone layer depletion. Solid waste management: control measures of urban and industrial wastes. Carbon footprint – How to calculate carbon footprint and ways to reduce your carbon footprint. Human Population growth – impacts on environment Environmental movements: Chipko movement, Bishnois of Rajasthan, Silent Valley, Narmada bachaoandolan	✓			15%	**SE, SA**

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

Suggested Readings:

1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36-37.
7. McCully, P. 1996. Rivers no more: the environmental effects of dams (pp. 29-64). Zed Books.
8. McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
9. Odum, E.P., Odum, H.T. & Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders.
10. Pepper, I.L., Gerba, C.P. &Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
11. Rao, M.N. & Datta, A.K. 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd.
12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.
13. Rosencranz, A., Divan, S., & Noble, M. L. 2001. Environmental law and policy in India. Tripathi 1992.
14. Sengupta, R. 2003. Ecology and economics: An approach to sustainable development. OUP.

15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.
17. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.
18. Warren, C. E. 1971. Biology and Water Pollution Control. WB Saunders.
19. Wilson, E. O. 2006. The Creation: An appeal to save life on earth. New York: Norton.
20. World Commission on Environment and Development. 1987. Our Common Future. Oxford University Press

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SEMESTER V

APPLIED DIALYSIS TECHNOLOGY I

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

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

CO 1 Understanding the concepts of adequacy of dialysis, anticoagulation requirements and abnormalities seen in dialysis patients.

CO 2 Comprehend special problems pertaining to genitourinary tract and male reproductive organs in CKD patients.

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit I	05 hrs	Adequacy of Dialsyis 1.1. Hemodialysis 1.2. Peritoneal dialysis	✓ ✓			**10 %**	LE, SE, SA
Unit II	5 hrs	Erythropoietin in Detail		✓		**10 %**	LE, SE, SA
Unit III	5 hrs	Anticoagulation during dialysis	✓			20 %	LE, SE, SA
Unit IV	45 hrs	Applied Aspect 4.1. Endocrine disturbances in dialysis patients 4.2. Diabetes in dialysis patients 4.3. Bone disease 4.4. Aluminum toxicity	 ✓	 ✓	✓ ✓	60%	SE, SA

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type of Questions
		4.5. Sleep disorders		✓			
		4.6. Psychological aspect of dialysis patients		✓			
		4.7. Musculoskeletal and rheumatologic disease	✓				
		4.8. Special problems pertaining to genitor urinary tract and male reproductive organs in chronic renal failure patients	✓				
		4.9.Metabolic abnormalities	✓	✓			
		4.10. Gastrointestinal diseases in dialysis patients	✓	✓			
		4.11. Dialysis Amyloidosis	✓				
		4.12. Ascites in dialysis patients	✓				

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. Oxford handbook of dialysis-2nd Edition-Jeremy Levy, Julie Morgan, Edwina Brown

2. Hand Book of Hemodialysis – 5th Edition – John T. Daugirdas, Peter G. Blake, Todd S. Ing

APPLIED DIALSYIS TECHNOLOGY II

Course: Core

Credits: 4 **No of Hours: 60 Hours**

Course Outcomes:

At the end of the course, students will be able to:

CO 1 Understanding the concepts of Metabolic Acidosis, Metabolic Alkalosis and renal failure In liver disease.

CO 2 Understanding renal diseases associated with HIV.

CO 3 Knowledge in principles of ICU care.

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit I	10 hrs	Metabolic Abnormalities 1.1. Metabolic acidosis 1.2. Metabolic Alkalosis		√ √		20%	LE, SE LE, SE
Unit II	45 hrs	Applied Aspects 2.1. Renal Function in liver diseases	√			60%	SE

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
		2.2. Renal involvement in systemic vasculitis	√				LE, SE, SA
		2.3. Renal manifestation in SLE and rheumatic disorder	√				
		2.4. Diabetic nephropathy	√				
		2.5. HUS/TTP	√				
		2.6. Renal disease associated with HIV			√		
		2.7. Care for HIV infected dialysis patients	√		√		
		2.8. Hyperoxaluria					
		2.9. VUR and reflux nephropathy	√				
		2.10. UTI		√			
		2.11.Extracorporeal Shockwave Lithotripsy (ESWL)		√			

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type of Questions
		2.12. Hereditary renal disorder 2.13. Neurologic aspects of uremia	√	√			
Unit III	5 hrs	Principles of ICU care	√			20%	LE, SE

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answers

Recommended Books:

1. Oxford handbook of dialysis-2nd Edition-Jeremy Levy, Julie Morgan, Edwina

2. Brown Hand Book of Hemodialysis – 5th edition – John T. Daugirdas, Peter G. Blake, Todd S. Ing

HEMODIALYSIS GUIDELINES

Course: Core **Course Code: AH01RD5CC3**

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

  At the end of the course, students will be Knowledgeable in the following aspects of hemodialysis guidelines:

  CO 1 Understanding the concepts of Bioethics related to dialysis.

