MAHATMA GANDHI UNIVERSITY
of
MEDICAL SCIENCES & TECHNOLOGY
JAIPUR

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Mahatma Gandhi Institute of Allied Health Sciences

Syllabus

Bachelor of Dialysis Therapy Technology

4 years

(3 Years + 1 Year Internship)

Program Code: BDTT26

Duration- VIII Semesters (4 Years)

(B.DTT)

Principal
MG Institute of Allied Health Sciences
Jaipur

Dr. Bushra Fiza
Dean, Faculty of Allied and
Healthcare Professions
MGUMST, Jaipur

2026-2027

Recommended by the BOS in Allied Health Sciences at its meeting held on 8th April, 2026, the Faculty of Allied and Healthcare Professions at its meeting held on 28.7.2026 and approved by Academic Council at its meeting held on 03.08.2026

NOTICE

1. The university reserves the right to make changes in the syllabus /books/ guidelines, fee-structure or any other information at any time without prior notice the decision of the university shall be binding on all.

2. The jurisdiction of all court cases shall be Jaipur Bench of Hon'ble Rajasthan High Court only.

3. This syllabus is aligned with the NCAHP Curriculum dated 24.04.2025 and Corrigendum dated 13.05.2026. Any subsequent amendments, revisions or corrigenda issued by the NCAHP shall automatically apply to the Rules, Regulations and Syllabus of MGUMST, Jaipur, and implemented accordingly.

References:

- https://ncahp.abdm.gov.in/Curriculum/Dialysis%20Technology%20&%20Therapy.pdf
- https://ncahp.abdm.gov.in/Curriculum/CurriculumCorrigendum/CORRIGENDUM-1%20Dialysis%20Therapy.pdf

Rules and Regulations of
Bachelor of Dialysis Therapy Technology (B.DTT)
Program Code: BDTT26

1. **Title of the Program** - Bachelor of Dialysis Therapy Technology

2. **Duration of the Program** – Duration shall be for a period of 4 years (VIII semesters) including one year of internship.

3. **Medium of Instruction** – English

4. **Eligibility for Admissions**

- The Candidate must have passed Senior Secondary (10+2) or equivalent with Physics, Chemistry & Biology subjects.
- Admission on the basis of Senior Secondary (10+2) Merit.
- He/she has completed 17 years of age at the time of admission or will complete that age on or before 31 December of the year of his/her admission to the first year of the Undergraduate Allied and Healthcare Course.
- Lateral Entry to the candidates in second year (3rd semester) who have passed Diploma of Dialysis Technology (D.DT) from recognized university.
- Medical fitness certificate is mandatory to submit and it is to be endorsed by Government medical officer.
- Foreign students' admission process in under graduate (UG):

    1) Foreign national students intending to study UG program
    2) in India, shall have to take equivalence certificate of eligibility certificate from respective State Allied and Healthcare Council.
    3) For Under Graduate admission of foreign national students, merit list will be based on University Entrance Exam.
    4) Verification of Valid Visa and valid visa duration of foreign national students, to be verified by respective institution & University before enrolling students for program.

    - The admission criteria shall be updated by the Commission from time to time.
    - Admission process shall be conducted by State/Union Territory/ University.

5. **Admission Process** – Selection shall be done by an admission board of the University/Rajasthan State Allied & Healthcare Council strictly on merit/written examination.

6. **Reservation Policy** – Reservation policy for admissions shall be as per the state/ Centre Government norms.

7. Enrolment@

1. Every candidate who is admitted to the Bachelor of Dialysis Therapy Technology program in Mahatma Gandhi Institute of Allied Health Sciences shall be required to get himself/herself enrolled with the Mahatma Gandhi University of Medical Sciences & Technology (MGUMST) after paying the prescribed eligibility and enrolment fees.

2. A candidate shall deposit enrolment fee along with tuition fees at the time of his/her admission to the program. Such a candidate who fails to submit, to the college principal, duly filled enrolment form along with original documents including migration certificate required for enrolment within prescribed period then after he/she shall pay late fee applicable at that time. No student will be allowed to appear in the End of Semester Examination without his/her enrolment.

8. Introduction –

Dialysis Therapist are healthcare Professionals who provides dialysis treatment for patients with acute or chronic kidney disease and also perform, monitor, maintain, manage, studies, advises, researches and supervises the various extra corporeal therapies for patients with renal and non- renal indications.

a) Objectives/ Aim of the Program

i.) Function as a Dialysis Therapy Technologist in a stand-alone dialysis unit as well as in a hospital with a dialysis facility that provides dialysis treatment/extra corporeal therapies to individuals diagnosed with acute or chronic kidney disease and other non-renal indications.

ii.) Understand and apply the principles of dialysis and the skills necessary to deliver safe and effective care to the individual undergoing dialysis treatments.

iii.) Demonstrate the use of haemodialysis equipment with an understanding of the process of operating dialysis equipment and alternate dialysis procedures.

iv.) Assess the patient for any complications with an understanding of the problem and recognize the complications thereby delivering the apt management & treatments under the supervision of the supervisor in a standalone unit or the physician/nephrologist in a hospital.

v.) Respond effectively to the physical and emotional needs of the patient undergoing dialysis treatment.

vi.) Develop the ability to understand the operation, routine maintenance, identification of malfunction in equipment, troubleshooting, and minor

repair in equipment used in daily units such as hemodialysis machines, water treatment plants, dialyzer reprocessing machines, etc.

vii.) Demonstrate renal transplant coordination with the transplantation team.

b.)Programme Outcomes (POs)

Upon successful completion of the B.DTT program, students will be able to:

PO NO.	PROGRAM OUTCOMES
PO1	Apply knowledge of basic medical sciences, renal physiology, and dialysis technology in patient care.
PO2	Perform hemodialysis, peritoneal dialysis, CRRT, and other extracorporeal procedures safely and effectively.
PO3	Operate, monitor, troubleshoot, and maintain dialysis machines and related equipment with accuracy.
PO4	Assess patient condition, monitor vital parameters, and respond appropriately to dialysis-related complications and emergencies.
PO5	Communicate effectively with patients, caregivers, nephrologists, nurses, and other healthcare professionals
PO6	Demonstrate professional ethics, patient confidentiality, accountability, and compassionate care in clinical practice.
PO7	Work efficiently as a member of a multidisciplinary healthcare team to provide quality renal care services.
PO8	Apply infection control practices, biomedical waste management, and patient safety protocols in dialysis units.
PO9	Utilize evidence-based practice, research skills, and modern technology for continuous improvement in dialysis care.
PO10	Develop leadership qualities, lifelong learning attitude, and professional competence to meet global healthcare standards.

c) GRADUATE ATTRIBUTES:

Upon graduation, students will possess the following attributes:

1. The primary goal of the Bachelor of Dialysis Therapy Technology program is to prepare accomplished professionals in renal replacement therapies with a specific emphasis on clinical skills and knowledge of dialysis therapies.

2. The students acquire the knowledge and procedural skills necessary to deliver a high standard of care to patients with chronic kidney disease requiring renal replacement therapy.

3. They will also receive training to conduct research in the field of dialysis.

4. This program involves all aspects of care for patients undergoing chronic hemodialysis and continuous ambulatory peritoneal dialysis (CAPD), renal transplant coordination as well as RRTs in the intensive care unit.

5. The overall goal of this training is to foster the trainee‟s development into an independent care provider in the field of dialysis.

6. The program intends for its graduates to contribute to a new generation of academic dialysis professionals equipped to address the challenging problems in renal replacement therapy & Other Extracorporeal Therapies.

9. **Attendance –** A candidate has to secure minimum -

   1. 80% attendance in theoretical

   2. 80% in Skills training (practical) for qualifying to appear for the final examination. No relaxation, whatsoever, will be permissible to this rule under any ground including indisposition etc.

Program Completion Timeline

- All academic coursework must be completed within a maximum of double the program duration.
- For example, in a 4-year program, all requirements must be fulfilled within 8 years from the date of admission.

Note: Failure to do so result in exit from the program.

10. **Minimum Instruction/ Teaching Days** – Each academic semester shall consist of minimum 120 working days, including examinations.

11. Programme Structure (Semester I, II, III, IV_____*Distribution of courses semester wise)*

B.DTT FIRST SEMESTER

COURSE CODE	COURSE NAME	Lecture	Practical/ Tutorial	Credits	Contact Hours
BDTT-001	Medical terminology and record keeping	30	-	2	30
BDTT-002	Professionalism and values & Indian constitution	30	-	2	30
BDTT-003	Human Anatomy	60	30	5	90
BDTT-004	Human Physiology	60	30	5	90
BDTT-005	Biochemistry	60	30	5	90
BDTT-006	Introduction to Dialysis Therapy	15	30	2	45
BDTT-007	Human Anatomy (Practicals)	-	60	2	60
BDTT-008	Human Physiology (Practicals)	-	60	2	60
BDTT-009	Biochemistry(Practicals)	-	60	2	60
BDTT-010	Community orientation and clinical visit (CT)	-	90	2	90
	Total	**255**	**390**	**29**	**645**

B.DTT SECOND SEMESTER

COURSE CODE	COURSE NAME	Lecture	Tutorial/ Practical	Credits	Contact Hours
BDTT-011	Pathology	60	-	4	60
BDTT-012	Microbiology	60	-	4	60
BDTT-013	General Pharmacology	60	-	4	60
BDTT-014	Applied anatomy & physiology related to Dialysis Therapy	60	-	4	60
BDTT-015	Fundamentals of Dialysis Therapy	45	-	3	45
BDTT-016	Pathology (Practicals)	-	30	1	30
BDTT-017	Micrology (Practicals)	-	30	1	30
BDTT-018	Applied anatomy & physiology related to Dialysis Therapy (Practicals)	-	30	1	30
BDTT-019	Fundamentals of Dialysis Therapy (Practicals)	-	30	1	30
BDTT-020	Clinical posting I (CT)	-	135	3	135
	Total	**285**	**255**	**26**	**540**

B.DTT THIRD SEMESTER

COURSE CODE	COURSE NAME	Lecture	Tutorial/ Practical	Credits	Contact Hours
BDTT-021	Sociology in Health Care	45	-	3	45
BDTT-022	Biomedical Waste Management	30	-	2	30
BDTT-023	Pathophysiology of the kidney diseases	45	30	4	75
	Elective course (To be chosen by the student)				
BDTT-024	Instrumentation Specific to Dialysis Therapy	45	30	4	75
BDTT-025	Basic Principles of Nursing Care	45	0	3	45
BDTT-026	Medical Law and Ethics	30	-	2	30
BDTT-027	Instrumentation Specific to Dialysis Therapy (Practicals)	-	60	2	60
BDTT-028	Clinical Postings II (CT)	-	180	4	180
	Total	**240**	**300**	**24**	**540**

B.DTT FOURTH SEMESTER

COURSE CODE	COURSE NAME	Lecture	Tutorial/ Practical	Credits	Contact Hours
BDTT-029	Pharmacology related to Dialysis Therapy	30	30	3	60
BDTT-030	Psychology	45	-	3	45
BDTT-031	Renal Nutrition	45	-	3	45
BDTT-032	Dialysis Therapies-Part-I	45	30	4	75
BDTT-033	Medical Electronics for Health Sciences	45	-	3	45
BDTT-034	Research Methodology and Biostatistics	60	-	4	60
BDTT-035	Pharmacology related to Dialysis Therapy (Practicals)	-	60	2	60
BDTT-036	Dialysis Therapies Part-I (Practicals)	-	60	2	60
BDTT-037	Clinical posting III (CT)	-	180	4	180
	Total	**270**	**360**	**28**	**630**

B.DTT FIFTH SEMESTER

COURSE CODE	COURSE NAME	Lecture	Tutorial/ Practical	Credits	Contact Hours
BDTT-038	Dialysis Therapies – part-II	60	-	4	60
BDTT-039	Renal Transplantation and Coordination	60	-	4	60
BDTT-040	Clinical Problems and Evidenced Based Practice in dialysis Therapy	60	-	4	60
BDTT-041	Advanced Extracorporeal Therapies	60	-	4	60
	Elective course (To be chosen by the student0				
BDTT-042	Renal Transplantation and Coordination (Practicals)	-	60	2	60
BDTT-043	Advanced Extracorporeal Therapies (Practicals)	-	60	2	60
BDTT-044	Dialysis Therapies – Part II (Practicals)	-	60	2	60
BDTT-045	Clinical Posting IV (CT)	-	180	4	180
	Total	**240**	**360**	**26**	**600**

B.DTT SIXTH SEMESTER

COURSE CODE	COURSE NAME	Lecture	Tutorial/ Practical	Credits	Contact Hours
BDTT-046	Recent Advancements in Renal replacement therapies	60	30	5	90
BDTT-047	Principals of Management	45	-	3	45
BDTT-048	Introduction to Quality Assurance in dialysis and Patient safety	45	30	4	75
BDTT-049	Basic and Advanced Cardiac Life Support	30	-	2	30
	Elective course (To be chosen by the student)				
BDTT-050	Recent Advancements in Renal replacement therapies (Practicals)	-	60	2	60
BDTT-051	Basic and Advanced Cardiac life Support (Practicals)	-	30	1	30
BDTT-052	Clinical Posting V (CT)	-	270	6	270
	TOTAL	**180**	**420**	**23**	**600**

B.DTT SEVENTH SEMESTER

COURSE CODE	Course Name	Tutorial/ Clinical training credit	Credit	Practical/Tutorial Hours	Contact Hours
BDTT-053	Compulsory Rotatory Internship	24	24	1080	1080
	TOTAL	**24**	**24**	**1080**	**1080**

B.DTT EIGHTH SEMESTER

COURSE CODE	Course Name	Tutorial/ Clinical training	Credit	Practical/ Tutorial	Contact Hours
BDTT -054	Compulsory Rotatory Internship	24	24	1080	**1080**
BDTT-055	Dissertation/ Project	-	6	180	**180**
	TOTAL	**24**	**30**	**1260**	**1260**

Elective Course:

Course Code	Course	Lecture	Credits	Hours / Semester Lecture	Practical / Tutorial	Total Hours
BDTT-056	Introduction to Healthcare Delivery System in India	2	2	30	-	30
BDTT-057	Basic computers and information Science	1	2	15	30	45
BDTT-058	Communication and soft skills	2	2	30	-	30
Total		5	6	75	30	105
Grand Total		**103**	**216**	**1545**	**4455**	**6000**

Total credits **= 216 credits**

Total Contact hours **= 5895**

Contact hours of all semesters **= (645+ 540+540+630+600+600) + (1260+1080)**

Credit Details:

- Lecture / Tutorial: 1 credit = 15 hours
- Practical: 1 credit = 30 hours
- Clinical Lab postings: 1 credit = 45 hours

Credit Includes: L – Lectures, T - Tutorials, P - Practical.

12. Conduct of Continuous Assessment/ Internal Assessment –

Theory – 50/100 marks
Practical - 50 marks

There shall be a minimum of two periodical tests preferably one in each term in theory and practical of each subject in a semester.

Class participation/presentation	10 marks
Assignment & quizzes	10 marks
Sessional exams	30 marks

The marks of IA shall be communicated to the University at least 15 days before the commencement of the University examination. The University shall have access to the records of such periodical tests. The marks of the internal assessment must be displayed on the notice board of the respective colleges with in a fortnight from the date test is held. If a candidate is absent for any one of the tests due to genuine and satisfactory reasons, such a candidate may be given a re-test within a fortnight.

13. Dissertation/ Internship/ Project/ Clinical Postings

The internship will span 1 year/ 2 semester. This will include 8 hours of practice a day, totalling to 2160 hours for two semesters.

As a part of this, the students will choose a relevant subject and prepare an in-depth project report of not less than 1000 words which will be handed over to the supervisor or trainer. The report can include objective, scope of the project and an in-depth report.

Each candidate will have to carry out a dissertation/ Project on the related subject. The dissertation will be guided by one or two members of the faculty of the department.

Note: The Bachelor's Degree will be awarded only upon successful completion of the Internship requirements.

14. **Scheme of Examination** –The end of semester examination for the program shall be conducted semester wise at the end of every semester

MARKS DISTRIBUTION
B.DTT FIRST SEMESTER

Course code	COURSE NAME	Continuous Internal assessment (CIA)	End Semester Examination		Total
		Theory/ Practical(a)	Theory(b)	Practical/Viva(c)	Theory: a+(b÷2) =100 Practical: a + c =100
BDTT-001	Medical Terminology and Record keeping	100	-	-	100
BDTT-002	Professionalism and values & Indian Constitution	100	-	-	100
BDTT-003	Human Anatomy	50	100	-	100
BDTT-004	Human Physiology	50	100	-	100
BDTT-005	Biochemistry	50	100	-	100
BDTT-006	Introduction to Dialysis Therapy	50	100	-	100
BDTT-007	Human Anatomy (Practicals)	50	-	50	100
BDTT-008	Human Physiology (Practical's)	50	-	50	100
BDTT-009	Biochemistry (Practicals)	50	-	50	100
BDTT-010	Community orientation and clinical visit	100	-	-	100
	TOTAL	**650**	**400**	**150**	**1000**

B.DTT SECOND SEMESTER

Course Code	COURSE NAME	Continuous Internal assessment (CIA)	End Semester Examination		Total
		Theory/Practical(a)	Theory (b)	Practical /Viva(c)	Theory: a+(b÷2) =100 Practical: a + c
BDTT-011	Pathology	50	100	-	100
BDTT-012	Microbiology	50	100	-	100
BDTT-013	General Pharmacology	50	100	-	100
BDTT-014	Applied anatomy & physiology related to Dialysis Therapy	50	100	-	100
BDTT-015	Fundamentals of Dialysis Therapy	50	100	-	100
BDTT-016	Pathology (Practicals)	50	-	50	100
BDTT-017	Microbiology (Practicals)	50	-	50	100
BDTT-018	Applied anatomy & physiology related to Dialysis Therapy (Practicals)	50	-	50	100
BDTT-019	Fundamentals of Dialysis Therapy (Practicals)	50	-	50	100
BDTT-020	Clinical Postings I (CT)	50	-	50	100
	Total	**500**	**500**	**250**	**1000**

B.DTT THIRD SEMESTER

COURSE CODE	COURSE NAME	Continuous Internal assessment (CIA)	End Semester Examination		Total
			Theory(b)	Practical/Viva (c)	Theory: a+(b÷2) =100 Practical: a + c =100
BDTT-021	Sociology in Health Care	100	-	-	100
BDTT-022	Biomedical Waste Management	100	-	-	100
BDTT-023	Pathophysiology of the kidney diseases	50	100	-	100
BDTT-024	Instrumentation Specific to Dialysis Therapy	50	100	-	100
BDTT-025	Basic Principles of Nursing Care	100	-	-	100
BDTT-026	Medical Law and Ethics	100	-	-	100
BDTT-027	Instrumentation Specific to Dialysis Therapy (Practicals)	50	-	50	100
BDTT-028	Clinical Postings II (CT)	50	-	50	100
	TOTAL	**600**	**200**	**100**	**800**

B.DTT FOURTH SEMESTER

COURSE CODE	COURSE NAME	Continuous Internal assessment (CIA)	End Semester Examination		Total
			Theory (b)	Practical/Viva (c)	Theory: a+(b÷2) =100 Practical: a + c =100
BDTT-029	Pharmacology related to Dialysis therapy	50	100	-	100
BDTT-030	Psychology	50	100	-	100
BDTT-031	Renal Nutrition	50	100	-	100
BDTT-032	Dialysis Therapies – Part I	50	100	-	100
BDTT-033	Medical Electronics for Health Sciences	50	100	-	100
BDTT-034	Research Methodology and Biostatistics	50	100	-	100
BDTT-035	Pharmacology related to Dialysis therapy (Practicals)	50	100	-	100
BDTT-036	Dialysis Therapies – Part I (Practicals)	50	-	50	100
BDTT-037	Clinical Postings III	50	-	50	100
	Total	**450**	**700**	**100**	**900**

B.DTT FIFTH SEMESTER

COURSE CODE	COURSE NAME	Continuous Internal assessment (CIA)	End Semester Examination		Total
			Theory(b)	Practical/Viva(c)	Theory: a+(b÷2) =100 Practical: a + c =100
BDTT-038	Dialysis Therapies – Part II	50	100	-	100
BDTT-039	Renal Transplantation and Coordination	50	100	-	100
BDTT-040	Clinical Problems and Evidenced Based Practice in Dialysis Therapy	50	100	-	100
BDTT-041	Advanced Extracorporeal Therapies	50	100	-	100
BDTT-042	Renal Transplantation and Coordination (Practicals)	50	-	50	100
BDTT-043	Advanced Extracorporeal Therapies (Practicals)	50	-	50	100
BDTT-044	Dialysis Therapies – Part II (Practicals)	50	-	50	100
BDTT-045	Clinical Posting IV (CT)	50	-	50	100
	Total	**400**	**400**	**200**	**800**

B.DTT SIXTH SEMESTER

COURSE CODE	COURSE NAME	Continuous Internal assessment (CIA)	End Semester Examination		Total
			Theory	Practical	Theory: a+(b÷2) =100 Practical: a + c
BDTT-046	Recent Advancements in Renal replacement therapies	50	100	-	100
BDTT-047	Principals of Management	50	100	-	100
BDTT-048	Introduction to Quality Assurance in Dialysis and Patient safety	50	100	-	100
BDTT-049	Basic and Advanced Cardiac Life Support	50	100	-	100
BDTT-050	Recent Advancements in Renal replacement therapies (Practicals)	50	-	50	100
BDTT-051	Basic and Advanced Cardiac Life Support (Practicals)	50	-	50	100
BDTT-052	Clinical Posting V (CT)	50	-	50	100
	TOTAL	350	400	150	**700**

B.DTT SEVENTH SEMESTER

COURSE CODE	COURSE NAME	Continuous Internal assessment (CIA))	End Semester Examination		Total
			Theory(b)	Practical/Viva(c)	Theory: a+(b÷2) =100 Practical: a + c =100
BDTT-053	Compulsory Rotatory Internship	100	-	-	100
	Total	**100**			**100**

B.DTT EIGHTH SEMESTER

COURSE CODE	COURSE NAME	Continuous Internal assessment (CIA)- Theory/ Practical (a)	End Semester Examination		Total
			Theory (b)	Practical/Viva (c)	Theory: a+(b÷2) =100 Practical: a + c =100
BDTT-054	Compulsory Rotatory Internship	50	-	50	100
BDTT-055	Dissertation/Project	50	-	50	100
	TOTAL	**100**		**100**	**200**

ELECTIVE COURSE

Course Code	Course	Continuous Internal Assessment CIA – Theory / Practical (a)	End Semester		Grand Total
			Theory (b)	Practical / Viva (c)	Theory: a+(b-2) = 100 / Practical: a+c = 100
BDTT-056	Introduction to Healthcare Delivery System in India	100	-	-	100
BDTT-057	Basic computers and information Science	100	-	-	100
BDTT-058	Communication and soft skills	100	-	-	100
Total		300			300

Credit Distribution: Each semester would consist of a minimum of 20 credits. The credit distribution hours for Lecture, Tutorial, Practical, and Clinics are as follows:

Credit Details:

Lecture / Tutorial: 1 credit = 15 hours; Practical: 1 credit = 30 hours; Clinical/ Lab Posting: 1 credit = 45 hours

Credit Includes: L – Lectures, T- Tutorials, P- Practical

Undergraduate Program Requirements: A minimum of **216** credits is required for the BDTT. A program of 4 years duration, inclusive of a one-year internship (Lab posting /research dissertation).

15. Conduct of University Examination/ End of Semester Examination –

a) **Appointment of Examiners and Paper Setters (Qualification of paper Setters and Examiners):**
   - All the examiners, paper setters, theory examination answer book evaluators, external and internal examiners for practical examinations shall be appointed by the respective university.
   - Professor/Assoc. Professor/ Assistant Professor/Lecturer/Allied Health Professional having PG Qualification and 3 years professional /teaching experience after PG in respective fields or UG Qualification and 5 years professional industry/teaching experience after UG is eligible to act as an internal or external examiner of theory/practical examination.

b) **Eligibility to appear for the Examination**:
   - A student is required to have minimum 80% attendance in theory and practical's separately of each semester to make him/her eligible to appear in the university semester examination.
   - Candidates failing in one or more subjects (theory/practical) of semester will require to appear in failing subjects in the next examination of same semester.

c) Theory Examinations:
   - There shall be Theory papers in each semester of study.
   - Each Theory paper examination shall be of 3 hours duration and a maximum of 100 marks.
   - Internal assessment (IA) shall be 50 marks for each Theory paper.
   - The Paper Setter shall set the questions within the prescribed course of study of the concerned paper. There will be a set pattern of question papers duly approved by the Academic Council.

- Proposed Pattern of question papers –

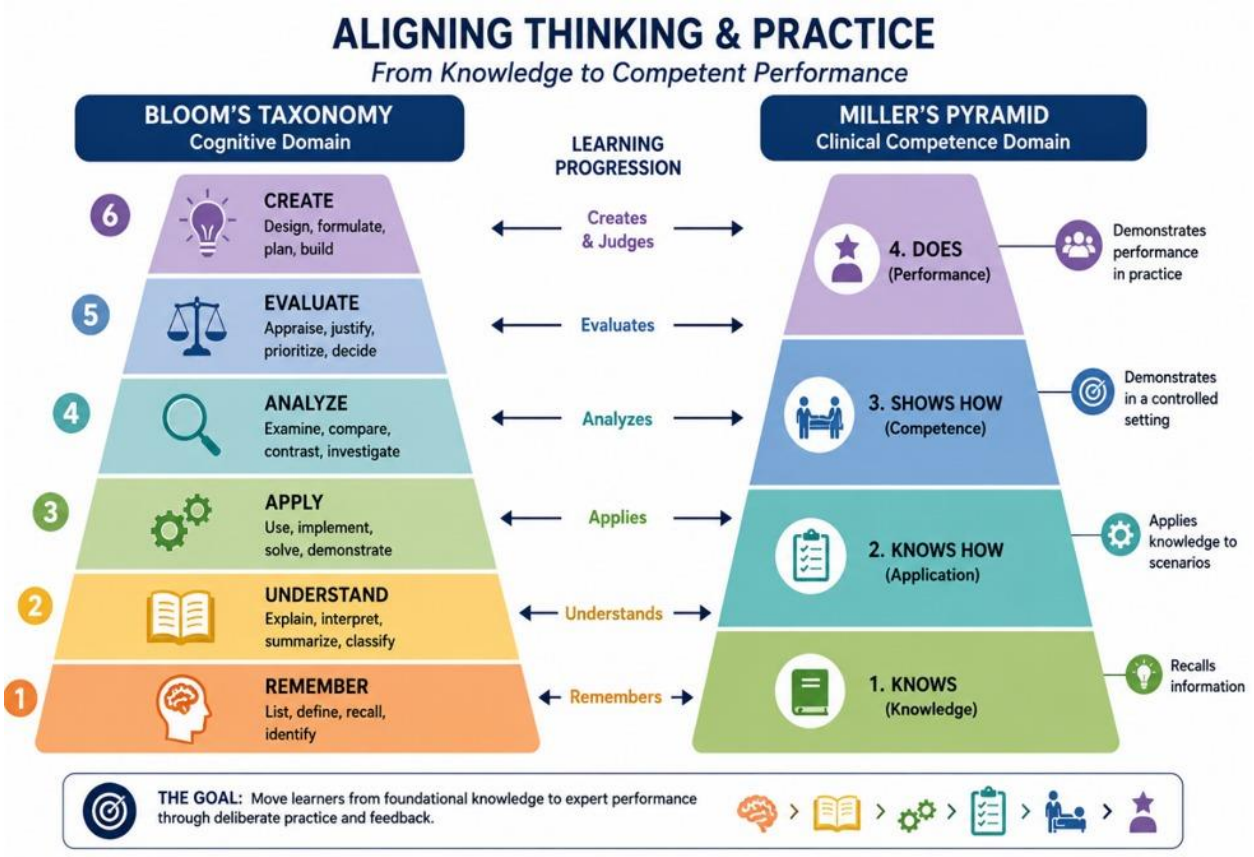
MAXIMUM MARKS = 100		
TYPE OF QUESTION	NUMBER OF QUESTION	MARKS FOR EACH QUESTION
ESSAY TYPE	3 (to answer 2)	15
SHORT ESSAY TYPE	10 (to answer 8)	5
SHORT ANSWER TYPE	12 (to answer 10)	3

Passing Marks- A candidate will have to obtain 50% in internal assessment, 50% in theory examination, 50% in practical examination and 50% in aggregate

Results in Group (RG) – For Programs wherein Theory and Practical's (Lab Course) are assessed jointly (RG), the passing minimum for the theory exams and Practical exams have to be obtained separately, in order to be declared passed in the individual courses and thereby earning the credits for both Theory and Practical courses. Reappearance in any one of the components (Theory or Practical) is treated as reappear in both these components (Theory and Practical's).

Bloom's Taxonomy: A blended approach—combining **didactic methods, experiential laboratory training, problem-solving, clinical immersion, and research exposure**—is essential in Dialysis Therapy Technology . When guided by educational frameworks such as **Bloom's Taxonomy,** these methodologies ensure that learners progress from acquiring foundational knowledge to demonstrating competence and ultimately practicing independently as professionals.

By weaving Bloom's Taxonomy (cognitive depth) the curriculum ensures that graduates not only master theoretical knowledge but also translate it into safe, accurate, and independent laboratory practice.



d) **Practical Examinations and Viva Voce**

- At the end of each semester there shall be the practical and viva-voce examination. It shall be conducted after the Theory examination is over. A candidate will have to obtain at least 50% marks in the practical and viva-voce examination.
- The university shall appoint the panel of examiners in such a manner that the complete syllabus of semester is taken care of by the internal/external practical examiner(s).

Letter Grades and Grade Points

Letter Grade	A+	A	B	C	D	E	F/I/DT
Credit value	10	9	8	7	6	5	0

F- Fail, DT - Detained/Attendance shortage, I – Incomplete

Internals Weightage (%)	**End semester Exam Weightage (%)**
30	70

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Course code	**Course**	**Credits (a)**	**Grade obtained by the student**	**Credit value (b)**	**Grade Points (a x b)**
BDTT 1	Course - 1	4	D	6	24
BDTT 2	Course - 2	4	B	8	32
BDTT 3	Course - 3	3	A+	10	30
BDTT 4	Course - 4	4	C	7	28
BDTT 5	Course - 5	5	A	9	45
TOTAL		**20**	**-**	**-**	**159**

1st Semester GPA = Total grade points / total credits

159/20 = **7.95**

Suppose in **the 2nd semester, GPA** = **8.35** with respective course credit 20

$$Then, 1^{st} YearCGPA = \frac{\sum 7.95 x 20 \sum + \sum 8.35 x 20 \sum}{20 + 20} = 8.15$$

e) **Results:** A candidate will have to obtain 50% in internal assessment, 50% in theory examination, 50% in practical examination and 50% in aggregate.

Results in Group (RG) – For Programs wherein Theory and Practical's (Lab Course) are assessed jointly (RG), the passing minimum for the theory exams and Practical exams have to be obtained separately, in order to be declared passed in the individual courses and thereby earning the credits for both Theory and Practical courses. Reappearance in any one of the components (Theory or Practical) is treated as reappear in both these components (Theory and Practical's).

f) Supplementary Examination :

- Supplementary examination conducted by the University for unsuccessful candidates.
- Lower semester exams conducted along with current semester exams.
- Internal assessment can be improved before supplementary examination**.**

Grace Marks: The Award of grace marks shall be as per the policy governed by rules of MGUMST.

g) Revaluation: (As per MGUMST Rules)

Re- Evaluation of marks is permitted only for theory papers. The University/board, on application within the stipulated time and remittance of a prescribed fee, shall permit a Re- evaluation of marks for the course/s applied. The marks obtained after re- evaluation shall be the final marks awarded.

h) **Promotion to the next Semester** : A candidate who has appeared in the University examination of a semester and has passed it Or failed in one or more subjects shall be promoted to next semester. A candidate will be allowed to start internship only when the backlog of all subjects (theory and practical) of first semester to sixth semesters exams including elective papers (if any) is cleared. (As per MGUMST rules)

16. **Award of Degree**: The degree shall be awarded by the university only after receipt of course completion certificate and No Dues from the principal of the college.

17. **Authority to issue transcript:** The Controller of Examination of the University shall be the authority for issuing transcript after receiving the described fee from the candidate.

18. **Logbooks and Clinical Records:** The internship will span 1 year/ 2 semester. This will include 8 hours of practice a day, totalling to 2160 hours for two semesters.
    As a part of this, the students will choose a relevant subject and prepare an in-depth project report of not less than 1000 words which will be handed over to the supervisor or trainer. The report can include objective, scope of the project and an in-depth report.

19. Any specific point/ rule/ regulation related to college/ institute- NA

20. Course wise Syllabus with Recommended Text Books

21. Model Papers- Attached

QUESTION PAPER TEMPLATE FOR B.DTT SEMESTER I–IV

INSTRUCTIONS FOR PAPER SETTERS FOR B.DTT SEMESTER I–IV

1. All questions must be framed in alignment with the NCAHP framework. Map each question to the relevant Course Outcome (CO) and Bloom's taxonomy.
2. Every question must carry two mandatory annotations:(a) Course Outcome (CO): e.g., CO2, CO5;(b) Highest Bloom's Level Attained: e.g., L3 – Application. These must be written in brackets after the question text.
3. The Bloom's Taxonomy ceiling for B.DTT Semester I–IV is Level 3 – Application. No question in this paper shall exceed this level. The paper setter must self-audit using the Bloom's reference table provided in this template.
4. Question distribution across Bloom's levels [L1 – Knowledge; L2 – Comprehension; and L3 – Application] must be documented on the master copy. Recommended distribution for Semester I–IV:
   L1–L2: ~70–80%;
   L3: ~20– 30%;
   L4–L6: ~0% (not applicable).
5. Avoid repetition of topics across questions. Q1, Q2 and Q3 should collectively cover a minimum of 6–8 different topics/competencies to ensure adequate syllabus sampling.
6. All Long Answer Questions must carry sufficient internal scope. A 15-mark Long Answer Question should have 4–5 expected response components. These expected answers must be included in the model answer key submitted alongside the paper.
7. The paper setter must submit:
   (i) Question Paper with CO + Bloom's Level annotations;
   (ii) Model Answer Key with marking scheme.
   All documents are confidential and must be submitted in a sealed envelope to the Examination Cell.

B.DTT Semester I–IV: Question-Level Mapping Table (100 Marks)

Q. No.	Question Type	Bloom's Range
Q1	Long Answer (Attempt any 2 out of 3)	L1 – L3
Q2	Short Essay (Attempt any 8)	L1 – L3
Q3	Short Answer (Attempt any 10)	L1 – L2 only

Question Paper Structure:

Subject Code: BDTT……. **Subject Abb.**

Bachelor of Dialysis Therapy Technology

Semester
Subject Name

Time: 3 Hours
Maximum Marks: 100

Q.1. Essay Questions (Attempt any 2) **2 × 15 = 30 Marks**

a) …… (CO- , L-)
b)…… (CO- , L-)
c)…… (CO- , L-)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

a) …… (CO- , L-)

b) …… (CO- , L-)

c) …… (CO- , L-)

d) …… (CO- , L-)

e) …… (CO- , L-)

f) …… (CO- , L-)

g) …… (CO- , L-)

h) …… (CO- , L-)

i) …… (CO- , L-)
j) …… (CO- , L-)

Q.3. Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

(a) …… (CO- , L-)
(b) …… ((CO- , L-)
(c) …… (CO- , L-)
(d) …… (CO- , L-)
(e) …… ((CO- , L-)
(f) …… (CO- , L-)
(g) …… (CO- , L-)
(h) …… (CO- , L-)
(i) …… (CO- , L-)
(j) …… (CO- , L-)
(k) …… (CO- , L-)
(l) …… (CO- , L-)

QUESTION PAPER TEMPLATE FOR B.DTT SEMESTER V–VI

INSTRUCTIONS FOR PAPER SETTERS FOR B.DTT SEMESTER V–VI

1. All questions must be framed in alignment with the NCAHP framework. Map each question to the relevant Course Outcome (CO) and NCAHP and Bloom's Taxonomy.
2. Every question must carry two mandatory annotations:(a) Course Outcome (CO): e.g., CO2, CO5;(b) Highest Bloom's Level Attained: e.g., L5. These must be written in brackets after the question text.
3. The Bloom's Taxonomy ceiling for B.DTT Semester V–VI is Level 5 – Evaluation. No question in this paper shall exceed this level. The paper setter must self-audit using the Bloom's reference table provided in this template.
4. Question distribution across Bloom's levels [L2 – Comprehension; L3 – Application; L4 – Analysis; and L5 – Evaluation] must be documented on the master copy.
   Recommended distribution:
   L2-L3: ~70–80%;
   L4: ~10–15%;
   L5: 5-10%
5. Avoid repetition of topics across questions. Q1, Q2 and Q3 should collectively cover a minimum of 6–8 different topics/competencies to ensure adequate syllabus sampling.
6. All Long Answer Questions must carry sufficient internal scope. A 10-mark Long Answer Question should have 4–5 expected response components. Clinical scenarios or case-based questions should be included wherever appropriate. These expected answers must be included in the model answer key submitted alongside the paper.

The paper setter must submit:
(i) Question Paper with CO + Bloom's Level annotations;
(ii) Model Answer Key with marking scheme.
All documents are confidential and must be submitted in a sealed envelope to the Examination Cell.

B.DTT Semester V–VI: Question-Level Mapping Table (70 Marks)

Q. No.	Question Type	Bloom's Range
Q1	Long Answer (Attempt any 2 out of 3)	L2 – L4
Q2	Short Essay (Attempt any 8)	L2 – L4
Q3	Short Answer (Attempt any 10)	L2 – L3 only

Question Paper Structure:

Subject Code: BDTT……. **Subject Abb.**

Bachelor of Dialysis Therapy Technology

Semester
Subject Name

Time: 3 Hours
Maximum Marks: 100

Q.1. Essay Questions (Attempt any 2) **2 × 15 = 30 Marks**

a) …… (CO- , L-)
b)…… (CO- , L-)
c)…… (CO- , L-)

Q.2. Short Essay Questions (Attempt any 8) **8× 5 = 40 Marks**

(a) …… (CO- , L-)

(b) …… (CO- , L-)

(c) …… (CO- , L-)

(d) …… (CO- , L-)

(e) …… (CO- , L-)

(f) …… (CO- , L-)

(g) …… (CO- , L-)

(h) …… (CO- , L-)

(i) …… (CO- , L-)
(j) …… (CO- , L-

Q.3. Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

(a) …… (CO- , L-)
(b) …… (CO- , L-)
(c) …… (CO- , L-)
(d) …… (CO- , L-)
(e) …… (CO- , L-)
(f) …… (CO- , L-)
(g) …… (CO- , L-)
(h) …… (CO- , L-)
(i) …… (CO- , L-)
(j) …… (CO- , L-)
(k) …… (CO- , L-)
(l) …… (CO- , L-)

SEMESTER-I

Medical Terminologies and Record Keeping (30 Hours)

This course introduces the elements of medical terminology. Emphasis is placed on building familiarity with medical words through knowledge of roots, prefixes, and suffixes. Topics include origin, word building, abbreviations and symbols, terminology related to the human anatomy, reading medical orders and reports, and terminology specific to the student's field of study. Spelling is critical and will be counted when grading tests.

CO NO.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the origin, purpose, structure, and formation of medical terminology including roots, prefixes, suffixes, and combining forms.	**L2**
CO2	Describe medical terminologies related to different body systems including musculoskeletal, respiratory, cardiovascular, digestive, endocrine, nervous, urinary, reproductive,	**L2**
CO3	Apply medical terminology principles to form, spell, and interpret medical words, abbreviations, and symbols used in healthcare practice.	**L3**
CO4	Interpret diagnostic, surgical, procedural terms, and medical orders/reports related to various body systems in clinical settings.	**L4**
CO5	Analyze the formats, contents, and documentation requirements of medical records and healthcare reports.	**L4**
CO6	Apply knowledge of medical terminology and electronic health record systems for accurate data entry and healthcare documentation.	**L3**

Topics to be covered under the subject are as follows:

1. Derivation of medical terms. - Origin, uses and purpose of medical terminology,
2. Word roots, prefixes, and suffixes. - Musculo-skeletal system, respiratory system, cardiovascular system, Digestive system, Endocrine system, Central Nervous system, Urinary system, Reproductive system, Organs of special sense and Integumentary system. prefixes and pseudo prefixes used in medical terminology, suffixes and pseudo suffixes used in medical terminology.
3. Conventions for combined morphemes and the formation of plurals.
4. Basic anatomical medical terms.
5. Form medical terms utilizing roots, suffixes, prefixes, and combining roots.
6. Interpret basic medical abbreviations/symbols.
7. Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system, musculoskeletal system, respiratory system, cardiovascular system, nervous system, and endocrine system.
8. Interpret medical orders/reports.

9. Formats and Contents of medical records
10. Data entry and management on electronic health record system.

Reference Books:

1. Davies, Juanita. Essentials of Medical Terminology. 3rd edition. New York. Delmar.2008.
2. Mogli. JD. Medical Records: Organization & Management 2ndedition New Delhi: Jaypee Brothers.
3. The body by Bilbirson Agreed for Occupance

Professionalism and Values & Indian Constitution (30 Hours)

CO NO.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the concepts of professionalism, ethical values, personal values, accountability, and professional conduct in healthcare practice.	**L2**
CO2	Describe the importance of teamwork, equality, cultural sensitivity, and appropriate professional behavior in the healthcare environment	**L2**
CO3	Apply principles of confidentiality, integrity, objectivity, and ethical decision-making in professional healthcare settings	**L3**
CO4	Analyze the structure, features, and significance of the Indian Constitution including fundamental rights, duties, directive principles, and constitutional bodies.	**L4**
CO5	Interpret the relationship between democracy, constitutional laws, social justice, sustainable development, and healthcare practices in India.	**L4**
CO6	Apply constitutional principles and professional ethics in addressing social, cultural, and legal issues within healthcare systems.	**L3**

Part A Professionalism and Values

The course on professionalism will deliver the concept of what it means to be a professional and how a specialized profession is different from a usual vocation. It also explains how relevant professionalism in terms of healthcare system is and how it affects the overall patient environment.

1. Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality
2. Personal values- ethical or moral values
3. Attitude and behaviour- professional behaviour, treating people equally.
4. Code of conduct, professional accountability and responsibility, misconduct
5. Differences between professions and importance of team efforts.Cultural issues in the healthcare environment

Part B Indian Constitution

The course on Indian Constitution provides understanding of knowledge of the Indian constitution. Familiarize students with the fundamental rights and duties. Understand the importance of constitutional laws. Understand the correlation between Indian constitution,

democracy, and society.

1. Meaning of the term „Constitution". Making of the Indian Constitution 1946- 1950.
2. The democratic institutions created by the constitution, bicameral system of Legislature at the Centre and in the States.
3. Fundamental rights and duties their content and significance.
4. Directive principles of States, policies need to balance fundamental rights with directive principles.
5. Special rights created in the Constitution for Dalits, backwards, women and children and the religious and linguistic minorities.
6. Doctrine of Separation of Powers, legislative, executive, and judicial and their functioning in India.
7. The Election Commission and State Public Service commissions.
8. Method of amending the Constitution.
9. Enforcing rights through writs.
10. Constitution and sustainable development in India

Reference Books -

1. Professionalism in Health Care: A Primer for Career Success" by Sherry Makely
2. "Principles of Management for Quality Projects: Smart Strategies" by George Ecke

Human Anatomy (90 Hours)

Course Outcomes

CO No.	Course Outcomes	Bloom's Taxonomy Level
CO1	Explain the basic structure, organization, and histology of cells, tissues, glands, and organ systems of the human body.	**L1**
CO2	Describe the anatomy and physiological relevance of the musculoskeletal, cardiovascular, respiratory, gastrointestinal, urinary, reproductive, endocrine, and nervous systems.	**L2**
CO3	Analyze the anatomical relationships of organs, blood vessels, nerves, lymphatics, and body structures with special emphasis on clinical and vascular access correlations.	**L2**
CO4	Apply anatomical knowledge of joints, muscles, sensory organs, embryology, and systemic organization in healthcare and clinical practice.	**L2**
CO5	Evaluate the gross and microscopic anatomy of major organs and systems relevant to diagnostic, therapeutic, and allied health sciences.	**L3**
CO6	Develop an integrated understanding of human anatomy and embryology for interpreting normal body structure, development, and clinical applications.	**L2**

COURSE CONTENT:

1. Introduction: Human body as a whole
    a. Definition of anatomy and its divisions.
    b. Terms of location, positions, and planes.
    c. Cell and its organelles.
    d. Epithelium: definition, classification, describe with examples, function.
    e. Glands: classification, describe serous, mucous & mixed glands with examples.
    f. Basic tissues: classification with examples
2. Locomotion and support
    a. Cartilage: types with example & histology.
    b. Bone: 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.
    c. Joints: classification of joints with examples, synovial joint (in detail for radiology).
    d. Muscular system: classification of muscular tissue & histology, names of muscles of the body.

3. Cardiovascular system
    a. Heart: size, location, chambers, exterior & interior, blood supply of heart.
    b. 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. Lymphatic system: cisterna chyli & thoracic duct, histology of lymphatic tissues, names of regional lymphatics, axillary and inguinal lymph nodes in brief. Anatomy correlated to vascular access to be emphasized.

4. Gastro-intestinal system
    a. Parts of GIT, oral cavity, lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Waldeyer‟s ring, esophagus, stomach, small and large intestine, liver, gall bladder, pancreas, radiographs of abdomen.
5. Respiratory system
    a. Parts of RS, nose, nasal cavity, larynx, trachea, lungs, broncho-pulmonary segments, histology of trachea, lung and pleura, names of paranasal air sinuses.
6. Peritoneum
    a. Description in brief.
7. Urinary system
    a. Kidney, ureter, urinary bladder, male and female urethra. Histology of kidney, ureter and urinary bladder.
8. Reproductive system
    a. Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology). Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology). Mammary gland: gross.
9. Endocrine glands
    a. Endocrine glands: pituitary gland, thyroid gland, parathyroid gland, suprarenal glad (gross & histology).
10. Nervous system
    a. Neuron, classification of nervous system, cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (gross & histology), meninges, ventricles & cerebrospinal fluid, names of basal nuclei, blood supply of brain, cranial nerves.
    b. Sympathetic trunk & names of parasympathetic ganglia.
11. Sensory organs
    a. Skin: histology, appendages of skin.
    b. Eye: parts of eye & lacrimal apparatus. Extra-ocular muscles & nerve supply.
    c. Parts of ear: external, middle and inner ear and contents.
12. Embryology:
    a. Spermatogenesis & oogenesis.
    b. Ovulation, fertilization.
    c. Fetal circulation.
    d. Placenta.

Human Anatomy Practicals (60 Hours)

COURSE OUTCOMES

CO No.	Course Outcomes	Bloom's Taxonomy Level
CO1	Describe the normal structure, histology, and organization of various tissues, organs, and body systems including epithelial tissues, glands, muscles, nerves, and sensory organs.	(L2)
CO2	Demonstrate identification of bones, muscles, organs, radiographs, histological slides, and anatomical models related to different body systems.	(L3)
CO3	Analyze the microscopic and gross anatomical features of cardiovascular, respiratory, urinary, gastrointestinal, reproductive, endocrine, and nervous systems with clinical correlation.	(L4)
CO4	Integrate anatomical, histological, embryological, and radiological knowledge for interpretation of normal body structures and their relevance in allied health practices such as dialysis and patient care.	(L5–L6)

COURSE CONTENT:

1. Introduction: Human body as a whole
    a. Histology of types of epitheliums.
    b. Histology of serous, mucous & mixed salivary gland.
2. Locomotion and support
    a. Histology of the 3 types of cartilage.
    b. Demo of all bones showing parts, radiographs of normal bones & joints.
    c. Histology of compact bone (TS & LS).
    d. Demonstration of all muscles of the body.
    e. Histology of skeletal, smooth & cardiac muscle (TS & LS).

3. Cardiovascular system
    a. Demonstration of heart and vessels in the body.
    b. Histology of large artery, medium sized artery & vein, large vein.
    c. Histology of lymph node, spleen, tonsil & thymus.
    d. Normal chest radiograph showing heart shadows.
    e. Relationship to vascular access in dialysis
4. Gastro-intestinal system
    a. Demonstration of parts of gastrointestinal system.
    b. Normal radiographs of gastrointestinal system.
    c. Histology of gastrointestinal system.
5. Respiratory system
    a. Demonstration of parts of respiratory system.
    b. Normal radiographs of chest.
    c. Histology of lung and trachea.
6. Peritoneum
    a. Demonstration of reflections.
7. Urinary system
    a. Demonstration of parts of urinary system.
    b. Histology of kidney, ureter, urinary bladder.
    c. Radiographs of abdomen-IVP, retrograde cystogram.
8. Reproductive system
    a. Demonstration of section of male and female pelvis with organs in situ.
    b. Histology of testis, vas deferens, epididymis, prostate, uterus, fallopian tube, ovary.
9. Endocrine glands
    a. Demonstration of the glands.
    b. Histology of pituitary, thyroid, parathyroid, suprarenal glands.
10. Nervous system
    a. Histology of peripheral nerve & optic nerve.
    b. Demonstration of all plexuses and nerves in the body.
    c. Demonstration of all parts of brain.
    d. Histology of cerebrum, cerebellum, spinal cord.
11. Sensory organs
    a. Histology of thin and thick skin.
    b. Demonstration and histology of eyeball.
    c. Histology of cornea & retina.
12. Embryology.
    a. Demonstration of models.

Suggested Readings:

- Ross and Wilson – *Anatomy and Physiology in Health and Illness*, 11th Ed., Elsevier
- Chaurasia B.D. – *Human Anatomy*, 7th Ed., CBS Publishers
- Gerard J. Tortora & Bryan H. Derrickson – *Principles of Anatomy and Physiology*, 14th Ed., Wiley

- Frank H. Netter – *Atlas of Human Anatomy*, 7th Ed., Elsevier
- Frederic H. Martini et al. – *Fundamentals of Anatomy and Physiology*, 9th Ed., Pearson
- Gray's Atlas of Anatomy – Richard Drake, Elsevier
- Manju Chugani & Preysi Chauhan – *Simplified Anatomy and Physiology for Paramedical Students*, Jaypee

Human Physiology (90 Hours)

Course Outcomes

CO NO.	COURSE OUTCOMES	Bloom's Taxonomy Level
CO1	Explain the composition, functions, and physiological properties of blood, cardiovascular system, and body fluids in maintaining homeostasis.	**L2**
CO2	Describe the physiology of digestive, respiratory, endocrine, and excretory systems with emphasis on regulation and functional mechanisms.	**L2**
CO3	Apply the principles of nervous system physiology, special senses, muscle physiology, and skin functions in clinical and healthcare settings.	**L3**
CO4	Analyze physiological mechanisms involved in circulation, respiration, renal function, hormonal regulation, and neural conduction under normal and abnormal conditions.	**L4**
CO5	Interpret physiological changes associated with blood disorders, cardiac abnormalities, respiratory dysfunctions, endocrine disorders, and renal impairments.	**L4**
CO6	Explain reproductive physiology, lactation, thermoregulation, and integrated body functions relevant to patient care and allied health sciences.	**L2**

COURSE CONTENT:

1. Blood
    a. Introduction: composition and function of blood.
    b. Red blood cells: erythropoiesis, stages of differentiation, function, count, physiological variation.
    c. Structure, function, concentration, physiological variation, methods of estimation of haemoglobin.
    d. White blood cells: production, function, life span, count, differential count.
    e. Platelets: origin, normal count, morphology functions.
    f. Plasma proteins: production, concentration, types, functions, albumin, globulin, fibrinogen, prothrombin.
    g. Haemostasis: definition, normal haemostasis, clotting factors, mechanism of clotting, disorders of clotting factors.
    h. Blood bank:
    i. Blood groups: ABO system, Rh system.
    j. Blood grouping & typing, cross matching.
    k. Rh system: Rh factor, Rh incompatibility.
    l. Blood transfusion: indication, universal donor and recipient concept.

m. Selection criteria of a blood donor, transfusion reactions.
n. Anticoagulants: classification, examples and uses.
o. Anaemias: morphological and etiological classification, effects of anaemia on body.
p. Blood indices: colour index, MCH, MCV, and MCHC.
q. Erythrocyte sedimentation rate (ESR) and packed cell volume, normal values, definition, determination.
r. Blood volume: normal value, determination of blood volume and regulation of blood volume.
s. Body fluid: pH, normal value, regulation and variation.
t. Lymph: lymphoid tissue formation, circulation, composition and function of lymph

2. Cardiovascular system

a. Heart: physiological anatomy, nerve supply.
b. Properties of cardiac muscle, cardiac cycle: systole, diastole. Intra-ventricular pressure curves.
c. Cardiac output (only definition).
d. Heart sounds, normal heart sounds, areas of auscultation.
e. Blood pressure: definition, normal value, clinical measurement of blood pressure.
f. Physiological variations, regulation of heart rate, cardiac shock, hypotension, hypertension.
g. Pulse: jugular, radial pulse, triple response.
h. Heart sounds: normal heart sounds, causes, characteristics and significance, heart rate.
i. Electrocardiogram (ECG) significance

3. Digestive System

a. Physiological anatomy of gastrointestinal tract, functions of digestive system.
b. Salivary glands: structure and functions, deglutition: stages and regulation.
c. Stomach: structure and functions.
d. Gastric secretion: composition function regulation of gastric juice secretion.
e. Pancreas: structure, function, composition, regulation of pancreatic juice.
f. Functions of liver. Bile secretion, composition, function, regulation of bile secretion, bilirubin metabolism, types of bilirubin, Vandenberg reaction, jaundice: types, significance.
g. Functions of gall bladder.
h. Small intestine: functions, digestion, absorption, movements.
i. Large intestine: functions, digestion and absorption of carbohydrates, proteins, fats, lipids, defecation

4. Respiratory system

a. Functions of respiratory system, physiological anatomy of respiratory system, respiratory tract, respiratory muscles.
b. Respiratory organs: lungs, alveoli, respiratory membrane, stages of respiration.
c. Mechanism of normal and rigorous respiration, forces opposing and favoring expansion of the lungs. Intra pulmonary pleural pressure, surface tension, recoil tendency of the wall.
d. Transportation of respiratory gases: transportation of oxygen: direction, pressure gradient, forms of transportation, oxygenation of Hb. Quantity of oxygen transported. Lung volumes and capacities
e. Regulation of respiration: mechanisms of regulation, nervous and chemical regulation, respiratory center, Hering–Breuer reflex.
f. Applied physiology and respiration: hypoxia, cyanosis, asphyxia, dyspnea, dysbarism, artificial respiration, and apnea.

5.Endocrine System

- Definition, classification of endocrine glands & their hormones, properties of hormones.
- Thyroid gland hormone: physiological anatomy, hormone secreted, physiological function, regulation of secretion, disorders: hypo and hyper secretion of hormone.
- Adrenal cortex: physiological anatomy of adrenal gland, adrenal cortex, cortical hormones, functions and regulation.
- Adrenal medulla: hormones, regulation and secretion. Functions of adrenaline and nor adrenaline.
- Pituitary hormones: anterior and posterior pituitary hormones, secretion, function.
- Hormones of pancreas.
- Insulin: secretion, regulation, function and action.
- Diabetes mellitus: regulation of blood glucose level.
- Parathyroid gland: function, action, regulation of secretion of parathyroid hormone.
- Calcitonin: function and action.

6. 6. Special senses

a. Vision: structure of eye, function of different parts.
b. Structure of retina.
c. Hearing: structure and function of ear, mechanism of hearing.
d. Taste buds: functions.
e. Smell: physiology, receptors.

7. Nervous system
    a. Functions of nervous system, neuron: structure, classification and properties.
    b. Neuroglia, nerve fiber, classification, conduction of impulses continuous and saltatory.
    c. Velocity of impulse transmission and factors affecting.
    d. Synapse: structure, types, properties.
    e. Receptors: definition, classification, properties.
    f. Reflex action: unconditioned properties of reflex action. Babinski's sign.
    g. Spinal cord nerve tracts. Ascending tracts, descending tracts.
    h. Pyramidal tracts
        - Extrapyramidal tracts, functions of medulla, pons, hypothalamic disorders.
        ii. Cerebral cortex lobes and functions, sensory cortex, motor cortex, cerebellum, functions of cerebellum. Basal ganglion: functions. EEG.
        iii. Cerebro Spinal Fluid (CSF): formation, circulation, properties, composition and functions.
        iv. Lumbar puncture.
    i. Autonomic Nervous System:
        i. Sympathetic and parasympathetic distribution and functions and comparison of functions.

8. Excretory System
    a. Functions of kidneys, nephron, vasa recta, cortical and juxtamedullary nephrons, comparison, juxta glomerular apparatus: structure and function. Renal circulation peculiarities.
    b. Mechanism of urine formation: ultrafiltration criteria for filtration GFR, plasma fraction,
    c. GFR, factors effecting GFR. Determination of GFR selective reabsorption –sites of reabsorption, substance reabsorbed, mechanisms of reabsorption of glucose, urea, H+, Cl- amino acids etc. TMG, tubular lead, renal threshold % of reabsorption of different substances, selective secretion.
    d. Properties and composition of normal urine, urine output. Abnormal constituents in urine, mechanism of urine concentration. Counter-current mechanisms: micturition, innervation of bladder, cystometrogram.
    e. Diuretics: water, diuretics, osmotic diuretics, artificial kidney, renal function tests: plasma clearance, actions of ADH, aldosterone and PTH on kidneys.
    f. Renal function tests.

9. 9. Reproductive system

a. Function of reproductive system, puberty.
b. Male reproductive system: functions of testes, spermatogenesis: site, stages, factors influencing, semen. Endocrine functions of testes.
c. Androgens: testosterone structure and functions.
d. Female reproductive system: ovulation, menstrual cycle: physiological changes during pregnancy, pregnancy test.
e. Lactation: composition of milk, factors controlling lactation.

10. Muscle nerve physiology
    - Classification of muscle, structure of skeletal muscle, sarcomere contractile proteins, neuromuscular junction. Transmission across neuromuscular junction. Excitation contraction coupling. Mechanism of muscle contraction muscle tone, fatigue, rigor mortis.

11. Skin
    - Structure and function, body temperature measurement, physiological variation, regulation of body temperature by physical chemical and nervous mechanisms. Role of hypothalamus, hypothermia and fever

Human Physiology (Practical)

Course Outcomes

CO No.	Course Outcomes	Bloom's Taxonomy Level
CO1	Describe the principles, procedures, and normal values of hematological and physiological laboratory investigations including hemoglobin estimation, blood cell counts, blood grouping, ESR, clotting time, and bleeding time.	**(L2)**
CO2	Perform basic hematological and physiological techniques such as blood pressure recording, differential WBC count, packed cell volume estimation, and determination of blood indices using standard laboratory methods.	**(L3)**
CO3	Analyze laboratory findings and physiological parameters obtained from hematological investigations, cardiovascular examination, and respiratory function tests for clinical interpretation.	**(L4)**
CO4	Integrate practical knowledge of hematology and human physiology in patient assessment, emergency care procedures, and allied health clinical applications.	**(L5–L6)**

COURSE CONTENT:

1. Hemoglobinometry.
2. White blood cell count.
3. Red blood cell count.
4. Determination of blood groups.
5. Leishman's staining and differential WBC count.
6. Determination of packed cell Volume.
7. Erythrocyte sedimentation rate (ESR).

8. Calculation of blood indices.
9. Determination of clotting time, bleeding time.
10. Blood pressure recording.
11. Auscultation for heart sounds.
12. Artificial respiration.
13. Determination of vital capacity.

Suggested Readings:

- Guyton & Hall – *Textbook of Medical Physiology*, Elsevier
- C.C. Chatterjee – *Human Physiology*, Medical Allied Agency
- K. Sembulingam – *Essentials of Medical Physiology*, Jaypee
- Gerard J. Tortora & Bryan H. Derrickson – *Principles of Anatomy and Physiology*, 14th Ed., Wiley
- Ross and Wilson – *Anatomy and Physiology in Health and Illness*, 11th Ed., Elsevier

BIOCHEMISTRY (90 Hours)

Course Outcomes

CO No.	Course Outcomes	Bloom's Taxonomy Level
CO1	Explain the principles of specimen collection, laboratory apparatus, analytical instruments, safety measures, and quality control procedures used in clinical laboratories**.**	**(L2)**
CO2	Apply the concepts of solution preparation, dilutions, acids, bases, buffers, indicators, and laboratory calculations in biochemical and clinical laboratory practices.	**(L3)**
CO3	Describe the structure, properties, metabolism, and biological significance of carbohydrates, lipids, proteins, nucleoproteins, enzymes, vitamins, minerals, and bioenergetics..	**(L2)**
CO4	Analyze acid–base balance, electrolyte regulation, blood gases, water balance, and metabolic disturbances using biochemical principles and laboratory investigations.	**(L4)**
CO5	Interpret organ function tests, hemoglobinopathies, enzyme activities, and special biochemical investigations relevant to clinical diagnosis and patient care**.**	**L4**
CO6	Apply principles of laboratory instrumentation, calibration, measurement systems, and standardization techniques for accurate biochemical analysis and reporting.	**L4**

COURSE CONTENT

1. Specimen collection:
    a. Pre-analytical variables.
    b. Collection of blood.
    c. Collection of CSF & other fluids.
    d. Urine collection.
    e. Use of preservatives.
    f. Anticoagulants.

2. Introduction to laboratory apparatus
    a. Pipettes: different types (graduated, volumetric, Pasteur, automatic etc.).
    b. Calibration of glass pipettes.
    c. Burettes, beakers, petri dishes, depression plates.
    d. Flasks: different types (volumetric, round bottomed, Erlenmeyer conical etc.).
    e. Funnels: different types (conical, Buchner etc.).
    f. Bottles: reagent bottles – graduated and common, wash bottles – different type

specimen bottles

3. Measuring cylinders, porcelain dish
    a. Tubes: test tubes, centrifuge tubes, test tube draining rack.
    b. Tripod stand, wire gauze, Bunsen burner.
    c. Cuvettes, significance of cuvettes in colorimeter, cuvettes for visible and UV range. Cuvette holder racks: bottle, test tube, pipette, desiccator, stop watch, timers, scissors.
    d. Dispensers: reagent and sample.
    e. Maintenance of lab glass ware and apparatus.
    f. Glass and plastic ware in laboratory.
    g. Use of glass: significance of boro silicate glass, care and cleaning of glass ware, different cleaning solutions of glass
    h. Care and cleaning of plastic ware, different cleaning solution.