  CO 2 Comprehend guidelines for hemodialysis unit.

COURSE CONTENT

Unit	Hrs	Content	Know	to Know	le to Know	Weig htage	Type of Questions
Unit I	30 hrs	**Bioethics related to dialysis** 1.1 Dialysis therapist professionalism 1.2 Professional boundaries 1.3. Ethical and social issues in dialysis 1.4. Ethical and Social issues in renal transplantation	√ √ √			**25%**	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit II	30 hrs	Guidelines for haemodialysis unit 2.1. Setting up of HD unit 2.2. Staff, Infrastructure and instruments 2.3. Machine and dialyser 2.4. Dialysis fluid 2.5. Water treatment 2.6. Vascular access 2.7. Priming. connecting and disconnecting 2.8. Anticoagulation 2.9. Dialyser reuse 2.10. Dialysis dose 2.11. Dialysis infection prevention	 √ √ √ √ √ √ 	 √ √ √ √ √		75%	LE, SE, SA

LE- Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books:**

1. Indian Journal of Nephrology-Indian Society of Nephrology Guidelines for Hemodialysis.

RENAL DIALYSIS TECHNOLOGY RELATED WITH LABORATORY, CARDIOLOGY & IMAGING TECHNOLOGY

Course: Core **Course Code: AH01RD5CC4**

Credits: 4 **No of Hours: 60 Hours**

Course Outcomes:

At the end of the course, students will be able to:

CO 1 Understanding the concepts of Laboratory technology related to dialysis technology.

CO 2 Understanding the concepts of Cardiology related to dialysis technology.

CO 3 Understanding the concepts of Imaging related to dialysis technology.

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit I	20 hrs	**Laboratory Technology** 1.1 Lab tests related to Nephrology 1.2 Haematological tests 1.3.Biochemistry tests (GFR, RFT, LFT, Urinalysis etc.) 1.4.Blood grouping and cross matching 1.5.Basics of immunology & tests 1.6 Microbiology (Viral infections (HBsAg, HCV, HIV, CMV, BKV) 1.7 Biopsy test 1.8 Centrifugal plasmapheresis	√ √	√ √ √ √	√	**30%**	LE, SE, SA

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type of Questions
Unit II	25 hrs	**Cardiology** 2.1. Vital signs 2.2. Vital signs measurement 2.3. Signs and symptoms of heart failure 2.4. Heart problems associated with renal failure 2.5. Hypertension – definition, stages, symptoms etiology, management 2.6. LVH, cardiomegaly 2.7. Tachycardia, bradycardia 2.8. Pericarditis, pericardial effusion, pericardial tamponade,	√ √ √ √		√ √ √	50%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
		2.9. Measurement and importance of 24 hours BP monitoring 2.10. Basic electrocardiography (ECG) 2.11. The normal electrocardiogram 2.12. ECG changes during hyperkalemia, cardiac arrest	√	√ √ √			SE, SA
Unit III	15 hrs	Imaging Technology 3.1. X ray Ultrasound, Doppler, CT scan, MRI 3.2. Contrast Media	√ √			20%	SE, SA

- **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

Recommended Books:

1. Leo Schamroth - Electrocardiography
2. Mervin Goldmann - Electrocardiography
3. Marriott's Practical Electrocardiography
4. Textbook of Microbiology - by R. Ananthanarayan (Author), Arti Kapil (Editor)
5. Textbook of Medical Biochemistry - by MN Chatterjea, Rana Shinde
6. Robbins Basic Pathology - by Vinay Kumar, Abul K. Abbas, Jon C. Aster
7. Christensen's physics of diagnostic radiology by Thomas S. Curry, James E, Dowdey Murry

CLINICAL DIALYSIS III

Course: SEC

Credits: 4 **No of Hours: 120 Hours**

Course Outcomes:

At the end of the course, students will be able to:

CO 1 Understand the universal protocol of haemodialysis procedure.

CO 2 Knowledge on maintenance and management of water treatment plant.

CO 3 Comprehend Dialysis reprocessing.

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage
Unit I	40hrs	Hemodialysis procedure 1.1.Following HD prescription 1.2.Initiation 1.3. Setting parameters and termination	√ √ √			30%

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage
Unit II	40 hrs	Water Treatment 2.1. Types of filters 2.2. Maintenance and disinfection 2.3. Monitoring and testing water quality 2.4. Quality maintenance and documentation	√			**50 %**
Unit III	40 hrs	Dialyser Reprocessing 3.1. Types and Purpose 3.2. Steps of reprocessing and documentation	√			20 %

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

BIOSTATISTICS

Course: AEC **Course Code: AH01RD5AE1**

Credits: 2 **No of Hours: 30 Hours**

- **Course Outcomes:**

  At the end of the course, students will be able to:

CO 1: Understand the concepts of Statistics in the field of Health Professionals.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Question
Unit I	3 hours	**Introduction** 1.1 Meaning, definition of statistics. 1.2 Importance of the study of statistics. 1.3 Branches of statistics. 1.4 Statistics and health science including nursing. 1.5 Parameters and estimates. 1.6 Descriptive and inferential statistics. 1.7 Variables and their types. 1.8 Measurement scales		√		15%	SA, SE

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Question
Unit II	3 hours	**Tabulation of Data** 2.1 Raw data, the array, frequency distribution 2.2 Basic principles of graphical representation 2.3 Types of diagrams - histograms, frequency polygons, smooth frequency polygon, cumulative frequency curve, ogive. 2.4 Normal probability curve.	√			15%	SA, SE
Unit III	4 hours	**Measure of Central Tendency** 3.1 Need for measures of central tendency 3.2 Definition and calculation of mean - ungrouped and grouped 3.3 Meaning, interpretation and calculation of median ungrouped and grouped 3.4 Meaning and calculation of mode. 3.5 Comparison of the mean, and mode.	√			15%	LA, SE

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Question
Unit IV	6 hours	**Measure of Variability** 4.1 Need for measure of dispersion. The range, the average deviation. 4.2 The variance and standard deviation. 4.3 Calculation of variance and standard deviation ungrouped and grouped. 4.4 Properties and uses of variance	√			15%	LA, SE
Unit V	6 hours	**Probability and Standard Distributions** 5.1 Meaning of probability of standard distribution. 5.2 The Binominal distribution. 5.3 The normal distribution. 5.4 Divergence from normality - skewness, kurtosis.	√			15%	SA, SE

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Question
Unit VI	5 hours	**Sampling Techniques** 6.1 Need for sampling - Criteria for good samples. 6.2 Various sampling designs. 6.3 Procedures of sampling and sampling designs errors. 6.4 Sampling variation. 6.5 Tests of significance.	√			15%	SA, SE
Unit VII	3 hours	**Health Indicator** 7.1 Importance of health Indicator. 7.2 Indicators of population, morbidity, mortality, health services. 7.3 Calculation of rates and rations of health.		√		10%	

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

➢ **Recommended Books:**

1. K S Negi, Biostatistics, Third Edition, AITBS Publishers, India, 2020.

2. K VisveswaraRao, Biostatistics a Manual of Statistical Methods for Use in Health Nutrition and Anthropology. 2 nd Edition, JAYPEE, 2009.

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SEMESTER VI

ADVANCED DIALYSIS TECHNOLOGY I

Course: Core

Credits: 4 **No of Hours: 60 Hours**

Course Outcomes:

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

CO 1 Understand Haemodialysis Prescription

CO 2 Comprehend Peritoneal Dialysis

CO 3 Understand recent advances in dialysis

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of questions
Unit I	5 hrs	**Hemodialysis Prescription**	√			**10 %**	LE, SE, SA
Unit II	15 hrs	**Peritoneal Dialysis Part 4** 2.1. History of peritoneal dialysis 2.2. Physiology of peritoneal dialysis 2.3. Indication and contraindication of peritoneal dialysis 2.4. Peritoneal dialysis apparatus 2.5. Peritoneal dialysis therapies 2.6. Peritoneal dialysis access	√ √	√	√ √ √	**50%**	SA LE, SE,

Unit	Hrs	Content	Must Know	to Know	ble to Know	Weightage	Type of questions
		2.7. Catheter and exit-site care 2.8. Peritoneal dialysis process 2.9. Assessment of peritoneal membrane permeability 2.10. Complications and management 2.11. Advantages and disadvantages, HD & PD comparison	√ √ √ √	√			
Unit III	5 hrs	Biochemical Investigations required for renal dialysis		√		5%	LE, SE, SA
Unit IV	10 hrs	Complications 4.1. Acute and chronic complications of hemodialysis 4.2. Acute and chronic complications of peritoneal dialysis 4.3. Complications associated with vascular access 4.4. Infection in dialysis patients	√ √ √	√		10%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of questions
Unit V	10 hrs	Machine 5.1. Dialysis Machine maintenance 5.2. Clean and disinfect dialysis machine 5.3. Machine disinfection procedure 5.4. Readiness of other emergency equipment's 5.5. Verify Calibration of medical equipment's in dialysis unit 5.6. Recognize errors in dialysate and blood flow rate	 √ √ √	√ √ √		10%	SE, SA
Unit VI	5 hrs	Withdrawal of dialysis criteria 6.1. Acute dialysis 6.2. Chronic dialysis	 √ √			5%	LE, SE, SA
Unit VII	10 hrs	Recent advances in hemodialysis 7.1. Nocturnal dialysis 7.2. Online dialysis 7.3. Daily dialysis	 √ √ √			5%	SE, SA
Unit VIII	5hrs	Telemedicine in dialysis practice	√			5%	LE, SE, SA

LE- Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books:**

1. Oxford handbook of dialysis-2nd Edition-Jeremy Levy, Julie Morgan, Edwina Brown

2. Hand Book of Hemodialysis – 5th Edition – John T. Daugirdas, Peter G. Blake, Todd S. Ing

ADVANCED DIALYSIS TECHNOLOGY II

Course: Core

Credits: 4 **No of Hours: 60 Hours**

Course Outcomes:

At the end of the course, students will be able to:

CO 1 Understanding special dialysis procedures like CRRT, SLED, MARS etc.