4. Instruments (Theory and demonstration) Diagrams to be drawn

    a. Use, care and maintenance of: water bath, oven & incubators, water distillation plant, water deionizers, refrigerators, cold box, deep freezers, reflux condenser, centrifuge, balances, colorimeter, spectrophotometer, pH meter and electrodes.
    b. Centrifuges: definition, principles, Svedberg unit, centrifugal force, centrifugal field, RPM, conversion of G to RPM and vice versa, different types of centrifuges.
    c. Manual balances: single pan, double pan, triple balance, direct read out electrical balances.
    d. Guideline to be followed and precautions to be taken while weighing. Weighing different types of chemicals, liquids, hygroscopic compounds etc.
    e. Colorimeter, spectrophotometer, pH meter, electrodes, salt bridge solution: principles, parts, types, guidelines to be followed and precautions to be taken while using.
5. Safety of measurements
6. Conventional and SI units
7. Atomic structure
    a. Dalton's theory, properties of electrons, protons, neutrons, and nucleus, Rutherford's model of atomic structure, Bohr's model of atomic structure, orbit and orbital quantum numbers, Heisenberg's uncertainly principle. Electronic configuration, Aufbau principle.
    b. Pauli's exclusion principle, etc.
    c. Valency and bonds: different types of strong and weak bonds in detail with examples.
    d. Theory & Practical for all the following under this section: molecular weight, equivalent weight of elements and compounds, normality, molarity. Preparation of molar solutions (mole/liter solution) e.g.: 1 M NaCl, 0.15 M NaCl, 1 M NaOH, 0.1 M HCl, 0.1 M H2S04 etc.
    e. Preparation of normal solutions. e.g., 1N Na2CO3, O.1N Oxalic acid, 0.1 N HCl, 0.1N H2SO4, 0.66 N H2S04 etc., percent solutions. Preparation of different solutions: v/v w/v (solids, liquids and acids). Conversion of a percent solution into a molar solution.

8. Dilutions

    a) Diluting solutions: e.g. preparation of 0.1 N NaCl from 1 N NaCl & from 2N NaCl etc., preparing working standard from stock standard, body fluid dilutions, reagent dilution techniques, calculating the dilution of a solution, body fluid reagent etc., saturated and supersaturated solutions. Technique for preparation of standard solutions e.g.: glucose, urea, etc., significance of volumetric flask in preparing standard solutions. Volumetric flasks of different sizes, preparation of standard solutions of deliquescent compounds (CaCl2, potassium carbonate, sodium hydroxide etc.). Preparation of standards using conventional and SI unit's acids, bases, salts and indicators.

9. Acids and Bases
    a. Definition, physical and chemical properties with examples. Arrhenius concept of acids and bases, Lowry – Bronsted theory of acids and bases. Classification of acids and bases.
    b. Differences between bases and alkali, acidity and basicity, monoprotic and polyprotic acids and bases. Concepts of acid base reaction, hydrogen ion concentration, ionization of water, buffer, and pH value of a solution.
    c. Preparation of buffer solutions using pH meter. Salts: definition, classification, water of crystallization, definition and different types, deliquescent and hygroscopic salts.

10. Acid- base indicators:
    a. Definition, concept, mechanism of dissociation of an indicator, color change of an indicator in acidic and basic conditions, use of standard buffer solution and indicators for pH determinations, preparation and its application, list of commonly used indicators and their pH range, suitable pH indicators used in different titrations, universal indicators.

11. Quality control
    a. Accuracy, precision. Specificity, sensitivity, limits of error allowable in laboratory, percentage error.
    b. Normal values and Interpretations.

12. Special Investigations
    a. Serum electrophoresis, immunoglobulins, drugs: digitoxin, theophylline, regulation of acid base status, Henderson Hassel Bach equations, buffers of the fluid, pH regulation, disturbance in acid base balance, anion gap, metabolic acidosis, metabolic alkalosis, respiratory acidosis, respiratory alkalosis, basic principles and estimation of blood gases and pH, basic principles and estimation of electrolytes, water balance, sodium regulation, bicarbonate buffers, nutrition, nutritional support with special emphasis on parental nutrition, calorific value, nitrogen balance, respiratory quotient, basal metabolic rate, dietary fibers, nutritional importance of lipids, carbohydrates and proteins, vitamins.

13. Carbohydrate- properties, metabolism of fructose, Glycolysis, TCA cycle, Gluconeogenesis and its biological importance

14. Lipid- properties, metabolism and its biological importance

15. Protein - properties, metabolism, degradation of fatty acids and its biological importance
16. Nucleoproteins- chemistry, structure and function
17. Hemoglobinopathies- structure, properties and abnormal Hb
18. Enzymes- definition, classification, coenzymes, factors affecting their action, enzyme inhibition, enzymes of clinical importance.
19. Vitamins- classification, functions, source, deficiency manifestations and hypervitaminoses.
20. Bioenergetics – Importance of ATP, Mitochondria, biological oxidation, respiratory chain
21. Minerals – Ca2+, phosphorous, Na+, Cl-, iron, Iodine and copper, water and electrolytes
22. Organ function tests – Liver function test, Renal Function test.

Biochemistry Practicals (60 hours)

COURSE OUTCOME

CO No.	Course Outcomes	Bloom's Taxonomy Level
CO1	Describe the composition of normal urine, principles of biochemical investigations, renal and liver function tests, lipid profile, cardiac markers, blood gases, and electrolyte analysis.	(L2)
CO2	Perform routine urine examination, biochemical estimations, glucometer testing, titration procedures, and identification of abnormal urinary constituents using standard laboratory techniques.	(L3)
CO3	Analyze biochemical laboratory reports and interpret diagnostic charts related to renal disorders, metabolic abnormalities, liver dysfunction, and cardiovascular conditions.	(L4)
CO4	Integrate biochemical and laboratory findings for clinical interpretation, diagnosis support, and application in allied health and patient care settings.	(L5–L6)

COURSE CONTENT:

1. Analysis of normal urine.
2. Composition of urine.
3. Procedure for routine screening.
4. Urinary screening for inborn errors of metabolism.

5. Common renal disease.
6. Urinary calculus.
7. Urine examination for detection of abnormal constituents.
8. Interpretation and diagnosis through charts.
9. Liver function tests.
10. Lipid profile.
11. Renal function test.
12. Cardiac markers.
13. Blood gas and electrolytes.
14. Estimation of blood sugar, blood urea, serum creatinine and electrolytes.
15. Demonstration of strips, demonstration of glucometer.
16. Titration of a simple acid and a base (preparation of standard solution of oxalic acid and using this solution finding out the normality of a sodium hydroxide solution. Acid to be titrated using this base Calculation of normality of an acid or a base after titration, measurement of hydrogen ion concentration.

Suggested Readings:

- U. Sathyanarayana – *Biochemistry*, Elsevier
- Robert K. Murray et al. – *Harper's Illustrated Biochemistry*, Tata McGraw-Hill
- M.N. Chatterjee & Rana Shinde – *Textbook of Medical Biochemistry*, Jaypee
- Alan Gowenlock – *Varley's Practical Clinical Biochemistry*, CBS
- David L. Nelson & Michael M. Cox – *Lehninger Principles of Biochemistry*, W.H. Freeman
- D.M. Vasudevan – *Textbook of Biochemistry*, Jaypee
- A.C. Deb – *Fundamentals of Biochemistry*, New Central Book Agency
- Y.K. Joshi – *Basics of Clinical nutrition*, Jaypee publishers

Introduction to Dialysis Therapy (45 Hours)

Course Outcome:

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the basic concepts, causes, and clinical features of acute kidney injury (AKI) and chronic kidney disease (CKD).	**(L2)**
CO2	Describe the history, principles, components, and mechanisms of hemodialysis and peritoneal dialysis.	**(L2)**
CO3	Compare the functions of the normal kidney with dialysis therapies and differentiate between hemodialysis and peritoneal dialysis.	**(L4)**
CO4	Explain the principles, indications, and clinical importance of renal transplantation and organ transplantation.	**(L3)**
CO5	Analyze the role of conservative management and palliative care in patients with end-stage renal disease (ESRD).	**(L4)**
CO6	Demonstrate understanding of dialysis unit organization, staff responsibilities, protocols, and operational requirements for establishing a dialysis unit.	**(L3)**

COURSE CONTENT:

1. Kidney Diseases Basics AKI & CKD
2. Haemodialysis (HD)
    a. History of dialysis
    b. Define Haemodialysis
    c. Components of haemodialysis apparatus
    d. Mechanisms of haemodialysis
3. Peritoneal Dialysis (PD)
    a. History of Peritoneal Dialysis
    b. Define peritoneal dialysis.
    c. Components of peritoneal dialysis apparatus.
    d. Mechanisms of peritoneal dialysis.
4. Renal Transplantation
    a. History of organ transplantation (including Kidney)
    b. List & Define organ/tissue transplantation.

c. Define kidney transplantation.

5. Normal Kidney & Dialysis
    a. Compare the normal kidney functions with dialysis.
    b. Indications for dialysis.
    c. Compare HD & PD
6. Conservative management
    a. Define conservative management & Palliative care.
    b. Methods of conservative management.
    c. Importance of conservative management.
    d. Palliative care for ESRD.
7. Introduction to Dialysis Unit
    a. Various areas in the dialysis unit and their importance
    b. Staff, job responsibilities
    c. Protocol to establish a dialysis unit.

Community orientation and clinical visit (CT) (90 Hours)

The objective of this particular section of the foundation course is to sensitize potential learners with essential knowledge; this will lay a sound foundation for their learning across the undergraduate program and across their career. Innovative teaching methods should be used to ensure the attention of a student and make them more receptive such as group activities, interactive fora, role plays, and clinical bed-side demonstrations.

1. The community orientation and clinical visit will include a visit to the entire chain of healthcare delivery systems -Sub center, PHC, CHC, SDH, DH and Medical college, private hospitals, dispensaries and clinics.
2. The student will also be briefed regarding governance at village level including interaction and group discussion with village panchayat and front-line health workers.

3. Clinical/ OPD visit to their respective professional departments within the hospital

SEMESTER-II

PATHOLOGY (60 Hours)

Course Outcome

CO NO.	Course Outcomes	Bloom's Taxonomy Level
CO1	Define the basic terminologies, branches, and fundamental concepts of pathology including etiology, pathogenesis, lesions, prognosis, and disease manifestations.	**L1**
CO2	Explain the mechanisms and pathological features of cell injury, inflammation, healing, fluid hemodynamics, neoplasia, and infectious diseases.	**L2**
CO3	Apply the principles of genetics, cardiovascular, respiratory, gastrointestinal, renal, endocrine, nervous, and musculoskeletal pathology in clinical conditions.	**L3**
CO4	Describe histopathology procedures including specimen handling, fixation, tissue processing, section cutting, staining techniques, and biomedical waste management.	**L2**
CO5	Demonstrate clinical pathology procedures including collection, preservation, processing, and examination of urine, body fluids, CSF, sputum, and stool specimens.	**L3**
CO6	Identify hematology and blood bank procedures including blood sample collection, anticoagulants, hematological investigations, blood grouping, Rh typing, and cross matching.	**L1 & L3**

COURSE CONTENT:

1. **Introduction to pathology & basic terminologies**
   1. Introduction to pathology
   2. Recognize the relevance of Pathology
   3. Define the basic terminologies and branches of Pathology
      a. Aetiology
      b. Pathogenesis
      c. Pathological and clinical manifestations
      d. Complications & sequelae
      e. Prognosis
      f. Syndrome
      g. Lesion
   4. Explain the scope of the following branches of pathology:
      a. Histopathology
      b. Cytopathology
      c. Hematology

2. **Cell injury & adaptation**
   Cell adaptation
   Define cell growth, differentiation and cell. adaptation
   Describe the various cell adaptations with examples.
      a. Hypertrophy
      b. Hyperplasia
      c. Atrophy
      d. Metaplasia
      e. Dysplasia
   Necrosis
   1. Define necrosis
   2. Describe the various types of necrosis with clinical examples
      a. Coagulative necrosis
      b. Colliquative necrosis/ Liquefactive necrosis
      c. Caseous necrosis
      d. Fibrinoid necrosis
      e. Fat necrosis
      f. Gangrene

3. **Inflammation**
   Define inflammation. List the types with examples.

Acute inflammation

1. Define acute inflammation.
2. Describe the causes and cardinal signs of acute inflammation
3. Explain the vascular of acute inflammation.
4. Describe the cellular events in acute inflammation.
5. Explain the sequelae of acute inflammation.
6. Explain the beneficial, harmful and systemic effects of acute inflammation.

Chronic inflammation

1. Define chronic inflammation.
2. List the causes of chronic inflammation.
3. Describe the macroscopic and microscopic features in chronic inflammation.
4. List the cells in chronic inflammation.
5. Define granulomatous inflammation.
6. List the components of a granuloma and describe its morphology
7. List the causes of granulomatous inflammation.

4. Healing & repair

Wound healing

1. Define granulation tissue and describe the formation of granulation tissue.
2. Describe the following:
    a. Healing by first intention.
    b. Healing by second intention.
    c. Wound organization, contraction and scarring.
3. Explain the factors which modify (influence) healing and repair.

5. **Fluid Hemodynamics**

Oedema

1. Define oedema.
2. List the types of oedema.
3. Describe the pathogenesis and clinical features of the different types of oedema.

Shock

1. Define shock.
2. List the various types of shock.
3. Describe the pathogenesis of septic and hypovolemic shock.

Thrombosis (Arterial & Venous)

1. Define thrombosis.
2. Describe the factors influencing pathogenesis of thrombosis.
3. List causes of arterial and venous thrombosis.
4. List the fates of thrombus.

Embolism

1. Define embolism. List the types of embolism with examples.
2. Describe the clinicopathologic consequences of pulmonary thromboembolism

Infarction

1. Define infarction.
2. Describe the types and clinical significance of infarction.

6. **Neoplasi**a
    1. Define neoplasia
    2. Describe the nomenclature of tumors with examples
    3. Define dysplasia and anaplasia
    4. Describe the differences between benign and malignant tumors
    5. Define carcinogenesis. List the types of carcinogens with example of each
    6. Describe the etiology & predisposing factors of tumors
    7. Define metastasis.
    8. Describe the routes of metastasis with examples
    9. Describe the prognostic factors of tumors with emphasis on staging & grading
    10. Describe the various modalities for diagnosis of cancer

7. **Infectious diseases**

    Tuberculosis

    1. Describe the aetiology and mode of transmission of tuberculosis
    2. Describe the clinical features of tuberculosis.
    3. Describe the morphology of primary, secondary and miliary tuberculosis.

    Leprosy

    1. List the aetiological factors of leprosy
    2. Classify leprosy
    3. Describe the morphology of lepromatous and tuberculoid leprosy

8. **Genetics**
    1. Describe the basic concepts of genetics
    2. Define with suitable examples
        a. Autosomal dominant
        b. Autosomal recessive
        c. X-linked recessive
        d. Chromosomal abnormalities
    3. Define karyotyping
9. Blood vessels & heart

    Hypertension

    1. Define hypertension
    2. Classify hypertension
    3. Describe the effects of hypertension on various organs

    Atherosclerosis

    1. Define atherosclerosis
    2. List the sites of involvement by atherosclerosis
    3. Describe the predisposing factors, complications & clinical effects of atherosclerosis

    ischemic heart disease/coronary artery disease

    1. Define ischemic heart diseases
    2. Describe the clinical spectrum of the disease (with reference to angina and myocardial infarction

    Aneurysm

    1. Define aneurysm
    2. List the causes, types and complications of aneurysms

Rheumatic heart disease

1. Define rheumatic heart diseases
2. Describe its aetiology & clinical features

Cardiac failure

1. Define cardiac failure
2. List the causes of cardiac failure
3. Describe its pathophysiology & clinical features

10. Respiratory system

Pneumonia

1. Define pneumonia
2. List the types of pneumonia
3. Describe the etiology and clinical features of pneumonia

Chronic obstructive airway disease

1. Define chronic obstructive airway disease.
2. List the types of chronic obstructive airway Disease.

Emphysema

1. Define emphysema
2. List the types of emphysema
3. Describe the etiology and clinical features of emphysema

Chronic bronchitis

1. Define chronic bronchitis
2. Describe the etiology and clinical features of chronic bronchitis

Bronchiectasis

1. Define bronchiectasis
2. List the types of bronchiectasis.
3. Describe the etiology and clinical features of bronchiectasis

Asthma

1. Define asthma
2. List the types of asthma
3. Describe the etiology and clinical features of asthma

Pneumoconiosis

1. Define pneumoconiosis
2. List the types of pneumoconiosis
3. Describe the etiology and clinical features of pneumoconiosis

11. Gastrointestinal tract & liver

Gastric & duodenal ulcers

1. Definition gastric and duodenal ulcer
2. Describe the etiology, gross pathology and clinical features of gastric and duodenal ulcer

GIT malignancies

1. List the types of common GIT malignancies
2. Describe their predisposing factors & clinical features

Jaundice

1. Define jaundice
2. List the types of jaundice with examples

Viral hepatitis

1. Describe the etiology of viral hepatitis
2. List the modes of infection
3. Describe the clinical features of viral hepatitis

Cirrhosis of liver

1. Define cirrhosis
2. List the causes of cirrhosis

Liver failure

1. Define liver failure
2. List the causes of liver failure
3. Describe its pathophysiology & clinical features

12. **Renal system**

Define nephrotic syndrome & nephritic syndrome with suitable examples Renal failure

1. Define renal failure
2. List its types & describe the clinical features

13. **Endocrine system**
    1. Define hyperthyroidism & hypothyroidism
    2. Describe the causes, clinical features and laboratory diagnosis of hyperthyroidism and hypothyroidism
    3. Describe the types, causes & clinical features of goiter
    4. Describe types, clinical features, complications & laboratory diagnosis of diabetes
14. **Nervous system**
    1. Define Cerebrovascular diseases
    2. Describe its causes and clinical features
15. **Musculoskeletal system**

Fracture

1. Define fracture
2. List the types of fracture
3. Describe the process of fracture healing
4. List the factors influencing fracture repair

Osteomyelitis

1. Define osteomyelitis
2. Describe the etiology, types and clinical features of osteomyelitis
3. Define and list the clinical features of Rheumatoid arthritis

16. **Histopathology**
    1. Introduction to histopathology.
    2. Receiving of specimen in the laboratory.
    3. Grossing techniques.
    4. Mounting techniques: various mountants.
    5. Maintenance of records and filing of the slides.
    6. Use & care of microscope.
    7. Various fixatives, mode of action, preparation and indication.
    8. Section cutting.
    9. Tissue processing for routine paraffin sections.

10. Decalcification of tissues.
11. Staining of tissues: H & E Staining.
12. Bio-medical waste management.

17. **Clinical Pathology**

1. Introduction to clinical pathology.
2. Collection, transport, preservation, and processing of various clinical specimens.
3. Urine Examination: collection and preservation of urine, physical, chemical, microscopic examination.
4. Examination of body fluids.
5. Examination of Cerebro spinal fluid (CSF).
6. Sputum examination.
7. Examination of faeces/Stool.

18. **Hematology**

1. Introduction to hematology.
2. Normal constituents of blood, their structure and function.
3. Collection of blood samples.
4. Anticoagulants used in hematology.
5. Instruments and glassware used in hematology, preparation and use of glassware.
6. Laboratory safety guidelines.
7. SI units and conventional units in hospital laboratory.
8. Hb, PCV.
9. ESR.
10. Normal hemostasis.
11. Bleeding time, clotting time, prothrombin time, activated partial thromboplastin time.

19. **Blood Bank**

1. Introduction.
2. Blood grouping and Rh types.
3. Cross matching

Pathology Practicals

Course Outcomes

CO NO.	COURSE OUTCOMES	Bloom's Taxonomy Level
CO1	Identify the principles and procedures involved in physical, chemical, and microscopic examination of urine specimens.	L1

CO2	Demonstrate blood grouping, Rh typing, hemoglobin estimation, packed cell volume, and erythrocyte sedimentation rate procedures using standard laboratory methods.	**L3**
CO3	Apply laboratory techniques for assessment of bleeding time and clotting time in hematological investigations	**L3**
CO4	Describe the principles and steps involved in histopathological section cutting and Hematoxylin & Eosin staining procedures.	**L2**

COURSE CONTENT:

1. Urine Examination: physical, chemical, microscopic.
2. Blood grouping Rh typing.
3. Hb estimation, packed cell volume (PCV), erythrocyte sedimentation rate (ESR).
4. Bleeding time, clotting time.
5. Histopathology: section cutting and H &E staining.
   Renal Biopsy Slides

MICROBIOLOGY (60 Hours)

Course Outcomes

CO NO.	Course Outcomes	Bloom Taxonomy Level
CO1	Define the basic concepts, classification, morphology, growth, nutrition, and culture characteristics of microorganisms used in medical microbiology.	**L1**
CO2	Explain the principles of sterilization, disinfection, culture media preparation, antimicrobial sensitivity testing, and biomedical waste management in microbiology laboratories.	**L2**
CO3	Apply the principles of immunology and interpret common serological and rapid diagnostic tests including Widal, VDRL, ASLO, CRP, RF, ELISA, HIV, and HBsAg tests.	**L3**
CO4	Describe the morphology, cultivation, diseases caused, specimen collection, and laboratory diagnosis of clinically important bacteria in systematic bacteriology.	**L2**
CO5	Demonstrate the laboratory identification and diagnostic methods of medically important parasites, fungi, and viruses associated with human diseases.	**L3**
CO6	Identify the causative agents, transmission methods, prevention, and control measures related to hospital-acquired infections in healthcare settings.	**L1 & L3**

COURSE CONTENT:

1. Introduction to Medical Microbiology, Virology, Mycology & Parasitology
2. Morphology
    a. Classification of microorganisms, size, shape and structure of bacteria. Use of microscope in the study of bacteria.
3. Growth and nutrition
    a. Nutrition, growth and multiplications of bacteria, use of culture media in diagnostic bacteriology.
4. Culture media
    a. Use of culture media in diagnostic bacteriology, antimicrobial sensitivity test.
5. Sterilization and Disinfection
    a. Principles and use of equipment of sterilization namely hot air oven, autoclave and serum inspissator, pasteurization, antiseptic and disinfectants.
6. Immunology
    a. Immunity, vaccines, types of vaccine and immunization schedule, principles and interpretation of common serological tests namely Widal, VDRL, ASLO, CRP, RF & ELISA.
    b. Rapid tests for HIV and HBsAg (excluding technical details).
7. Systematic Bacteriology
    a. Morphology, cultivation, diseases caused, laboratory diagnosis including specimen collection of the following bacteria (excluding classification, antigenic structure and pathogenicity), Staphylococci, Streptococci, Pneumococci, Gonococci, Meningococci, C. diphtheriae, Mycobacteria, Clostridia, Bacillus, Shigella, Salmonella, *E. coli*, Klebsiella, Proteus, Vibrio cholerae, Pseudomonas & Spirochetes.
8. Parasitology
    a. Morphology, life cycle, laboratory diagnosis of following parasites: *E. histolytica*, Plasmodium, tape worms, Intestinal nematodes.
9. Mycology
    a. Morphology, diseases caused and lab diagnosis of following fungi. Candida, Cryptococcus, Dermatophytes, opportunistic fungi
10. Virology
    a. General properties of viruses, diseases caused lab diagnosis and prevention of following viruses, Herpes, Hepatitis, HIV, Rabies and Poliomyelitis.
11. Hospital infection
    a. Causative agents, transmission methods, investigation, prevention and control of hospital infection.
12. Principles and practice Biomedical waste management

Microbiology Practicals (30 Hours)

COURSE OUTCOME

CO No.	Course Outcomes	Bloom's Taxonomy Level
CO1	Describe the principles of microbiology, sterilization techniques, culture media, staining methods, serological tests, and infection control practices related to clinical and dialysis settings.	(L2)
CO2	Perform microbiological procedures including microscopy, staining techniques, culture methods, antibiotic susceptibility testing, and stool examination using standard laboratory protocols.	(L3)
CO3	Analyze microbial growth patterns, laboratory findings, serological test results, and infection control measures for identification and prevention of infectious diseases.	(L4)
CO4	Integrate microbiological knowledge, biomedical waste management practices, and applied anatomy & physiology in maintaining infection control and patient safety during dialysis procedures.	(L5–L6)

COURSE CONTENT:

1. Compound microscope.
2. Demonstration of sterilization equipment's: hot air oven, autoclave, bacterial filters.
3. Demonstration of commonly used culture media, nutrient broth, nutrient agar, blood agar, chocolate agar, MacConkey medium, L J media, Robertson cooked meat media, Potassium tellurite media with growth, MacConkey medium with LF & NLF, NA with staph.
4. Anaerobic culture methods.
5. Antibiotic susceptibility test.
6. Demonstration of common serological tests: Widal, VDRL, ELISA.
7. Gram staining.
8. Acid fast staining.
9. Fungal Staining
10. Stool exam for helminthic ova & cysts.
11. Visit to hospital for demonstration of work done by infection control team and biomedical waste management department

GENERAL PHARMACOLOGY (60 Hours)

COURSE OUTCOME

CO No.	Course Learning Outcomes	Bloom's Level
CO1	Define the basic principles of pharmacology including routes of drug administration, pharmacokinetics, pharmacodynamics, drug toxicity, and drug safety.	**L1**
CO2	Explain the pharmacological actions and therapeutic uses of drugs acting on the autonomic nervous system including cholinergic, adrenergic, anticholinergic, and neuromuscular blocking agents.	**L2**
CO3	Apply the principles of pharmacotherapy related to central nervous system disorders, pain management, rheumatoid arthritis, gout, epilepsy, and psychiatric conditions.	**L3**
CO4	Describe the therapeutic uses and mechanisms of drugs acting on the gastrointestinal, blood, cardiovascular, and respiratory systems.	**L2**
CO5	Demonstrate understanding of antimicrobial chemotherapy including antibiotics, antifungal, antiviral, antitubercular, antimalarial, anti-amoebic, and anthelmintic drugs used in clinical practice.	**L3**
CO6	Identify the pharmacological applications of hormones, antidiabetic drugs, thyroid medications, immunosuppressors, and immunomodulators in disease management.	**L1&L2**

COURSE CONTENT:

1. General Pharmacology
    a. Introduction
    b. Routes of drug administration
    c. Pharmacokinetics
    d. Pharmacodynamics
    e. Drug toxicity and safety

2. Autonomic nervous system including skeletal muscle relaxants.
    a. Cholinergic drugs
    b. Anticholinergic drugs:

c. Neuromuscular blocking drugs
d. Adrenergic drugs
e. Adrenergic receptor antagonists

3. Central nervous system
    a. General anesthetics (GAs)
    b. Local anesthetics (LAs)
    c. Sedative & hypnotics
    d. Opioids
    e. NSAIDs
    f. Drug treatment of rheumatoid arthritis (RA)
    g. Drug treatment of gout:
    h. Psychopharmacology
    i. Parkinsonism
    j. Alcohol
    k. Antiepileptic drugs

4. GIT
    a. Drugs for peptic ulcer
    b. Antiemetics
    c. Laxatives and antidiarrheals

5. Blood
    a. Hematinic
    b. Anticoagulants
    c. Antiplatelet drugs
    d. Fibrinolytics and antifibrinolytics

6. Cardiovascular system
    a. Diuretics
    b. Drugs used in congestive heart failure (CHF)
    c. Antihypertensives
    d. Antianginal drugs
    e. Hypolipidemic

7. Respiratory System
    a. Pharmacotherapy of bronchial asthma
    b. Pharmacotherapy of cough
    c. Antihistaminic

8. Chemotherapy
    a. General aspects
    b. Beta lactam antibiotics
    c. Cotrimoxazole
    d. Macrolides
    e. Fluoroquinolones

f. Antifungal agents
g. Antiviral drugs
h. Antitubercular drugs
i. Antileprotic drugs
j. Aminoglycosides
k. Antiamoebic drugs
l. Anthelmintics
m. Antimalarial drugs

9. Hormones and related drugs
    a. Glucocorticoids
    b. Antidiabetic drugs
    c. Thyroid and anti-thyroid drugs

10. Immunosuppressors and Immunomodulators

Applied Anatomy & Physiology Related to Dialysis Therapy (60 Hours)

COURSE OUTCOME

CO NO.	Course Outcome	Bloom's Taxonomy Level
CO1	Define the anatomy and histology of the urinary system including kidney, bladder, ureter, urethra, prostate, and peritoneum relevant to dialysis therapy.	L1
CO2	Explain the blood supply, innervation, developmental anatomy, and vascular structures used for dialysis access procedures.	L2
CO3	Apply the principles of renal physiology including urine formation, glomerular filtration rate, clearance studies, and renal circulation in clinical dialysis practice.	L3
CO4	Describe the physiological regulation of electrolytes, acid-base balance, hemostasis, coagulation mechanisms, and hormonal functions of the kidney	L2
CO5	Demonstrate understanding of nutritional management in renal diseases and interpretation of basic diagnostic investigations including ECG and ECHO	L3
CO6	Identify the structure and functional significance of the juxtaglomerular apparatus and mechanisms involved in micturition and vesicoureteral reflux.	L1&L2

COURSE CONTENT:

Applied Anatomy

1. Basic anatomy of urinary system: structural anatomy of kidney, bladder, ureter, urethra, prostate.
2. Histology of kidney.
3. Blood supply of kidney.
4. Development of kidney in brief.
5. Anatomy of peritoneum including concept of abdominal hernias.
6. Anatomy of vascular system:
    a. Upper limb vessels: course, distribution, branches, origin & abnormalities.
    b. Neck vessels: course, distribution, branches, origin & abnormalities.
    c. Femoral vessels: course, distribution, branches, origin & abnormalities.
    d. Artery & Veins used for dialysis.
7. Histology of bladder, urethra

8. Innervation of urinary bladder

Physiology

1. Mechanism of urine formation.
2. Glomerular filtration rate (GFR).
3. Clearance studies.
4. Physiological values of urea, creatinine, electrolytes, calcium, phosphorous, uric acid, magnesium, glucose; 24 hours urinary indices – urea, creatinine, electrolytes, calcium, magnesium.
5. Physiology of renal circulation
    a. Factors contributing & modifying renal circulation.
    b. Auto regulation.
6. Hormones produced by kidney & physiologic alterations in pregnancy.
7. Haemostasias: coagulation cascade, coagulation factors, auto regulation, BT, CT, PT, PTT, thrombin time.
8. Acid base balance: basic principles & common abnormalities like hypokalemia, hyponatremia, hyperkalemia, hypernatremia, hypocalcemia, hypercalcemia, pH, etc.
9. Basic nutrition in renal diseases.
10. Basics of ECG, ECHO
11. Juxta Glomerular Apparatus
12. Micturition reflux

Applied Anatomy & Physiology Related to Dialysis Therapy Practicals (30 Hours)

Course Outcomes

CO NO.	Course Outcomes	Bloom's Taxonomy Level
CO1	Describe the anatomy and physiology of the urinary and vascular systems, including kidney development, peritoneum, dialysis-related vessels, and cardiovascular parameters.	(L2)
CO2	Demonstrate identification of urinary organs, vascular structures, radiographs, ECG/ECHO findings, and perform physiological procedures such as GFR estimation, hemoglobinometry, blood pressure recording, and clotting studies.	(L3)
CO3	Analyze anatomical, physiological, and diagnostic findings related to renal and cardiovascular function for clinical interpretation in dialysis practice.	(L4)
CO4	Integrate applied anatomy and physiology concepts for safe vascular access management, patient assessment, and monitoring during dialysis procedures.	(L5–L6)

COURSE CONTENT:

Applied Anatomy

1. Urinary system
    a. Demonstration of parts of urinary system.
    b. Histology of kidney, ureter, urinary bladder.
    c. Radiographs of abdomen-IVP, retrograde cystogram.
2. Development of Kidney
3. Peritoneum
    - Demonstration of reflections.
4. Anatomy of vascular system:
    - Upper limb vessels.
    - Neck vessels
    - Femoral vessels
    - Artery & Veins used for dialysis.

Applied Physiology

1. Estimation of GFR
2. Hemoglobinometry.
3. Determination of clotting time, bleeding time.
4. Blood pressure recording.
5. Auscultation for heart sounds.
6. Interpretation of ECG & ECHO

Fundamentals of Dialysis Therapy (45 Hours)

Course Outcome

CO No.	Course Learning Outcomes	Bloom's Taxonomy Level
CO1	Define the indications, types, and basic principles of hemodialysis and peritoneal dialysis used in renal replacement therapy.	**L1**
CO2	Explain the mechanisms of diffusion, ultrafiltration, convection, osmosis, and factors affecting solute clearance in hemodialysis and peritoneal dialysis.	**L2**
CO3	Apply the principles of vascular access management, water treatment systems, extracorporeal blood circuits, dialysate preparation, and peritoneal dialysis apparatus in dialysis procedures.	**L3**
CO4	Describe the structure, properties, permeability, and biocompatibility of semipermeable and peritoneal membranes used in dialysis therapy.	**L2**
CO5	Demonstrate the procedures for priming dialysis apparatus, assembling hemodialysis equipment, and dialyzer reuse techniques with appropriate safety measures.	**L3**
CO6	Identify common complications of hemodialysis and methods for effective monitoring of patients during dialysis therapy.	**L1 & L3**

COURSE CONTENT:

1. Indications of dialysis.

2. Types of dialysis.
   List the types of Hemodialysis
   List the types of Peritoneal dialysis

3. Principles of Hemodialysis
   Define Hemodialysis Principles
   Discuss the application of diffusion in HD and list the factors affecting diffusion
   Discuss ultrafiltration and convection in hemodialysis and factors affecting them
   List the factors affecting solute clearance in HD
   Define Kuf & KoA
4. Principles of Peritoneal Dialysis

Define Peritoneal Dialysis Principles
Discuss the application of diffusion in PD and list the factors affecting diffusion
Discuss ultrafiltration/ Osmosis, convection and fluid absorption in Peritoneal Dialysis and factors affecting them
List the factors affecting solute clearance in PD

5. Hemodialysis Apparatus
   Vascular Access
   Water Treatment Plant
   Extracorporeal Blood
   Circuit HD machine
   Dialysate

6. Basics of Semipermeable membrane & Peritoneal Membrane
   Define semipermeable membrane
   List the properties of a semipermeable membrane
   List the importance of biological semipermeable membrane
   List the importance of semipermeable membrane in the field of dialysis – HD & PD
   Define biocompatibility and explain its importance in the dialysis field
   Discuss the factors affecting the permeability of the semipermeable membrane in HD & PD

7. Peritoneal Dialysis Apparatus
   PD Access
   PD fluid
   PD Cyclers

8. Introduction to hemodialysis
   machine.
   Electronics Circuit
   Hydraulics Circuit
   Alarms in HD
   machine
9. Priming of dialysis
   apparatus.
   Purpose
   Assembling
   Steps for priming HD apparatus

10. Dialyzer reuse
    Chemicals used
    Purpose
    Advantages and Disadvantages
    Steps involved in reuse

11. Common complications of hemodialysis.
12. Monitoring patients during dialysis.

Fundamentals of Dialysis Therapy Practicals (30 Hours)

COURSE OUTCOME

CO No.	Course Outcomes	Bloom's Taxonomy Level
CO1	Describe the components and functioning of hemodialysis apparatus including vascular access, water treatment plant, extracorporeal blood circuit, HD machine, and dialysate system.	(L2)
CO2	Demonstrate the procedures of assembling, priming, dialyzer reuse, patient monitoring, and handling of dialysis equipment using standard dialysis protocols.	(L3)
CO3	Analyze dialysis blood circuit parameters, patient vitals, and complications arising during hemodialysis for appropriate clinical management.	(L4)
CO4	Integrate technical and clinical knowledge for safe operation of dialysis equipment, effective patient monitoring, and management of complications during dialysis procedures.	(L5–L6)

COURSE CONTENT:

1. **HD Apparatus Spotters**

   Vascular Access
   Water Treatment Plant
   Extracorporeal Blood
   Circuit HD machine
   Dialysate

2. Priming of Dialysis Apparatus
   Assembling
   Steps for priming HD apparatus
3. Dialyzer reuse
   Steps involved in reuse
4. Monitoring during
   dialysis Patient
   Monitoring
   Vitals

5. Managing complications during dialysis.
6. Understanding Dialysis Blood Circuit.

CLINICAL POSTING I (135 Hours)

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a senior dialysis therapist. Students are tested on intermediate clinical dialysis therapy skills.
Areas to be covered.

1. OPD
2. Dialysis Unit
3. Procedure room for assisting in Renal Biopsy.

SEMESTER-III

SOCIOLOGY IN HEALTH CARE (45 Hours)

Course Outcomes

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the fundamental concepts, principles, scope, and significance of sociology and medical sociology in healthcare and patient care.	**L2**
CO2	Describe the influence of social, cultural, economic, demographic, and psychosocial factors on health, illness, and healthcare utilization.	**L2**
CO3	Apply sociological concepts to understand health-related issues, occupational diseases, community health problems, and healthcare delivery systems.	**L3**
CO4	Analyze the role of social class, gender, ethnicity, age, culture, and life events in determining health outcomes and health inequalities.	**L4**
CO5	Analyze the structure and functioning of hospitals, medical social services, healthcare professions, and healthcare organizations from a sociological perspective.	**L4**
CO6	Apply sociological principles in addressing healthcare challenges, health administration, and health development issues in society and developing countries.	**L3**

COURSE CONTENT:

1.Introduction to medical sociology
   a. Definition, objectives, principles, scope, and its relevance to patient care.
   b. Difference between sociology of medicine and sociology in medicine.
   c. Historical development of medical sociology.
   d. Sociological perspectives of health and illness.
2. Social Patterning of health
   a. Social Class
   b. Gender
   c. Ethnicity
   d. Age

e. Place
f. Health and development
g. Marital and Cultural Factors
h. Psycho-Social Factors
i. Social
j. Life Events
k. Life Course

3. Social epidemiology
    a. Definitions, socio-cultural factors bearing on health in India.
    b. Common occupational diseases and prevention of occupational diseases.
4. Health profession and organization
    a. Medical social service in a hospital
    b. Hospital as a social organization.
    c. Professional qualities of a physician.
5. Principles of sociology
    a. Definition, objectives
    b. Nature and scope of sociology
    c. Origin and Nature of society.
    d. Social groups – characteristics and functions
    e. Social control
    f. Culture and civilization
6. Sociology of health and hospital management
    a. Health, development, and care
    b. Third world countries health
    c. Challenges of health and health care administration.

BIOMEDICAL WASTE MANAGEMENT (30 Hours)

COURSE OUTCOME

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the concepts, classification, and significance of Biomedical Waste (BMW) management in healthcare settings.	**L2**
CO2	Describe the procedures for segregation, collection, transportation, treatment, and disposal of biomedical waste, including color-coding systems.	**L2**
CO3	Apply appropriate methods of biomedical waste management, disinfection techniques, and use of Personal Protective Equipment (PPE) to ensure environmental and occupational safety.	**L3**
CO4	Analyze the risks associated with biomedical waste, HAZMAT, cross infections, and hazardous materials in healthcare environments.	**L4**
CO5	Analyze the role of modern technologies, monitoring systems, and infection control measures in effective biomedical waste management.	**L4**
CO6	Apply relevant biomedical waste management regulations, legal provisions, and safety protocols in healthcare practice.	**L3**

COURSE CONTENT:

Bio medical waste management and environment safety- The aim of this section will be to help prevent harm to workers, property, the environment, and the general public. Topics to be covered under the subject are as follows:

1. Definition of Biomedical Waste
2. Waste minimization
3. BMW – Segregation, collection, transportation, treatment, and disposal (including color coding)
4. Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste
5. BMW Management & methods of disinfection
6. Modern technology for handling BMW
7. Use of Personal protective equipment (PPE)
8. Monitoring & controlling of cross infection (Protective devices)

9. Acts/Law of BMW
10. HAZMAT

PATHOPHYSIOLOGY OF KIDNEY DISEASES (75 Hours)

Course Outcomes

CO No.	Course Learning Outcomes	Bloom's Level
CO1	Explain the etiology, pathogenesis, clinical features, and pathology of acute and chronic kidney diseases, glomerular disorders, nephrotic syndrome, nephritic syndrome, and urinary tract infections.	L2
CO2	Describe the pathology of renal vascular disorders, obstructive uropathies, congenital and inherited renal diseases, renal tumors, and pregnancy-associated renal disorders.	L2
CO3	Apply knowledge of renal biopsy, culture and sensitivity sampling techniques, infection control measures, and universal precautions in nephrology practice.	L3
CO4	Analyze the pathological changes associated with hypertension, diabetes mellitus, peritoneal diseases, reflux nephropathy, and dialysis-related complications.	L4
CO5	Analyze the microbiological aspects of vascular access infections, opportunistic infections, hepatotropic viral infections, HIV-associated renal diseases, and their preventive measures.	L4
CO6	Apply pathological and microbiological principles in the assessment and management of renal diseases relevant to dialysis and patient care.	L3

COURSE CONTENT:

1. Acute Kidney Injury.
2. Glomerular pathology Primary and Secondary
3. Renal biopsy
4. Nephrotic syndrome – primary & secondary.
5. Nephritic syndrome.
6. UTI (urinary tract infections.)
7. Asymptomatic urinary abnormalities.
8. Chronic Kidney Diseases.
9. Renal stone diseases.
10. Obstructive uropathies.
11. Congenital abnormalities of urinary system
12. Inherited renal diseases.
13. Tumors of kidney & Urinary Bladder.
14. Pregnancy associated renal diseases.