CO 2 Comprehend dialysis in special situations

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit I	30 hrs	Special dialysis procedures 1.1 High flux high efficiency dialysis 1.2. Hemofiltration 1.3. Hemodiafiltration 1.4. Continuous therapies in haemodialysis 1.5. SLED	√ √ √ √	√		50%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	e to Know	Weightage	Type of Questions
		1.6. MARS 1.7. Hemoperfusion 1.8. Plasmapheresis	√ √ √				
Unit II	30 hrs	Dialysis in Special situations 2.1. Cardiovascular diseases in CKD patients 2.2. Neurological aspects of uremia 2.3. Advanced liver diseases 2.4. Dialysis in patients positive for HIV, HBsAg & HCV 2.5. Pregnancy in dialysis patients 2.6. Paediatric dialysis	√	√ √ √		50%	LE, SE, SA

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. Oxford handbook of dialysis-2nd Edition-Jeremy Levy, Julie Morgan, Edwina Brown

2. Hand Book of Hemodialysis – 5th edition – John T. Daugirdas, Peter G. Blake, Todd S. Ing

RENAL TRANSPLANTATION

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

  At the end of the course, students will be able to:

CO 1 Understanding the concept of Organ transplant

CO 2 Knowledge on Transplant immunology

CO 3 Understanding the principles, indications and types of Renal transplant

COURSE CONTENT

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
Unit I	15hrs	Organ Transplant 1.1. Introduction 1.2. Definition 1.3. Types		√ √ √		15%	SE, SA
Unit II	15 hrs	Transplant immunology 2.1. Innate & Acquired immunology			√	15%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
		2.2. HLA & its significance 2.3. Transplant grouping and cross match	√ √				
Unit III	30 hrs	Renal Transplant 3.1. Introduction 3.2. Definition 3.3. Principles 3.4. Indications and contraindications to kidney transplantation 3.5. Types & Classification 3.6. Advantages and disadvantages of living donor kidney transplantation procedure 3.7. Pre transplant work up	√ √ √ √ √ √ √			60%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of Questions
		3.8. Evaluation of donors and recipients 3.9. Initial tests for potential live kidney donor 3.10. Routine tests for potential kidney transplant recipients 3.11. Relative and absolute contraindications to live & cadaver kidney donation 3.12. Post-transplant care, complications and management 3.13. Immunosuppressive therapy in kidney transplantation 3.14. Induction therapy 3.15. Maintenance therapy	√ √ √ √ √ √ √ √				

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books:**

1. Kidney Transplantation - Principles and Practice – by Peter Morris, Stuart J. Knechtle
2. Hand book of Kidney Transplantation – by Gabriel M Danovitch, MD
3. Comprehensive Clinical Nephrology – Richard J. Johnson, John Feehally, Jurgen
4. Primer on Kidney Diseases – by Arthur Greenberg
5. Atlas of organ transplantation-springer

CLINICAL DIALYSIS IV

Course: SEC **Course Code: AH01RD6SE1**

Credits: 4 **No of Hours: 120 Hours**

Course Outcomes:

CO 1 Comprehend the care for Vascular access, needling and independent handling of dialysis procedure.

CO 2 Understanding Extracorporeal blood therapies and ICU dialysis.

CO 3 Knowledge on AVF and AVG needling techniques.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage
Unit I	30 hrs	Dialyser reprocessing, maintenance of water treatment plant and conducting Hemodialysis 1.1. Dialyser reprocessing 1.2.Water treatment plant 1.3. Starting dialysis with catheters 1.4. Dialysis prescription 1.5. Dialysis Initiation	✓			35%

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage
		1.6. Parameter settings 1.7. Dialysis termination	✓			
Unit II	30 hrs	Vascular access care, needling and independent handling of dialysis procedure 2.1. Vascular access assessment and care 2.2. AVF/AVG cannulation & techniques 2.3. Fistula needle removal 2.4. Dialysis unit maintenance record documentation 2.5. Independent handling of dialysis procedure	✓ ✓ ✓ ✓ ✓			35%

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage
Unit III	30 hrs	Extracorporeal blood therapies and ICU dialysis 3.1. Exposure to special extracorporeal blood therapies 3.2. Individual handling of ICU dialysis cases, saline dialysis and SLED 3.3. Counselling 3.4. Haemodialysis procedure demonstration	✓ ✓ ✓ ✓			10
Unit IV	20 hrs	AVF and AVG needling technique	✓			10
Unit V	10 hrs	PD Procedure and special procedures	✓			10

- **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

MEDICAL ETHICS

Course: VAC

Credits: 2 **No of Hours: 30 Hours**

- **Course Outcomes:**

At the end of the course, students will be able to:

CO1: Increasing the awareness and knowledge of students of the value dimensions of interactions with the patients, colleagues, relations and public.

CO2: Fostering the development of skills of analysis, decision making and judgment.

CO3: Making the students aware of the need to respect the rights of the patient.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type Of Questions
Unit I	3hr	**Introduction to ethics** What is ethics, what are values and norms, freedom and personal responsibility?	✓			15%	SA, SE
Unit II	4hrs	**Definition of medical ethics** Major principles of medic ethics.	✓			20%	LE, SA
Unit III	4hrs	**Perspective of medical ethics** The Hippocratic oath, The Declaration of Helsinki, The WHO Declaration of Geneva, International code of Medical Ethics (1993), Medical Council of India Code of Ethics (2002).	✓			15%	LE, SA, SE

Unit	Hrs	Content	Know	to Know	ble to Know	Weightage	Type Of Questions
Unit IV	4hrs	**Ethics of the individual** Truth and confidentiality, the concept of disease, health and healing, the Right to health.	✓			15%	SE
Unit V	3hrs	**The ethics of human life** Prenatal sex determination.	✓			15%	SA, SE
Unit VI	4hrs	**The family and society in medical ethics** Euthanasia, cancer and terminal care.		✓		10%	LE, SA
Unit VII	4hrs	**Death and dying** Use of life-support systems, the right to die with dignity, suicide–the Ethical outlook.		✓		05%	LE, SA, SE
Unit VIII	4hrs	**Professional Ethics** Contract and confidentiality, malpractice and negligence.		✓		05%	SA, SE

LE- Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books:**

1. Tsai DF. The WMA medical ethics manual. Journal of Medical Ethics. 2006 Mar 1;32(3):163
2. Loewy EE, Loewy RS. Textbook of healthcare ethics. Springer Science & Business Media; 2004 Jun 29

INTERNSHIP (SEMESTER VII &VIII)

ELIGIBILTY:

A candidate should have passed in all the courses (Core, AECC and Electives) amounting to 120 number of credits before entering in to internship.

DURATION:

A candidate has to mandatorily complete 1 year (2 semesters) of internship. The total credit per semester is 18 and for two semesters it is 36.

OBJECTIVES

1. Demonstrates ability to provide safe and effective care to the individual.
2. Demonstrate ability to formulate and implement a plan for examination.
3. Demonstrate ability to manage acute emergent complications on dialysis.
4. Understands the process of operating dialysis equipment and how to perform alternate dialysis procedures.
5. Be able to initiate, monitor, manage and terminate hemodialysis therapy without any complications.
6. Contributes to a Nephrologist's efficiency by suggesting technical aspects of hemodialysis therapy in hemodialysis prescription.
7. Assesses the patient for any complications with an understanding of the problem and recognizes the need to report the complications to the physician or nephrologist.
8. Determines abnormal conditions during therapy by machine parameters monitoring and by patient vitals during therapy.
9. Performs other therapeutic procedures like plasmapheresis, Sustained-low efficiency dialysis and assisting catheter insertion procedures.
10. Responds effectively to the physical and emotional needs of the patient undergoing dialysis treatment.
11. Demonstrates a sensitive and caring attitude towards the patient.
12. Instructs and counsels patients on renal diet and providing counselling on emotional problems of daily living.
13. Demonstrates knowledge and ability to operate and maintain all equipment in the dialysis unit.

14. Communicates relevant information to other members and completes accurate documentation
15. Demonstrates ability to correctly position the patient.
16. Demonstrates professional behavior.

Learning Outcomes

Sl.No.	Learning Outcomes	Knowledge/Comprehension	Application/Synthesis/Evaluation
1.	Formulation and implementation of an examination plan	Knowledge of vascular access procedures and tests which will efficiently provide the information required for diagnosis	Determines tests and procedures appropriate to the patient's condition and abilities with nephrologist, performs the tests and progressively modifies them (if needed) on the basis of findings
2.	Managing acute emergent complications on dialysis	Knowledge of allergic reactions to medication	Responds properly to patient complaints and takes appropriate measures including emergency termination of dialysis if needed
3.	Performs/Simulation on peritoneal dialysis	Knowledge and understanding of the principles of peritoneal dialysis and the different types of PD	Ability to assess a patient for PD, troubleshoot PD problems, prepare for and initiate peritoneal dialysis therapy
4.	Administration of medication under the supervision of nephrologists	Knowledge of documenting the administration of medications on flow sheet and use of proper aseptic techniques to prepare and administer medications	Recognizes signs and symptoms of adverse reactions; properly administers drugs as prescribed by the doctors during, before and after dialysis procedure; provides adequate education to patients on various medications used
5.	Provides safe and effective care to the individual	Factual knowledge of the principles of dialysis; hemodialysis preparations, methods and techniques; and quality control measures	Demonstrates appropriate use of barrier precautions and cleaning and disinfection procedures