15. Renal vascular disorders & hypertension associated renal diseases.
16. Tubulo-interstitial diseases.
17. Renal vascular disorders.
18. Pathology of kidney in hypertension, diabetes mellitus.
19. Pathology of peritoneum, peritonitis, bacterial, tubular & sclerosing peritonitis, dialysis induced changes.
20. Renal Tuberculosis
21. Hepatotropic viruses in detail: mode of transfusion, universal precautions vaccinations.
22. Human immunodeficiency virus (HIV), mode of transfusion, universal precautions & HIVAN.
23. Opportunistic infections.
24. Microbiology of vascular access infection (femoral, jugular, subclavian catheters).
25. Sampling methodologies for culture & sensitivity.
26. Reflux Nephropathy
27. Basic tropical disease

INTRUMENTATION SPECIFIC TO DIALYSIS THERAPY (75 Hours)

COURSE OUTCOMES

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the components, functions, operation, cleaning, disinfection, and troubleshooting of hemodialysis machines and associated circuits.	**(L2)**
CO2	Describe the principles, components, standards, and maintenance of water treatment systems used in dialysis, including RO systems, filtration units, and disinfection processes	**(L2)**
CO3	Apply knowledge of dialysis equipment, dialyzer reprocessing systems, CRRT machines, PD cyclers, and monitoring devices in clinical dialysis practice.	**(L3)**
CO4	Analyze the functioning, performance parameters, and operational requirements of advanced renal replacement therapy equipment and monitoring systems.	**(L4)**
CO5	Analyze equipment-related problems, safety issues, and maintenance requirements associated with dialysis and extracorporeal therapy devices.	**(L4)**
CO6	Apply technical knowledge for the safe use and monitoring of specialized equipment such as ECMO, plasmapheresis devices, online hemodiafiltration systems, liver dialysis systems, and ultrasound machines in patient care.	**(L3)**

COURSE CONTENT:

1. Equipment's used in Hemodialysis
    a. HD machine -Components and function
    b. HD machine – Blood Circuit
    c. HD machine – Dialysate circuit
    d. Cleaning and disinfection of HD machine
    e. OCM
    f. Trouble shooting equipment related problems during HD.
2. Water treatment System
    a. Purpose of water treatment
    b. AAMI and ISO standards for RO water.
    c. Filtration

d. Softener and carbon filtration
e. Deionizer
f. RO system
g. Ultrafiltration and UV Irradiation
h. Portable RO
i. Heat disinfection of water lines

3. Dialyzer Reprocessing Equipment
    a. Types of Automated dialyzer reprocessing machine
    b. Automated reuse equipment – components and function
    c. Automated reuse equipment – care and maintenance
4. Equipment‟s used for special procedures.
    a. Types of CRRT equipment
    b. CRRT equipment – components and function
    c. CRRT equipment – care and maintenance
5. PD cyclers
6. Defibrillators
7. Cardiac Monitors
8. MARS, SPAD and Prometheus System for Liver dialysis
9. ECMO
10. Plasmapheresis Equipment‟s
11. Bioimpedance analysis machine/ Body Composition Monitors
12. Online Hemodiafiltration
13. Blood Temperature, Blood Volume monitor
14. Enuresis monitor
15. Ultrasound machine- For Depth, Flow of AVF

INTRUMENTATION SPECIFIC TO DIALYSIS THERAPY Practicals (60 Hours)

COURSE OUTCOME

CO No.	Course Outcomes	Bloom's Taxonomy Level
CO1	Describe the principles, components, functions, and maintenance of hemodialysis equipment, water treatment systems, reprocessing units, and specialized renal care devices.	(L2)
CO2	Demonstrate identification, operation, cleaning, disinfection, troubleshooting, and maintenance of dialysis-related equipment and monitoring systems used in renal care procedures.	(L3)
CO3	Analyze the working mechanisms, performance parameters, and clinical applications of advanced renal support systems including CRRT, ECMO, plasmapheresis, online hemodiafiltration, and monitoring devices.	(L4)

CO4	Integrate technical and clinical knowledge for safe handling, monitoring, troubleshooting, and effective utilization of dialysis and critical care equipment in patient management.	(L5–L6)

COURSE CONTENT:

1. Equipments used in Hemodialysis Parts
    a. HD machine
    b. Blood Circuit
    c. Cleaning and disinfection of HD machine
    d. OCM
    e. Trouble shooting of HD.
2. Water treatment System Parts
    a. Sand Filters
    b. Softener and carbon filtration
    c. Deionizer
    d. RO system
    e. Ultrafiltration and UV Irradiation
    f. Portable RO
    g. Heat disinfection of water lines
3. Dialyzer Reprocessing Equipment parts
4. Automated reuse equipment – care and maintenance
5. Equipment's used for special procedures.
    a. Types of CRRT equipment parts
6. PD cyclers parts and usage
7. Defibrillators parts and usage
8. Cardiac Monitors
9. MARS, SAPD and Prometheus System Parts
10. ECMO Machine parts
11. Plasmapheresis centrifugal machine parts
12. Bioimpedance analysis machine/ Body Composition Monitors parts and working mechanism.
13. Online Hemodiafiltration machine parts
14. Blood Temperature, Blood Volume monitor
15. Enuresis monitor
16. Ultrasound machine- For Depth, Flow of AVF

BASIC PRINCIPLS OF NURSING CARE (45 Hours)

COURSE OUTCOMES

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the principles and procedures of basic nursing care including bed making, vital signs monitoring, intake-output charting, and care of bedridden patients.	**(L2)**
CO2	Demonstrate skills in bed making, monitoring vital signs, maintaining input-output charts, and managing emergency crash carts.	**(L3)**
CO3	Apply aseptic techniques while performing bladder catheterization, intravenous cannulation, injections, wound care, and specimen handling.	**(L3)**
CO4	Analyze patient care requirements and implement appropriate nursing interventions for bedridden patients and patients requiring vascular access care.	**(L4)**
CO5	Analyze the importance of infection prevention, patient safety, and accurate documentation in clinical practice.	**(L5)**
CO6	Apply procedural knowledge while assisting physicians in minor surgical procedures, vascular access procedures, suturing, and suture removal.	**(L3)**

COURSE CONTENT:

1. Bed making
2. Vital Signs Monitoring
3. Input and Output chart
4. Maintenance of emergency crash cart
5. Bladder catheterization
6. Injections – intravenous, intramuscular, subcutaneous
7. Insertion of intravenous canulae
8. Cleaning and dressing of wounds and vascular access sites and peritoneal catheter exit site
9. Assisting the physician in procedures like minor surgery, vascular access, etc.
10. Suturing & Removal of sutures
11. Care of bed ridden patients,
12. Documentation
13. Collection of blood, urine and stool specimens and their transfer aseptic precautions to the laboratory

MEDICAL LAW AND ETHICS (30 Hours)

COURSE OUTCOMES

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the principles and procedures of basic nursing care, vital signs monitoring, specimen collection, and collection, and clinical documentation.	**(L2)**
CO2	Demonstrate skills in bed making, monitoring vital signs, maintaining input-output charts, and managing emergency crash carts.	**(L3)**
CO3	Apply aseptic techniques while performing bladder catheterization, intravenous cannulation, injections, wound care, and specimen handling.	**(L3)**
CO4	Analyze patient care requirements and implement appropriate nursing interventions for bedridden patients and patients requiring vascular access care.	**(L4)**
CO5	Analyze the importance of infection prevention, patient safety, and accurate documentation in clinical practice.	**(L4)**
CO6	Apply procedural knowledge while assisting physicians in minor surgical procedures, vascular access procedures, suturing, and suture removal.	**(L3)**

COURSE CONTENT:

Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society‟s legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.

Medical ethics has developed into a well based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice" Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum. Few of the important and relevant topics that need to focus on are as follows:

1. Medical ethics - Definition - Goal - Scope
2. Introduction to Code of conduct
3. Basic principles of medical ethics – Confidentiality
4. Malpractice and negligence - Rational and irrational drug therapy

5. Autonomy and informed consent - Right of patients
6. Care of the terminally ill- Euthanasia
7. Organ transplantation
8. Medico legal aspects of medical records – Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects.
9. Professional Indemnity insurance policy
10. Development of standardized protocol to avoid near miss or sentinel events.
11. Obtaining an informed consent.

CLINICAL POSTING II (180 Hours)

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a senior dialysis therapist. Students are tested on intermediate clinical dialysis therapy skills.

Areas to be covered:

- Dialysis unit
- ICU
- Renal transplants work up.
- Operation Theater for Observing AVF/AVG Creation, PD catheter Insertion & Renal Transplantation.

SEMESTER-IV

PHARMACOLOGY RELATED TO DIALYSIS THERAPY (60 Hours)

COURSE OUTCOME

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the principles of fluid therapy, diuretics, antihypertensive agents, anticoagulants, and other pharmacological agents commonly used in renal diseases and dialysis care.	**(L2)**
CO2	Describe the mechanisms of action, therapeutic uses, dosage considerations, adverse effects, contraindications, and monitoring requirements of drugs used in nephrology and dialysis practice.	**(L2)**
CO3	Apply pharmacological knowledge in the administration, monitoring, and dosage modification of medications for patients undergoing dialysis and renal replacement therapies.	**(L3)**
CO4	Analyze factors affecting drug dialyzability, drug clearance during dialysis, and the clinical implications of altered dialysis prescriptions on medication management.	**(L4)**
CO5	Analyze the pharmacological management of anemia, mineral and bone disorders, anticoagulation, immunosuppression, and electrolyte imbalances in patients with kidney diseases.	**(L4)**
CO6	Apply knowledge of dialysis solutions, hemodialysis concentrates, CRRT solutions, emergency drugs, organ preservation solutions, and newer therapeutic agents in dialysis and transplantation practice.	**(L3)**

COURSE CONTENT:

1. IV fluid therapy with special emphasis in renal diseases
    a. Basics of fluid therapy
    b. Calculation of fluid infusion
    c. Intra-venous fluid administration
    d. Commonly used iv fluids
2. Diuretics
    a. Diuretics and its classification, actions, dosage, side effects & contraindications
3. Anti-hypertensives
    a. Classification of anti-hypertensive drugs, its actions, dosage, side effects & contraindications, special reference during dialysis, vasopressors, drugs used in hypotension.
4. Drugs and dialysis

a. Importance of dialyzabilty of drugs
b. Factors affecting the dialyzability of drugs.
c. Drugs that need modifications
d. Physicochemical characteristics of the drug and dialyzability
e. Dialysis properties that affect drug clearance.
f. Dialyzability of phenobarbital
g. Dialyzability of lithium
h. Dialyzability of methanol

5. Vitamin-D & its analogues, phosphate binders, iron, folic acid & other vitamins of therapeutic value
    a. Metabolism of Vitamin D in health & disease.
    b. Mechanism of action, Therapeutic use and contraindication of
        i. Vitamin D & its analogues.
        ii. phosphate binders & Newer Phosphate Binders.
        iii. Calcimimetics Agents
        iv. vitamin B12and folic acid.
6. Erythropoiesis Stimulating Agent (ESA)
    a. Use of ESAs
    b. Different types of ESAs
    c. Mechanism of action of ESAs
    d. Pharmacokinetics of ESAs
    e. Therapeutic use of ESAs
    f. Adverse effect of ESAs.
    g. Precautions and contraindications of ESAs.
7. Heparin and low molecular weight heparin (LMWH)
    a. Mechanism of action of unfractionated heparin (UFH).
    b. Mechanism of action of LMWH.
    c. Contraindication of unfractionated heparin and LMWH.
    d. Adverse effect of heparin and LMWH.
    e. Monitoring of heparin therapy.
    f. Heparin induced thrombocytopenia.
8. Protamine sulphate
    a. Therapeutic use of Protamine Sulphate.
    b. Dosage and administration
    c. Adverse reaction.
9. Newer anticoagulants
    a. Pharmacology of heparinoids.
    b. Pharmacology of regional citrate anticoagulant
    c. Pharmacology of thrombin inhibitors
10. Chemicals Used in Dialysis Unit (Renalin- Peroxyacetic Acid, Formalin, Citrate, Sodium hypochlorite and hydrogen peroxide)
    a. Therapeutic use, precautions, and adverse effects of formalin
    b. Therapeutic use, precautions, and adverse effects of citrate
    c. Therapeutic use, precautions, and adverse effects of sodium hypochlorite
    d. Therapeutic use, precautions, and adverse effects of hydrogen peroxide
    e. Therapeutic use, precautions, and adverse effects of Peroxyacetic Acid

11. Hemodialysis concentrates
    a. Composition of hemodialysis concentrates.
    b. Types of hemodialysis concentrates and write it's advantages and disadvantages
    c. Clinical implication of altered dialysate composition
12. Peritoneal dialysis (PD) fluid
    a. Buffer and pH of PD fluid.
    b. Electrolyte concentrations of PD fluid
    c. Newer PD Solutions
13. Potassium exchange resin
    a. Clinical pharmacology, mechanism of action and therapeutic use of potassium exchange resin.
    b. Contraindications of potassium exchange resin
    c. Adverse reactions of potassium exchange resins
    d. Drug interactions of potassium exchange resin
14. Immuno Suppressive Drugs
15. CRRT Replacement & Dialysis Solutions
16. Online HDF
17. Emergency Drugs used in Dialysis
18. IV iron preparations.
19. Organ Preservation Solutions
20. Other Newer Drugs for Dialysis & Transplantation.

Pharmacology Related to Dialysis Therapy Practicals (60 Hours)

COURSE OUTCOME

CO No.	Course Outcomes	Bloom's Taxonomy Level
CO1	Describe the pharmacological principles, indications, actions, and uses of drugs, anticoagulants, dialysis solutions, and chemicals commonly used in dialysis and renal care units.	(L2)
CO2	Demonstrate safe preparation, administration, and handling of erythropoiesis stimulating agents, IV iron preparations, PD fluids, CRRT solutions, anticoagulants, and emergency drugs used during dialysis procedures.	(L3)
CO3	Analyze the therapeutic effects, adverse reactions, dosage considerations, and clinical applications of medications and dialysis-related solutions in patient management.	(L4)
CO4	Integrate pharmacological knowledge for safe medication administration, anticoagulation management, and emergency care during dialysis and critical renal support procedures.	(L5–L6)

COURSE CONTENT:

1. Administration of Erythropoiesis stimulating agents (ESA)
2. IV Iron Preparation
3. Vitamin supplements
4. Crystalloids & Colloids
5. Inotropic drugs
6. Anti-pyretic drugs
7. Anti-emetic drugs
8. Heparin, LMWH and Tri-sodium citrate, Regional Anticoagulation
9. Chemicals used in dialysis unit
10. PD fluids
11. Dialysis & CRRT solutions
12. Emergency Drugs used in Dialysis

PSYCHOLOGY (45 Hours)

COURSE OUTCOMES

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the fundamental concepts, principles, methods, and major schools of psychology, including their relevance to healthcare and allied health sciences.	**(L2)**
CO2	Describe the physiological basis of behavior, human development, attention, perception, personality, learning, memory, intelligence, motivation, and emotions.	**(L2)**
CO3	Apply psychological principles to understand individual behavior, communication, attitudes, group dynamics, stress management, and interpersonal relationships in healthcare settings.	**(L3)**
CO4	Analyze the influence of cognitive, emotional, social, cultural, and environmental factors on human behavior, health, and well-being.	**(L4)**
CO5	Analyze psychological disorders, their classification, causes, clinical manifestations, and the role of clinical psychology in healthcare practice.	**(L4)**
CO6	Apply psychological assessment techniques, counseling principles, and therapeutic approaches in addressing behavioral and mental health issues.	**(L3)**

COURSE CONTENT:

1. Introduction to Psychology
    a. Definition of Psychology, Branches, Fields and Scope of Psychology, Educational and School Psychology‟ Physiological, Developmental, Social, Industrial and Organizational and Clinical Psychology. Emerging specialties, Environmental, Forensic and Health Psychology.
2. Scientific methods of studying Psychology
    a. Experimental, Observational, Case Study/Clinical Methods, Interview, Survey, Introspective and Testing Methods – Merits and Demerits.
3. Major schools of Psychology
    a. Structuralism-Functionalism-Behaviorism-Gestalt Psychology-Humanistic Psychology
4. Physiological basis of Psychology
    a. The Nervous System: Division of the nervous system, Neurons, Transmission of neural signals. The Synapse; The Implication of Chemical Transmission, Reflex Arcs and The Spinal Cord, The Endocrine System, The Brain, The Cerebral Hemispheres, The Central Core, Disorders of the Brain, Studying Brain behavior relations

5. Normal development
    a. Definition, Psychological needs and Development during Infancy, Early Childhood, Late Childhood, Adolescence, Adulthood and Old Age. Brief description of the relative importance of heredity and environment
6. Attention and Perception
    a. Definition, Types of attention, Voluntary, Involuntary and Habitual. Determinants of attention. Principles of perception, Inaccurate perception and Underlying reasons. Brain mechanisms of visual perception, Effects of brain damage on visual perception, Perception of form, Perception of Space and Motion.
7. Personality
    a. Definition- Trait and Type Theories of Personality, The social learning approaches: Bandura, Psychodynamic approach: Freud, The humanistic approach: Maslow and Self- actualization. Rogers and Conditions of worth, Assessment of Personality through questionnaires and Projective tests.

8. Learning and Memory
    a. Definition, Factors affecting learning, Laws of learning by Thorndike; Importance of studying Psychology of learning in relation to Allied Health Sciences. Experimentation in learning: Human and Animal learning, Quantitative assessment of learning; Learning curves; Theories of conditioning, Pavlov‟s contribution. The biological significance of classical conditioning-Basic principles of classical conditioning-Conditioned emotional responses, what is learned in classical conditioning?
    b. Operant conditioning; The laws of effect of Skinner and operant behavior, The three contingencies, Reinforcement, Punishment and Extraction, Other Operant procedures and Phenomena. Conditioning of complex behavior, Aversive control of behavior, Observation and imitation.
    c. Sensory memory, short term or Working memory, long term memory learning and encoding in long term memory, Organization of long-term memory, Reasons for forgetting.
9. Intelligence
    a. Definition, meaning of intelligence, Theories of intelligence, Spearman's two factor theory, an information processing theory of intelligence, The neuro psychological theory of intelligence, Mental age, and I.Q, Normal distribution of intelligence levels, Intelligence Testing, Intelligence tests, Uses and abuses of intelligence tests.
10. Motives and Emotions
    a. Definition, Motives, Drives, Needs, Biological needs, Eating, Sexual behavior, Aggressive behavior. The nature of Emotions, Expression and recognition of Emotions, Feelings and Emotions, Physiological basis of Emotions, Emotion and health, Heart disease, Headache, Asthma, Rheumatoid arthritis, Cancer and Peptic Ulcer. Theories of Emotions, James Lange theory, Cannon Bard theory and other theories
11. Attitudes and their Formation
    a. Sources of attitude, Nature of attitudes. Measurement of attitudes. Change of

attitudes, Persuasion, Prejudices. Social influences and Group behavior, Imitation, social facilitation, social loafing, Reciprocity, Commitment, Attractive people, Authority, Group decision making, resisting social influence, Interpersonal relation and loving.

12. Lifestyle, Health, Stress and Coping Behavior
    a. Cultural evolution, Life style choices and consequences, Healthy and Unhealthy life styles. Nutrition, Physical fitness, Smoking and Drinking. Stress and Health, the biological basis of stress, Stress and Physical functioning, Coping with stress, Adjustment a life-long process. Cognitive appraisal and Stress, Stressful life styles, coping with everyday stress, Sources of stress, Coping styles and Strategies, Stress inoculation training
13. Communication
    a. Persuasion, Communication, the source, the message, the audience, Behavior in groups, the nature of groups, Leadership, Group structure, Group thinking, Herold Leavitt's communication network.

14. Clinical Psychology
    a. Definition of Clinical Psychology, Role of Clinical Psychology in Allied Health Sciences, Concept of Normality and Abnormality. The nature and causes of mental disorders. Classification of abnormal behavior DSMIV, ICD 10, Difference between Neuroses and Psychosis. Anxiety, Somatoform and Dissociative disorders, Personality disorders, Psychoactive substance use disorders, Schizophrenic disorders, Mood disorders
15. Psychological Assessment and Treatment
    a. Tests of intelligence (important test), Tests of personality (important test), Tests for adjustments and conflicts (Bells adjustment inventory, Sentence Completion Test, Projective tests such as Rorschach, TAT, CAT, CPT etc.) The treatment of mental disorders, Insight therapies, Psychoanalysis and Psychodynamic approaches, Humanistic therapy, Gestalt therapy, Behavior and Cognitive Behavior therapies, Counselling. Group therapy, Electro convulsive therapy, Psychosurgery, Ethical and legal issues in Psychotherapy.