Sl.No.	Learning Outcomes	Knowledge/Comprehension	Application/Synthesis/Evaluation
6.	Understands the process of operating dialysis equipment and how to perform alternate dialysis procedures	Determines tests and procedures appropriate to the patient's condition and abilities, with nephrologist	Formulates an examination plan based on the patient history
7.	Assesses the patient for any complications with an understanding of the problem and recognizes the need to report the complications to the physician or nephrologist	Knowledge of possible complications and ways to treat them, ability to recognize dialyzer reaction and involve appropriate supervisory support if needed	Responds properly to patient complaints and takes appropriate measures including emergency termination of dialysis if needed
8.	Responds effectively to the physical and emotional needs of the patient undergoing dialysis treatment	Ensures a structured, efficient, rational and comfortable exchange of information	Communicates with the patient taking into account his/her physical, emotional, intellectual and cultural background
9.	Operation and Maintenance of all equipment	Factual knowledge of the appropriate system start up procedure and alarm systems function test	Performs basic operator troubleshooting, appropriately initiates, monitors and terminates chemical disinfect procedure for machine, dialyser and tubing. Instructs and supervises the dialysis technician.

ANNEXURES

List of annexures

- ANNEXURE – I: Question Paper Pattern for Core course (Internal Assessment & Semester End Examination)
- ANNEXURE – II: Question Paper Pattern for AEC (Internal Assessment & Semester End Examination)
- ANNEXURE – III: Question Paper Pattern for VAC (Internal Assessment & Semester End Examination)
- ANNEXURE – IV: Logbook Format
- ANNEXURE- V: OSPE Checklist Format

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ANNEXURE – I: Question Paper Pattern for Core course (Internal Assessment & Semester End Examination)

Model Question Paper

I Semester B.Sc. Technology

Time: 2 Hours Max. Marks: 50 Marks

SUBJECT NAME:
Q.P Code:

Your answer shall be specific to question asked.
Draw neat and labeled diagrams wherever necessary.

LONG ESSAY (Answer any One) **(1x10=10Marks)**

1.

2.

SHORT ESSAY (Answer any Five) **(5x4=20Marks)**

3.

4.

5.

6.

7.

8.

9.

SHORT ANSWERS (Answer any Ten) **(10x2=20Marks)**

10.

11.

12.

13.

14.

15

16.

17.

18.

19.

20.

21.

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ANNEXURE – II: Question Paper Pattern for AEC courses (Internal Assessment & Semester End Examination)

Model Question Paper

I Semester B.Sc. Technology

Time: 2 Hours Max. Marks: 50 Marks

Subject Name:
Q.P Code:

Your answer shall be specific to question asked.
Draw neat and labeled diagrams wherever necessary.

LONG ESSAY (Answer any One) **(1x10=10Marks)**

1.

2.

SHORT ESSAY (Answer any Five) **(5x4=20Marks)**

3.

4.

5.

6.

7.

8.

9.

SHORT ANSWERS (Answer any Ten) **(10x2=20Marks)**

10.

11.

12.

13.

14.

15

16.

17.

18.

19.

20.

21.

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ANNEXURE – III: Question Paper Pattern for VAC courses (Internal Assessment & Semester End Examination)

Model Question Paper

I Semester B.Sc. Technology

Time: 2 Hours Max. Marks: 25 Marks

Subject Name:

Q.P Code:

Your answer shall be specific to question asked.
Draw neat and labeled diagrams wherever necessary.

LONG ESSAY (Answer any Three) **(3x5=15Marks)**

1.
2.
3.
4.
5.

SHORT ANSWERS (Answer any Five) **(5x2=10Marks)**

6.
7.
8.
9.
10.
11.
12.

ANNEXURE – V: Logbook Format

Yenepoya School of Allied Health Sciences

Constituent college of

Yenepoya (Deemed to be University) University Road, Deralakatte
Mangaluru – 575018

Bachelor of Science in Renal Dialysis Technology
(B.Sc. RDT) 3rd Semester

LOG BOOK

CERTIFICATE

This is to certify that the candidate Mr./ Ms, ……..
Reg No. ……., admitted in the year in the Yenepoya School of Allied Health Sciences, a constituent college of Yenepoya (Deemed to be University) has satisfactorily completed the requirements mentioned in this logbook for 3rd Semester B.Sc. Renal Dialysis Technology during the period from …… to…….

CLINICAL COORDINATOR **PROGRAM COORDINATOR**

GENERAL INSTRUCTIONS

1) The logbook is a record of the academic / co-curricular activities of the designated student, who would be responsible for maintaining his/her logbook.

2) The student is responsible for getting the entries in the logbook verified by the clinical coordinator regularly.

3) Entries in the logbook will reflect the activities undertaken in the department & have to be scrutinized by the program coordinator.

4) The logbook is a record of various activities by the student like:

- Overall participation & performance
- Attendance
- Participation in sessions
- Record of completion of pre-determined activities.
- Acquisition of selected competencies

The logbook is the record of work done by the candidate in that department / specialty and should be verified by the clinical coordinator.

SPECIFIC LEARNING OBJECTIVES

INFECTION CONTROL

- Prevention and stopping of transmission of infections
- Implement strategies for standard and transmission-based precaution in dialysis setting
- Describe measures to prevent transmission of infection in dialysis setting

DIALYSIS UNIT DESIGN

- Learn physical set-up of the dialysis unit.
- Gain knowledge about general condition required for proper functioning of the dialysis unit

TREATMENT EVALUATION

1: Neurological evaluation: the assessment of sensory neuron and motor responses, especially reflexes, to determine whether the nervous system is impaired.

Evaluation includes whether the patient is;

- Responsive
- Slow to respond
- Calm
- Anxious
- Cooperative

2: Respiratory evaluation: A thorough respiratory assessment consists of;

- Type of respiration whether respiration is labored /regular/irregular.
- Respiratory Rate
- Auscultation

3: Cardiovascular evaluation: Consisting of performing physical examination such as;

- Pulse Rate
- Blood Pressure (Sitting & Standing)
- Angina (Yes/No)

4: Gastrointestinal evaluation: Includes inspection of;

- Appetite (good/fair/poor)
- Constipation (yes/no)
- Diabetic (yes/no)

5: Fluid Status: Physical examination to measure fluid status include;

- Edema (+1/+2/+3/+4)
- Location of Edema

Details of Clinical Training

Sl. No.	Reported on	Departments	Completed on	Remarks	Sign. of the Clinical Supervisor

Infection Control

Learning Outcome:

1. Prevention and stopping of transmission of infections
2. Implement strategies for standard and transmission based precaution in dialysis setting
3. Describe measures to prevent transmission of infection in dialysis setting

1. What are the standard infection control precautions practiced in your dialysis unit?

2. What is the common cause of infection in dialysis units?

3. Why are dialysis patients at risk of infection?

4. How do you prevent transmission of infections in a dialysis setting?

5. What are the WHO guidelines on Hand Hygiene in a healthcare setting?

Dialysis Unit Design

Learning Outcome:

1. Learn physical set-up of the dialysis unit.
2. Gain knowledge about general condition required for proper functioning of the dialysis unit.

1. What should be the minimum standards for personnel in dialysis facilities?

2. General Conditions

   Air Conditioning:

   Plumbing & Drainage:

   Oxygen & Vacuum:

   Ambience:

   Water Quality:

Assisting Dialysis Room Procedures

Activities performed by the student to be recorded below

Sl. No.	Date	Activity	Signature of Staff with date

Preparation of Dialysate

Activities performed by the student to be recorded below

Sl. No.	Date	Dialysate (Part A/Part B)	Quantity (L)	Signature of Staff with date

DIALYZER REPROCESSING

1. Mention the steps of manual cleaning and disinfection of a re-use dialyzer?

2. Write a note on performance testing after the reprocessing.

3. List the chemicals utilized during the Dialyzer reprocessing with the percentage.

4. Write a note on the storage and labelling of the dialyzer.

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New Patient Pre - Treatment Evaluation Form

Patient Name:_____ Hospital No:_____ Date:_____

Gender: ☐ Male ☐ Female Treatment Schedule: ☐ 2 times weekly ☐ 3 Times Weekly

---

Pre - Treatment Information:

First Dialysis Treatment: Date:_____ Location: _____

Allergies: _____

Hepatitis B Status: Date of Test:_____ Report: ☐ Positive ☐ Negative

---

Treatment Orders:

Dialyzer Type:_____ Tx Time:_____

DFR: ☐ 800 ☐ 500 ☐ 300
BFR: _____ Date Access is Placed:_____

Dialysate Bath:_____

Heparin Dose: _____

Vascular Access Information:

Access Location: _____

Access Type: ☐ AVF ☐ AVG ☐ CVC (Permanent:_____Temporary:_____)

S/S of Access Infection: _____

Consent:

☐ Hemodialysis Consent ☐ Reuse Consent

Physical Evaluation Assessment:

Neurological: ☐ Responsive ☐ Slow to Respond ☐ Calm ☐ Anxious ☐ Cooperative

Respiratory: Respiration: ☐ Laboured ☐ Regular ☐ Irregular

R. Rate: _____ Sound: ☐ Clear ☐ Crackles ☐ Wheezes ☐ Cough

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Cardiovascular: Pulse Rate:_____ Chest Pain: ☐ Yes ☐ No

Blood Pressure: Sitting:_____ Standing: _____

Gastrointestinal: Appetite: ☐ Good ☐ Fair ☐ Poor

Constipation: ☐ Yes ☐ No Diabetic: ☐ Yes ☐ No

Fluid Status: Edema: ☐ +1 ☐ +2 ☐ +3 ☐ +4 Location:_____

General Assessment: Mobility: ☐ Limb ☐ Wheelchair ☐ Stretcher

Temperature: _____

Prosthetic Devises: ☐ Limb ☐ Dentures ☐ Glasses ☐ Hearing Aid

Personal:

Hygiene: ☐ Good ☐ Fair ☐ Poor

Tobacco: ☐ Yes ☐ No

Alcohol: ☐ Yes ☐ No

Social Drugs: ☐ Yes ☐ No

Marital Status: ☐ Single ☐ Married ☐ Divorced ☐ Widow/Widower

Language: Primary Language:_____ Language Barrier: ☐ Yes ☐ No

Surgical procedure: Procedure: _____

Signature of the Staff with Date:

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Treatment Initiation Patient Assessment

Patient Name:_____ Hospital No:_____ Date:_____

Gender: ☐ Male ☐ Female Treatment Schedule: ☐ 2 times weekly ☐ 3 Times Weekly

Weight: _____ Ideal Weight (Dry Weight): _____

Treatment Prescription:

Dialyser Type:_____ Tx Time:_____

DFR: ☐ 800 ☐ 500 ☐ 300 BFR: _____

Dialysate Bath: _____ Heparin Dose: _____

Vascular Access Information:

Access Location: _____ Date Access is Placed:_____

Access Type: ☐ AVF ☐ AVG ☐ CVC (Permanent: _____ Temporary: _____)

S/S of Access Infection: _____

Consent:

☐ Hemodialysis Consent ☐ Reuse Consent

Patient Assessment:

Neurological: ☐ Responsive ☐ Slow to Respond ☐ Calm ☐ Anxious ☐ Cooperative

Respiratory: Respiration: ☐ Laboured ☐ Regular ☐ Irregular

R. Rate: _____ Sound: ☐ Clear ☐ Crackles ☐ Wheezes ☐ Cough

Cardiovascular: Pulse Rate: _____ Chest Pain: ☐ Yes ☐ No

Blood Pressure: Sitting: _____ Standing: _____

Gastrointestinal: Appetite: ☐ Good ☐ Fair ☐ Poor

Constipation: ☐ Yes ☐ No Diabetic: ☐ Yes ☐ No

Fluid Status: Edema: ☐ +1 ☐ +2 ☐ +3 ☐ +4 Location:_____

General Assessment: Mobility: ☐ Limb ☐ Wheelchair ☐ Stretcher

Temperature: _____

Prosthetic Devises: ☐ Limb ☐ Dentures ☐ Glasses ☐ Hearing Aid

Personal:

Hygiene: ☐ Good ☐ Fair ☐ Poor

Tobacco: ☐ Yes ☐ No

Alcohol: ☐ Yes ☐ No

Social Drugs: ☐ Yes ☐ No

Marital Status: ☐ Single ☐ Married ☐ Divorced ☐ Widow/Widower

Signature of the Staff with Date

Pre-Dialysis Dialyzer Inspection

Patient Name:_____ Hospital No:_____

Date & Time of Last Reprocessing:_____ Use No. : _____

Visual Inspection:

Structural Damage: ☐ Yes ☐ No

Volume level of disinfectant is adequate: ☐ Yes ☐ No
(both dialyser headers must be at least 2/3 full when viewed horizontally with the dialysate port caps pointing up)

The ports are properly capped: ☐ Yes ☐ No
(there is no evidence of leakage from the dialyzer and ports)

Minimum dwell time has been met (11 hrs): ☐ Yes ☐ No

Storage time has not exceeded 7 days: ☐ Yes ☐ No

Cosmetic appearance is acceptable for patients use: ☐ Yes ☐ No

---

DISINFECTANT USED IN HEMODIALYSIS

List the different disinfectants used in the hemodialysis units with the percentage

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____

ANNEXURE- V: OSPE Checklist Format

B.Sc. Renal Dialysis Technology

Objective Structured Practical Examination (OSPE) (Model)

Test: Pre-Dialysis Dialyser Inspection **Max. Marks:** 05

Time: 5 Minutes

Objective: To ensure patient receives the prescribed, correct and properly inspected dialyser.

Skills Tested:

Inspect the reuse dialyser label for the following; • Patient's first and last name • Hospital Number • Date and time of last reprocessing • Use number	The dialyser should be checked to ensure; • It is the correct dialyser for the correct patient • No evidence of structural damage or tampering • Volume level of disinfectant is adequate (at least 2/3 full when the viewed horizontally) • The ports are properly capped and there is no evidence of leaking from the dialyser and ports • The minimum dwell time of 11 hours has been met • The storage time has not exceeded 7 days • Cosmetic appearance is acceptable for patient use.

Checklist for the Observer:

Reg. Number:

Title	Marks	Remarks
Inspecting Reuse Dialyser		
Total Marks		

Signature of the Observer