RENAL NUTRITION (45 Hours)

COURSE OUTCOMES

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the fundamentals of nutrition, nutritional screening methods, and assessment tools used in patients with kidney diseases.	**(L2)**
CO2	Describe the metabolic alterations in protein, amino acid, carbohydrate, lipid, fluid, electrolyte, and acid-base balance associated with kidney diseases.	**(L2)**
CO3	Apply nutritional assessment findings and dietary principles in planning nutritional care for patients with CKD, AKI, Hemodialysis (HD), Peritoneal Dialysis (PD), and renal transplantation	**(L3)**
CO4	Analyze the impact of kidney disease on nutritional status and evaluate factors influencing malnutrition, inflammation, and metabolic complications in renal patients.	**(L4)**
CO5	Analyze the role of calcium, phosphate, parathyroid hormone, and vitamin D in Chronic Kidney Disease–Mineral and Bone Disorder (CKD-MBD) and their nutritional management.	**(L4)**
CO6	Apply evidence-based nutritional strategies to optimize dietary management, fluid balance, electrolyte control, and overall nutritional outcomes in renal patients.	**(L3)**

COURSE CONTENT:

1. Basics of Nutrition
2. Nutritional Screening and Assessment
    - Introduction
    - Mini Nutritional Assessment
    - Nutritional Assessment
        i. Medical History
        ii. The effect of comorbidities
        iii. Medications and Drug-Nutrient Interactions
        iv. Psychosocial History
        v. Dietary History
        vi. Physical Examination
        vii. Anthropometric Measurements
        viii. Biochemical Assessment and Laboratory Data
    - Nutritional Assessment Tools
        i. Subjective Global Assessment (SGA)
        ii. Dialysis Malnutrition Score (DMS)

iii. Malnutrition and Inflammation Score (MIS)

3. Impact of kidney disease on amino acid, protein, carbohydrate and lipid metabolism
    - Metabolic alterations in kidney disease
    - Impact of kidney disease on acid base balance,
    - Impact of kidney disease on protein and amino acid metabolism,
    - Impact of kidney disease on carbohydrate metabolism and
    - Impact of kidney disease on lipid metabolism

4. Nutritional management in CKD patient (pre-dialysis) fluid and electrolytes
    - Determine of Nutritional care in CKD patient,
    - Nutritional care indications
    - Nutrient guidance for adult patient with pre-ESRD
    - Management of fluid in patient with pre-ESKD and electrolytes management in patient with pre-ESRD.
5. Nutritional management of HD patient
    - Purpose of nutritional management in HD patient
    - Factors favoring nutritional status
    - Nutrient guidance in HD patient
    - Intentions of nutrition care in HD patient
    - Diet in HD patient
6. Nutritional management of Peritoneal Dialysis (PD) patient
    - Nutrient guidance in PD patient
    - Intentions of nutrition care in PD patient
    - Diet in PD patient
7. Nutritional management of renal transplant recipient
    - Motives of medical nutrition therapy for renal transplant recipient,
    - Factors favoring nutritional status,
    - Nutrient favoring for kidney transplant recipient
    - Determine nutrition care for kidney transplant recipient and diet for kidney transplant recipient
8. Nutritional management of acute kidney injury (AKI)
    - Determination of medical nutrition therapy for patient with AKI
    - Factors favoring nutritional status,
    - Nutrient recommendation for patient with AKI
    - Determination of nutrition care in patient with AKI and nutritional support for patient with AKI
9. Calcium, phosphate, parathyroid hormone & vitamin-D in CKD patients
    - Chronic kidney disease and mineral bone disease (CKD MBD),
    - Influence of kidney disease on Ca,
    - Phosphate, PTH and Vitamin- and nutritional modification in CKD MBD.
10. Goals of nutritional management in HD patient,
11. factors influencing nutritional status in HD & PD
12. Purpose of nutrition care in HD & PD.

DIALYSIS THERAPIES -PART I (75 Hours)

COURSE OUTOMES

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the principles, components, and operation of hemodialysis equipment, dialyzers, dialysis solutions, water treatment systems, and dialysis modalities.	**(L2)**
CO2	Describe vascular access types, cannulation techniques, vascular access surveillance methods, anticoagulation strategies, and medications commonly used in dialysis patients.	**(L2)**
CO3	Apply knowledge and technical skills for initiation of dialysis therapy, vascular access management, cannulation procedures, dialyzer reprocessing, and safe hemodialysis practices. .	**(L3)**
CO4	Analyze the performance of dialyzers, dialysis adequacy parameters, water treatment systems, vascular access complications, and factors affecting hemodialysis outcomes.	**(L4)**
CO5	Analyze the role of anticoagulation, infection control measures, universal precautions, and quality assurance practices in ensuring safe and effective dialysis treatment.	**(L4)**
CO6	Apply evidence-based principles for monitoring dialysis therapy, managing complications, optimizing dialysis adequacy, and maintaining patient safety in hemodialysis units.	**(L3)**

COURSE CONTENT:

1. Hemodialysis equipment
   Hemodialysis apparatus, function of dialysis machine, parts of extracorporeal circuit of dialysis machine, parts of dialysis delivery system

2. Initiation of dialysis therapy
   Initiating of dialysis therapy, choice of modality, options of renal replacement therapy, when to initiate dialysis, relationship between uremic syndrome and eGFR, indications of dialysis in the chronic setting and concept of early initiation of dialysis

3. Types of dialyzers and its membrane
   Structure of dialyzer, types of dialyzers, hollow fiber dialyzer, Parts of hollow fiber dialyzer, types of dialyzer membranes, cellulosic membrane, Synthetic membranes and its advantages, dialyzer performance and clearance, biocompatibility of the dialyzer, advantages of biocompatible membrane

4. Composition of dialysis solution
   Preparation of dialysate, types of concentrate, mixing of dialysate, chemical used to prepare dialysate, monitoring of dialysate parameter for quality maintenance, consequences of altered dialysate composition

5. Vascular access and its types and complication
   Types of vascular access for hemodialysis, permanent and temporary catheter, location of temporary catheter, pre-dialysis assessments for all types of vascular access, sign of exit site infection of catheter, importance of catheter care including hand hygiene and dressing, method of catheter lock, indication and contraindications of AVF, locations and construction of AVF, preparation of AVF evaluation, advantages, disadvantages and complications of AVF, AVG and its indications, characteristics of graft materials, types of synthetic materials, Types of AVG and its locations, Hero graft, advantages and disadvantages of AVG, use of Doppler for creating AVF & AVG, Use of USG for temporary access creation, Basic Uses of Doppler & USG.

6. Cannulation of vascular access in HD
   Importance of cannulation, steps in cannulation, skin preparation, Rule of 6"s, cannulation and its techniques- ladder rope, buttonhole and same area, needle removal and hemostasis, post dialysis assessment and cannulation of new fistula

7. Vascular access surveillance
   Arm Elevation Test, Allen"s Test, Inflow & Out flow stenosis & define vascular access recirculation, classify vascular access recirculation, causes, symptoms and indication of recirculation, Measurement of access recirculation, protocol for urea-based measurement recirculation, Alternative means of measuring access recirculation.

8. Types of hemodialysis modalities
   Categorize types of HD, Incenter hemodialysis and its advantages and its disadvantages, home hemodialysis – its indications, contraindications, Requirements, Ideal characteristics, Machines, types advantages and its disadvantages.

9. Dialyzer reprocessing
   Need for Dialyzer reprocessing, techniques, Steps in dialyzer reprocessing, advantages and disadvantages of dialyzer reprocessing, automated dialyzer reprocessor, advantages of dialyzer reprocessing machine, safe practice in reuse, factors affecting reusability of dialyzer, strategies to maximize reuse, preparation dialyzer for reuse, quality assurance and dialyzer reprocessing and water requirements.

10. Anti-coagulation

    principle coagulation pathways, blood clotting in the extracorporeal circuit, heparin, clotting tests used to monitor heparin therapy, routine heparin dosage prescription, heparin rebound phenomenon, regional heparinization, tight heparinization, heparin free dialysis- its indication, bicarbonate dialysis solution with low-concentration citrate and other anticoagulation techniques.

11. Hemodialysis adequacy

    Definition, explain urea kinetic modelling (UKM), urea as a marker for uremic toxins, urea reduction ratio (URR), advantages and disadvantages of URR, single pool kt/v, double pool UKM and eq kt/v.

12. Water treatment unit (WTU)

    Purpose of water treatment for dialysis, various sources of water, types of contaminants in water, various contaminants in water and its effect, components of a dialysis center‟s WTU, pre-treatment components, primary treatment components, distribution system, monitoring and testing of dialysis water treatment system, microbial testing and chemical monitoring

13. Medications used in dialysis patients.

    List the drugs used in dialysis patients, indication of these drugs- heparin, Volume expanders like saline, albumin, Sodium bicarbonate, Glucose, Xylocaine, Antibiotics, Inj. Erythropoietin, iron, Vitamins, Anticonvulsants, Deferoxamine, Phosphate binders, Anti-hypertensives and emergency drugs.

14. Infection control and universal precaution

    Prevention of infection in dialysis unit, infection control practices in dialysis unit, Universal precaution, current recommendation for immunization in patients with chronic kidney disease, methods that decrease the risk of infection in the vascular access, spread of hepatitis B, hepatitis C, hepatitis D and HIV in dialysis unit, specific infection control requirement for a patient with hepatitis B, why person with CKD are predisposed to development of active tuberculosis after exposure to the bacterium, dialyzer reprocessing contributing to bacteremia, reasons why patients with HIV do not require special isolation or infection control procedures.

DIALYSIS THERAPIES -PART I Practical (60 Hours)

COURSE OUTCOME

CO No.	Course Outcomes	Bloom's Taxonomy Level
CO1	Describe the structure, function, and importance of hemodialysis equipment components, vascular access management, water treatment maintenance, and infection control practices in dialysis units.	(L2)
CO2	Demonstrate handling of HD equipment parts, cannulation of vascular access, assessment of dialysis adequacy, and routine maintenance procedures of water treatment systems.	(L3)
CO3	Analyze dialysis adequacy parameters, vascular access performance, equipment functioning, and infection control measures for effective dialysis management.	(L4)
CO4	Integrate technical, clinical, and safety principles for maintenance of dialysis equipment, prevention of infection, and delivery of quality hemodialysis care.	(L5–L6)

COURSE CONTENT:

HD Equipment

1. Motor brush
2. Loading valve
3. Shunt cover
4. Hansen connector
5. Blood pump motor
6. Diasafe or Cut-off filter
7. Degas filter

Calculating Hemodialysis Adequacy

Assessing HD Vascular Access

Cannulating HD Vascular Access

Water Treatment Plant Maintenance

1. Daily
2. Weekly

Infection Control in dialysis unit

MEDICAL ELECTRONICS FOR HEALTH SCIENCES (45 Hours)

COURSE OUTCOMES

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the principles, characteristics, and applications of semiconductor devices including diodes, transistors, SCR, and UJT.	**(L2)**
CO2	Describe the working principles and configurations of amplifiers, feedback circuits, oscillators, and integrated circuits used in biomedical electronics.	**(L2)**
CO3	Apply the concepts of operational amplifiers, waveform generators, filters, A/D and D/A converters in electronic and medical instrumentation systems.	**(L3)**
CO4	Analyze the functions and performance of transducers, display devices, oscilloscopes, and biomedical recording instruments.	**(L4)**
CO5	Analyze the principles and applications of diagnostic equipment such as ECG, EEG, EMG, biochemical, and microbiological instruments in healthcare.	**(L4)**
CO6	Apply the basic principles and clinical applications of imaging techniques including radiography, ultrasonography, and radioisotopes.	**(L3)**

COURSE CONTENT:

1. Introduction to semiconductor devices
   Principles of semiconductor diodes, Zener diode, BJT, FET, SCR & UJT and applications of diodes
2. Amplifiers
   Basic amplifier configuration, types of amplifiers – Voltage amplifiers, current amplifiers, power amplifiers, frequency response, low noise pre amplifiers.
3. Feedback Amplifiers and Oscillators
   Principles of feedback amplifiers, condition for sustained oscillation, RC and LC oscillators
4. Introduction to ICs
   Linear and digital ICs, applications of op amp like amplifiers, waveform generators, timer, A/D and D/A converters, active filters
5. Transducers and display devices
   Various types of transducers – electric, capacitive, inductive, photo electric and piezoelectric. Types of recorders – ink jet, heated styles, photographic, low frequency magnetic tape recorder. Different types of oscilloscopes – long persistence, storage, digital scopes.
6. Introduction to diagnostic equipment
   Bio potential recording devices, ECG, EEG, EMG, non-electrical parameter

measurements, biochemical and microbiologic equipment.

7. Introduction to imaging techniques
   Principles of radiography, ultrasonography, and radioisotopes

RESEARCH METHODOLOGY AND BIOSTATISTICS (60 Hours)

COURSE OUTCOME

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the fundamental concepts, research processes, research designs, and ethical principles involved in health science research.	**(L2)**
CO2	Describe the characteristics, methods, and applications of qualitative, quantitative, and mixed-method research in health sciences	**(L2)**
CO3	Apply epidemiological methods, sampling techniques, probability concepts, and data collection tools in health-related research.	**(L3)**
CO4	Analyze research data using descriptive statistical methods, including measures of central tendency, variability, graphical representation, and data interpretation.	**(L4)**
CO5	Analyze inferential statistical techniques such as hypothesis testing, regression, correlation, t-test, ANOVA, chi-square, and non-parametric tests for research applications.	**(L4)**
CO6	Apply research methodology and biostatistical principles in the development, conduct, and interpretation of healthcare research studies.	**(L3)**

COURSE CONTENT:

1. Introduction to the Process of Conducting Research
   Introduction, Steps in the Process of Research, identifying a hypothesis and/or research problem, specifying a purpose, Research Designs, creating research questions, Review of literature, Ethics of research and informed consent, Research proposal writing & components of Research paper.

2. Introduction to Qualitative, Quantitative and Mixed methods Research
   Essence of Qualitative Data, Sampling, Collection Techniques, Biography, Essence of Quantitative Data, Collection and Analysis Techniques, Choosing a good instrument, Interval and Ratio Scales, Validity and Reliability, Essence of Mixed Methods, Advantages, Design Components, Explanatory Mixed Methods Frameworks

3. Epidemiological Methods
   Measuring disease frequency, Descriptive and analytical studies-observational and experimental studies and Biases in Epidemiological Studies

4. Introduction to Probability, distributions and sampling

Probability, addition and multiplicative theorems, problems, Probability Distribution- Binomial, Poisson, Normal, Applications to health sciences, Sampling methods, uses of sampling, Sample size

5. Introduction to Descriptive Statistics
   Introduction, Summarizing and describing a collection of data, Univariate and bivariate analysis, Mean, mode and standard deviation, Percentages and Ratios, Histograms, identifying randomness and uncertainty in data, summarizing biological data, Identifying the dependent and independent variables, Confidence levels

6. Introduction to Inferential Statistics
   Drawing inference from data, Estimation, testing of hypothesis, Type I & type II errors, power and p-value, modelling assumptions, Identifying Patterns, Regression analysis, t-test, Analysis of Variance, Correlations, Chi-square, Non-parametric tests

CLINICAL POSTING III (CT) (180 Hours)

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a senior dialysis therapist. Students are tested on intermediate clinical dialysis therapy skills. Students will continue with their clinical procedures along with careful analyzing and performing AVF and AVG cannulation and decannulation procedure, monitoring of water quality with the assistance of senior dialysis technologist

Areas to be covered.

1. OPD

2. Dialysis Unit

3. Procedure room for assisting in biopsy & catheterization

SEMESTER V

DIALYSIS THERAPIES – PART II (60 Hours)

Course Outcomes

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the principles of hemodialysis and peritoneal dialysis, including patient assessment, dialysis prescription, dialysis modalities, and monitoring procedures.	**L2**
CO2	Describe the indications, contraindications, apparatus, access devices, therapies, and adequacy assessment methods used in hemodialysis and peritoneal dialysis.	**L2**
CO3	Apply clinical knowledge to assess patients, interpret laboratory data, monitor dialysis procedures, and implement appropriate patient care before, during, and after dialysis.	**L3**
CO4	Analyze acute intradialytic complications, peritoneal dialysis complications, laboratory findings, and formulate appropriate preventive and management strategies.	**L4**
CO5	Analyze the special considerations, complications, and management approaches for pediatric patients and pregnant women undergoing dialysis therapy.	**L4**
CO6	Apply evidence-based dialysis practices, patient education strategies, nutritional principles, and complication management techniques to optimize patient outcomes in renal replacement therapy.	**L3**

COURSE CONTENT:

1. Hemodialysis procedure
   a. Patient assessment, management and prevention– General, pre, intra and post dialysis
   b. Lab data analysis
   c. Machine monitoring during hemodialysis
2. Hemodialysis prescription
   a. Acute hemodialysis prescription
   b. Chronic hemodialysis prescription
3. Acute complication
   1. Classify intra-dialytic complications- frequent and less commonly occurring

2. Sign, symptoms, prevention and management of
    a. Hypotension,
    b. Muscle cramps,
    c. Nausea and vomiting,
    d. Chest pain and back pain,
    e. Fever and chills,
    f. Itching,
    g. Headache,
    h. Dialysis disequilibrium syndrome (DDS)
    i. Dialyzer membrane reaction- type a and b,
    j. Hemolysis,
    k. Air embolism,
    l. First use syndrome,
    m. Arrhythmias,
    n. Cardiac arrest,
    o. Cardiac tamponade,
    p. Hypertension,
    q. Exsanguinations,
    r. Seizures,
    s. Anaphylaxis.

4. Lab-data analysis
    a. Various laboratory test use assess kidney disease- urea, creatinine, GFR measurement, sodium, potassium, chloride, bicarbonate, serum uric acid, hemoglobin, phosphate, calcium, PTH, vitamin D level, albumin, cholesterol, blood glucose level-fasting, post-prandial and random, total protein, liver function tests, serum bilirubin, ALT, AST and urine analysis.
    b. Importance laboratory investigation of kidney disease
5. Introduction to peritoneal dialysis
    a. History of peritoneal dialysis
    b. Physiology of PD – Kinetics of PD,
    c. Three-pore model & Distributive Model
    d. Acute peritoneal dialysis
    e. Indications- Strong indications, PD preferences, non-renal indications
    f. Contraindications for chronic PD- relative contraindications to peritoneal dialysis and Peritoneal dialysis is not preferred but is possible in select circumstances.
6. Peritoneal dialysis apparatus
    a. Solution
    b. Transfer set,
    c. Connectologies.
    d. Access for PD
    e. Catheter and Exit site care
7. Peritoneal dialysis process & Therapies
    a. Assessment of peritoneal membrane permeability
    b. Adequacy of peritoneal dialysis

c. PD therapies – intermittent & continuous

8. Peritoneal dialysis complications & management
    a. Non - infectious complications of PD
    b. Mechanical and metabolic complications
    c. Infectious complications of PD,
    d. Patient Education and Training
    e. Nutrition in PD
    f. Long term complications in PD
9. Pediatric dialysis
    a. Renal replacement therapy on children
    b. Complications of peritoneal dialysis in children
    c. Equipment required for pediatric chronic peritoneal dialysis.
    d. HD prescription in children
    e. Various vascular access for HD in children
    f. Dialysis machine and blood lines
    g. Extracorporeal blood access and circulation
    h. Immunization in children undergoing dialysis.
10. Pregnancy in dialysis patients
    a. Contraception
    b. Diagnosis of pregnancy in dialysis patients
    c. Hypertension in pregnant patients
    d. Drug removal
    e. Anemia
    f. Peritonitis occurrence
    g. Dialysis modalities- HD and PD
    h. Diet

DIALYSIS THERAPIES – PART –II (Practical)

COURSE OUTCOME

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Perform comprehensive patient assessment, interpret laboratory data, monitor dialysis machines, and administer hemodialysis procedures safely during pre-, intra-, and post-dialysis care.	L3
CO2	Design acute and chronic hemodialysis prescriptions and evaluate dialysis adequacy based on patient-specific clinical requirements.	L5

CO3	Analyze and manage acute hemodialysis and peritoneal dialysis complications using appropriate preventive, diagnostic, and therapeutic interventions.	L4
CO4	Evaluate and plan dialysis care, patient education, and training strategies for special populations including pediatric and pregnant patients undergoing renal replacement therapy.	L5

COURSE CONTENT:

1. Hemodialysis procedure
   Patient assessment, management and prevention– General, pre, intra and post dialysis
   Lab data analysis
   Machine monitoring during hemodialysis
2. Hemodialysis prescription
   Design Acute hemodialysis prescription
   Design Chronic hemodialysis prescription
3. Manage Acute complication
   Hypotension,
   Muscle cramps,
   Nausea and vomiting,
   Chest pain and back pain,
   Fever and chills,
   Itching,
   Headache,
   Dialysis disequilibrium syndrome (DDS)
   Dialyzer membrane reaction- type a and b,
   Hemolysis,
   Air embolism,
   First use syndrome,
   Arrhythmias,
   Cardiac arrest,
   Cardiac tamponade,
   Hypertension,
   Exsanguinations,
   Seizures,
   Anaphylaxis.
4. Identify Peritoneal dialysis apparatus
   Solution
   Transfer set,
   Connectologies.
   Access for PD
5. Calculate Peritoneal dialysis adequacy & PET
6. Manage Peritoneal dialysis complications
   Non - infectious complications of PD
   Mechanical and metabolic complications

Infectious complications of PD,

7. Educate and Train Patient for PD
8. Perform Pediatric dialysis

   Equipment required for pediatric chronic peritoneal dialysis. HD prescription in children

   Various vascular access for HD in children

   Dialysis machine and blood lines

   Extracorporeal blood access and circulation

   Immunization in children undergoing dialysis.
9. Plan to perform dialysis in Pregnancy

RENAL TRANSPLANTATION AND COORDINATION (60 Hours)

Course Outcomes

CO No.	Course Outcomes (COs)	Bloom Taxonomy Level
CO1	Explain the concepts of organ donation, types of transplantation, brain stem death, and the legal and ethical aspects of organ transplantation.	**L2**
CO2	Describe the basic principles of immunology, HLA system, cross-matching, sensitization, and immunological testing in kidney transplantation.	**L2**
CO3	Apply the knowledge of donor and recipient evaluation, kidney preservation, implantation procedures, and post-operative care in renal transplantation.	**L3**
CO4	Analyze the role of immunosuppressive therapy, graft rejection, post-transplant complications, and their management in kidney transplant recipients.	**L4**
CO5	Apply the principles of transplant coordination, donor management, documentation, patient education, and transplant registry services in living and deceased donor transplantation programs.	**L3**
CO6	Analyze the ethical, legal, and psychosocial issues related to organ donation and transplantation, including grief counselling, informed consent, and awareness programs.	**L4**

COURSE CONTENT:

1. Introduction & Renal Transplantation
    a. Types of organ donors (Living and deceased donors)
    b. Types of deceased organ donors – Deceased heart beating donors and non-heart-beating donors
    c. Types of transplantation
    d. Indications and contraindications for transplantation
    e. Types of kidney transplantation
    f. Importance of immunosuppressive drugs in kidney transplantation
2. Brain stem death
    a. Define brain stem death
    b. List the tests to confirm brain stem death and their importance
    c. Explain the brain stem death importance in organ transplantation
    d. Explain the Human Organ Transplantation Act and ethical issues related to transplantation
3. Basics of immunology

a. Define immunity, immunology, antibody, antigen and complement system
b. Types of immunity (Innate & Acquired immunity)
c. Explain the organs and cells involved in the immune system and their functions
d. List the functions of the immune system

4. Immunology related to kidney transplantation.
    a. Define sensitivity and autoimmunity
    b. Causes for sensitization
    c. Immunological tests recommended during kidney transplantation
    d. Significance of blood groups in renal transplantation
    e. Define HLA, its location
    f. Types and significance of HLA
    g. Explain the HLA inheritance and its importance in renal transplantation
    h. Define cross-match test and panel reactive antibodies & list the importance of these tests
    i. Explain CDC, ELISA and flow cytometry tests
5. Renal Transplantation Procedure
    a. Explain the pre-renal transplant donor (Living and deceased) and recipient evaluation.
    b. Pre-transplant counselling of donor and recipient and importance of consent for organ donation
    c. Steps of preoperative preparation of the kidney donor and the recipient
    d. Types of nephrectomy methods (incision) and their importance
    e. List the organs/tissues/parts procured from the donor during nephrectomy
    f. Define warm and cold ischemia time.
    g. List the steps of kidney preservation.
    h. List the steps of kidney implantation.
    i. Explain the relative and absolute contraindications of living and deceased donor renal transplantation.
    j. Post-operative care of donor.
    k. Post-operative care of recipient –immediately after the transplant and long term follow up
6. Post renal transplantation.
    a. History of immunosuppressive drugs
    b. Define immunosuppressive drugs and list the importance of these drugs in renal transplantation
    c. Types of immunosuppressive drugs used for kidney transplant induction therapy and list the drug names
    d. Define maintenance therapy and list the drug names
    e. Define triple therapy and list the drugs used under this therapy
    f. Complications/side effects of cyclosporine, tacrolimus, Azathioprine, MMF, Prednisolone, Sirolimus and ATG
    g. Explain the post-transplant complications (early and late) – Surgical, graft dysfunction and drug related complications
    h. Define the types of graft rejection and list the risk factors, features, and management
    i. Ethical and social issues related to dialysis and renal transplantation

7. Introduction to transplant coordination
    a. Define the term transplant coordinator
    b. Eligibility criteria for transplant coordinator
    c. Importance of transplant coordination team and their responsibilities
    d. Explain the role of kidney transplantation coordinator and coordination team
    e. Understand the work process of a transplant coordinator (routine)
    f. Explain the importance of consent for the organ donation
8. Living Donor kidney donation process
    a. Process of coordinating and monitoring living donor kidney transplantation
    b. Importance of document preparation for kidney transplantation
    c. Apply the acquired knowledge of transplantation for giving awareness about kidney disease and transplantation (Patient education)
9. Deceased donor kidney donation process
    a. Explain the process of identification of donor, declaration of brain stem death and evaluation of donor
    b. Explain the process of coordinating and monitoring the deceased donor kidney transplantation (Approaching the family members of donor, Coordination with regional committees, Allocation, Matching, organ procurement, storage, and transportation)
    c. Explain the process of creating a kidney transplantation registry
    d. Apply the acquired knowledge of transplantation giving awareness about deceased donor transplantation and becoming a deceased donor in the society
10. Introduction to grief counselling
    a. Define grief counselling and bereavement.
    b. Explain the grieving or bereavement process (Kubler Ross Model, Individual‟s mental status during grief)
11. Grief counselling and organ transplantation
    a. Explain how grief counselling is applied to end stage organ failure
    b. Explain the role of transplant coordinator during grief counselling
12. The functioning of transplant registration centers
13. Explain the functions of national, state or regional transplant registry services & registration centers
14. Human Organ Transplant Act and its amendments

Renal Transplantation and coordination Practical (60 Hours)

COURSE OUTCOMES

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Perform renal transplant work-up procedures, including donor and recipient assessment, documentation, and pre-transplant investigations.	**L3**
CO2	Apply effective communication skills during transplant counseling of patients and their families.	**L3**
CO3	Analyze the psychosocial, emotional, and ethical issues associated with renal transplantation and organ donation.	**L4**
CO4	Evaluate the emotional, psychological, and social needs of patients and their families to provide appropriate grief counseling and support during the transplantation process.	**L5**

COURSE CONTENT:

1. Renal transplants work up.
2. Grief Counseling
3. Transplant Counseling

CLINICAL PROBLEMS AND EVIDENCED BASED PRACTICE IN DIALYSIS THERAPY (60 Hours)

Course Outcomes

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the pathophysiology, clinical features, diagnostic evaluation, and management of anemia, hypertension, cardiovascular abnormalities, and endocrine disturbances in dialysis patients.	**L2**
CO2	Apply knowledge of laboratory investigations, diagnostic tests, and therapeutic interventions for the management of blood-borne infections, endocrine disorders, and bone diseases in patients with chronic kidney disease.	**L3**
CO3	Analyze the etiology, clinical manifestations, complications, and treatment of neurological disorders, dialysis amyloidosis, autosomal polycystic kidney disease (APKD), and malnutrition associated with kidney disease.	**L4**
CO4	Analyze the impact of psychological, behavioral, social, and quality-of-life issues on patients undergoing dialysis and formulate appropriate supportive care approaches.	**L4**
CO5	Apply preventive and management strategies for blood-borne infections, CKD-mineral bone disorders, skin disorders, and gastrointestinal complications in dialysis patients.	**L3**
CO6	Analyze the special considerations, risks, modality selection, and outcomes of dialysis therapy in geriatric patients and other high-risk patient populations.	**L4**

Course Content

1. Anemia and ESA use
    a. Anemia in dialysis patient.
    b. Causes of anemia in CKD patient.
    c. Clinical features
    d. Diagnostic test
    e. Treatment.

2. Hypertension in dialysis patients
    a. Definition and measurement of hypertension.
    b. Pathophysiology of hypertension.

c. Management of hypertension in dialysis patient.
d. Various types of antihypertensive drugs used in end-stage kidney disease.
e. Mechanism of intra-dialytic hypertension

3. Cardiovascular abnormalities
    a. Epidemiology of CVD in chronic kidney disease
    b. Risk factors for cardiovascular disease in dialysis patients.
    c. Left ventricular hypertrophy.
    d. Uremic pericarditis.
    e. Risks of dialysis therapy in patients with pericarditis

4. Psychological aspect in dialysis patients
    a. Common psychologic problem in ESRD patients
    b. Depression
    c. Dementia
    d. Anxiety and behavioral disorders
    e. Other psychologic problems- marital issues, sexual dysfunction, socioeconomic issues, rehabilitation, quality of life (QOL)

5. Blood borne disease in dialysis patients
    a. Major blood borne infection in dialysis patient
    b. Hepatitis B infection in dialysis patient
    c. Interpretation of diagnostic test in hepatitis b infection
    d. Epidemiology of hepatitis B virus in dialysis units
    e. Hepatitis B vaccination
    f. Hepatitis C infection in dialysis patient
    g. Interpretation of diagnostic test in hepatitis c infection
    h. Epidemiology of hepatitis C virus in dialysis units
    i. Human immunodeficiency virus (HIV) infection in dialysis patient
    j. Clinical manifestations of HIV
    k. Management of HIV infection
    l. Dialysis in patients who are HIV positive
    m. Prevention of blood borne infection in dialysis patients

6. Endocrine disturbances
    a. CKD and endocrine abnormalities.
    b. Effects of Thyroid Dysfunction on the Kidney
    c. Various hormones like insulin, glucagon, renin–angiotensin, aldosterone, norepinephrine and epinephrine, cortisol, thyroid function, testicular function, growth hormone, parathyroid hormone (PTH), sexual dysfunction in men and women, and its effect on dialysis patient.

7. Bone disease
    a. Renal Bone disease.
    b. Chronic Kidney Disease –Mineral and Bone Disorder.
    c. Role of PTH, Vitamin D, and Fibroblast Growth Factor-23.

d. Development of secondary hyperparathyroidism in CKD
e. Classification bone diseases in CKD patients
f. Medical treatments of CKD-MBD.
g. Role of optimal dialysis prescription in CKD – MBD.

8. Neurologic aspects of uremia
    a. Neurological problems in dialysis patients.
    b. Uremic encephalopathy.
    c. Acute aluminum intoxication.
    d. Acute cerebral dysfunction during or immediately after dialysis.
    e. Stroke in dialysis patient.
    f. Physical disability in dialysis patient.
    g. Peripheral neuropathy
    h. Carpel tunnel syndrome
    i. Autonomic neuropathy and myopathy
    j. Sleep disorders in dialysis patients.

9. APKD
    a. Introduction
    b. Pathologic features
    c. Clinical manifestations
    d. Diagnosis and differential diagnosis
    e. Management
    f. Outcome

10. Dialysis amyloidosis
    a. Define amyloidosis.
    b. Risk factors for dialysis related amyloidosis.
    c. Pathophysiology of amyloidosis.
    d. Clinical and laboratory manifestations of amyloidosis.
    e. Symptoms of amyloidosis.
    f. Treatment of amyloidosis

11. Geriatric Dialysis
    a. RRT in geriatric patient.
    b. Features of ageing in CKD patients.
    c. Choice of modality for geriatric patients‟ dialysis.
    d. Lifestyle benefits from the patient perspective
    e. QOL for geriatric patients on dialysis
    f. Falls and factors associated with falls in dialysis patients.
    g. Dialysis related risk factors in geriatric patients.

12. Malnutrition
    a. Epidemiology
    b. Pathogenesis
    c. Nutritional assessment
    d. Supplementation

13. Skin Disorders
    a. Dermatologic manifestations of disease
        a. related with ESRD
        b. related with uremia
    b. related with renal transplant
    c. Management
    d. Treatment

14. GI Disorders
    a. GI symptoms in kidney disease
    b. Gastritis, duodenitis, upper gastrointestinal hemorrhage
    c. Diseases of the colon
    d. Gastroparesis
    e. Management and treatment

ADVANCED EXTRACORPOREAL THERAPIES (60 Hours)

COURSE OUTCOMES

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the principles, indications, contraindications, and characteristics of advanced dialysis modalities including High-Flux, High-Efficiency Dialysis, CRRT, SLED, Hemodiafiltration, Sorbent Dialysis, and Adsorption Techniques.	**L2**
CO2	Apply the principles of prescription, equipment selection, vascular access management, and extracorporeal circuit setup for CRRT, SLED, Hemodiafiltration, and related renal replacement therapies.	**L3**
CO3	Analyze the procedures, technical requirements, complications, and clinical applications of Plasmapheresis, Hemoperfusion, Liver Dialysis, and Adsorption Techniques.	**L4**
CO4	Apply the principles of ICU care, ventilator support, ECG monitoring, dialysis in critically ill patients, and common uro-surgical procedures in renal care settings.	**L3**
CO5	Analyze the indications, contraindications, principles, risks, complications, and management strategies associated with ECMO and its integration with dialysis therapies.	**L4**
CO6	Analyze the advantages, disadvantages, clinical outcomes, and therapeutic applications of advanced extracorporeal therapies in the management of critically ill renal and liver disease patients.	**L4**

COURSE CONTENT:

1. Hi-flux and Hi-efficiency
    a. Hi-flux dialysis and its characteristics
    b. Hi-efficiency dialysis and its characteristics
2. Slow continuous therapies
    a. Multidisciplinary team
    b. indications of CRRT
    c. vascular access used and extracorporeal circuit
    d. types of CRRT- SCUF, C-HD, C-HF, C-HDF
    e. contraindications of CRRT
    f. complications of CRRT

3. SLED
    a. Describe slow low efficiency dialysis (SLED).
    b. indication and contraindication of SLED.
    c. advantages and disadvantages of SLED.
    d. equipment used for SLED.
    e. prescription of SLED
4. Plasmapheresis
    a. Indication and contraindication.
    b. Pharmacokinetics of immunoglobulin removal
    c. Pharmacokinetic basis for TPE prescriptions.
    d. How to estimate plasma volume.
    e. Various replacement solutions used in Plasmapheresis.
    f. Various complication of Plasmapheresis.
    g. Double filtration plasmapheresis
5. Hemoperfusion
    a. Indications of hemoperfusion
    b. Choice of therapy for the treatment of poisoning
    c. Technical requirements for hemoperfusion
    d. Complications occurs during hemoperfusion
6. Principle of ICU care
    a. Ventilator – Mode and operation
    b. Dialysis in ICU
    c. Basics of ICU management
    d. Basics of ECG
7. Common uro-surgical procedures
    a. Common urosurgical procedures
    b. Instruments & their management
    c. ESWL
8. Liver Dialysis/ Extracorporeal Albumin Dialysis
    a. Indications and contraindications
    b. Toxins cleared in Liver Dialysis
    c. Liver Dialysis system & Types
    d. Principles
    e. Process
    f. Types of treatment
    g. Complications and Management
9. ECMO
    a. Indication & Contraindications
    b. Principles
    c. Risk of ECMO
    d. Preparation and expectation of ECMO
    e. ECMO & Dialysis
10. Hemodiafiltration
    a. Introduction
    b. Preparation replacement fluid
    c. Techniques of HDF

d. Technical aspects
e. Advantages and disadvantages

11. Sorbent Dialysis
    a. Introduction
    b. Requirements
    c. Sorbent cartridge and its function
    d. Parameters of sorbent system
    e. Serum electrolytes and acid base adjustments
    f. Uses
    g. Conclusion
12. Adsorption techniques
    a. Introduction
    b. Basic principles
    c. Extracorporeal techniques using adsorption
    d. Extracorporeal filtration in adsorption systems
    e. Clinical experiences with high filtrate reinfusion (HFR)

Advanced extracorporeal therapies Practical (60 Hours)

COURSE OUTCOMES

CO No.	Course Outcomes (COs)	Bloom's Taxonomy Level
CO1	Explain the principles, indications, precautions, and modifications required while conducting dialysis in patients with CHF, advanced liver disease, HCV, HIV, HBsAg positivity, acute rejection, and failed renal transplant.	**L2**
CO2	Apply appropriate dialysis techniques and patient management strategies for poisoning, pregnancy, pediatric patients, and special clinical conditions.	**L3**
CO3	Analyze the challenges, complications, and outcomes associated with dialysis in high-risk and critically ill patient populations, including transplant failure and infectious diseases.	**L4**
CO4	Evaluate and design individualized dialysis care plans, including the application of ECMO and specialized dialysis modalities for complex clinical scenarios.	**L5**

COURSE CONTENT:

1. Conducting dialysis for-
    a. Patient with congestive heart failure (CHF)
    b. Advanced liver disease
    c. Patient positive for HCV, HIV & HBsAg
    d. Acute rejection and failed transplant
    e. Poisoning patient
    f. Pregnancy
    g. Dialysis in infants and children
    h. Application of ECMO

CLINCAL POSTING IV (180 Hours)

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a senior dialysis therapist. Students are tested on intermediate clinical dialysis therapy skills.

Areas to be covered:

- Dialysis unit
- ICU
- Renal transplants work up.
- Operation Theater for Observing AVF/AVG Creation, PD catheter Insertion & Renal Transplantation.

SEMESTER-VI

Recent Advancements in Renal Replacement Therapies (90 Hours)

Course Outcomes

CO NO.	COURSE OUTCOMES	Bloom's Taxonomy Level
CO1	Recall the concepts of recent advancements in renal replacement therapies, dialysis technologies, home hemodialysis, nocturnal dialysis, and hospital management principles.	**L1**
CO2	Explain the principles, advantages, limitations, and applications of wearable artificial kidney, bio-artificial kidney, artificial intelligence, nanotechnology, and pediatric dialysis techniques.	**L2**
CO3	Apply information technology tools such as TDMS, telemedicine, mobile applications, web-based education, and SMS services in dialysis and healthcare management practices.	**L3**
CO4	Analyze the technical, psychological, legal, and safety aspects involved in home hemodialysis, nocturnal dialysis, and advanced renal replacement therapies.	**L4**
CO5	Analyze the organization and administration of hospital clinical, support, ancillary, diagnostic, and therapeutic services in healthcare settings.	**L4**
CO6	Evaluate safety and risk management practices including hospital waste management, nosocomial infection control, disaster management, occupational safety, and hospital security services.	**L4**

COURSE CONTENT:

i. Current research and recent advances in dialysis technology
   a. Newer dialysis technologies
   b. Wearable artificial kidney
   c. Bio artificial kidney
   d. New sorbent technologies

ii. Information technology and dialysis
   a. TDMS
   b. Patient Online
   c. Web based education.

d. Short message service (SMS) texting
e. Mobile apps
f. Telemedicine in dialysis practice
g. Other IT delivery methods

iii. Home Hemodialysis
a. Indications and contraindications of home hemodialysis
b. Technical aspect of dialysis- legal, water preparation (plumbing), electrical considerations including backup power supply, dialysis machine choice and other equipment, space considerations and siting of dialysis machine, hygiene and noise, safety, medical staff and technical support, disposal of waste, storage of medication
c. Psychological aspect of home hemodialysis.
d. Advantages and disadvantages of conventional home dialysis
e. Impact on daily hemodialysis

iv. Nocturnal hemodialysis
a. Brief note on nocturnal hemodialysis
b. Advantages of longer, slower dialysis
c. Nocturnal dialysis in a dialysis center

v. Artificial Intelligence in renal replacement therapies
vi. Other Recent Advances in Dialysis Therapy
vii. Application of nanotechnology, microfluidics, bioreactors with kidney cells, and miniaturized sorbent systems
viii. New Techniques of Pediatric Dialysis
a. NIDUS
b. Carpediem

Recent Advancements in Renal Replacement Therapies Practical (60 Hours)

COURSE OUTCOMES

CO NO.	COURSE OUTCOMES	Bloom's Taxonomy Level
CO1	Explain the recent advancements in renal replacement therapies including wearable artificial kidney, bioartificial kidney, sorbent technologies, and pediatric dialysis systems.	**L1**
CO2	Describe the role of information technology, telemedicine, mobile applications, and AI in improving dialysis care and patient management.	**L2**
CO3	Apply the principles of home hemodialysis and nocturnal hemodialysis, including technical, safety, psychological, and operational considerations.	**L3**

CO4	Analyze the applications of artificial intelligence, nanotechnology, microfluidics, bioreactors, and other emerging innovations in enhancing the effectiveness and future scope of renal replacement therapies.	**L4**

COURSE CONTENT:

1. Current research and recent advances in dialysis technology
    a. Newer dialysis technologies
    b. Wearable artificial kidney
    c. Bio artificial kidney
    d. New sorbent technologies

2. Information technology and dialysis
    a. TDMS
    b. Patient Online
    c. Web based education.
    d. Short message service (SMS) texting
    e. Mobile apps
    f. Telemedicine in dialysis practice
    g. Other IT delivery methods

3. Home Hemodialysis
    a. Indications and contraindications of home hemodialysis
    b. Technical aspect of dialysis- legal, water preparation (plumbing), electrical considerations including backup power supply, dialysis machine choice and other equipment, space considerations and siting of dialysis machine, hygiene and noise, safety, medical staff and technical support, disposal of waste, storage of medication
    c. Psychological aspect of home hemodialysis.
    d. Advantages and disadvantages of conventional home dialysis
    e. Impact on daily hemodialysis

4. Nocturnal hemodialysis
    a. Brief note on nocturnal hemodialysis
    b. Advantages of longer, slower dialysis
    c. Nocturnal dialysis in a dialysis center

5. Artificial Intelligence in renal replacement therapies
6. Application of nanotechnology, microfluidics, bioreactors with kidney cells, and miniaturized sorbent systems
7. New Techniques of Pediatric Dialysis a) NIDUS b) Carpedium
8. Other recent advances in Dialysis Therapy

Principals of Management (45 Hours)

COURSE OUTCOMES

CO NO.	COURSE OUTCOMES	Bloom's Taxonomy Level
CO1	Define the basic concepts, principles, functions, and steps of management in healthcare organizations.	**L1**
CO2	Explain the organization and administration of clinical, support, ancillary, diagnostic, and therapeutic services in hospitals.	**L2**
CO3	Apply management principles such as planning, organizing, staffing, directing, and controlling in hospital and healthcare settings.	**L3**
CO4	Analyze the functioning and coordination of various hospital departments including ICU, operation theatre, laboratory, radiology, pharmacy, and blood bank services.	**L4**
CO5	Analyze the role of hospital support and ancillary services such as CSSD, medical records, housekeeping, laundry, engineering, and transportation in patient care management.	**L4**
CO6	Evaluate safety and risk management practices related to hospital waste management, nosocomial infections, disaster management, hospital security, and occupational safety.	**L4**

COURSE CONTENT:

i. Introduction to Management
   a. Introduction
   b. Definition
   c. Steps
   d. Planning
   e. Organizing
   f. Staffing
   g. Directing
   h. Controlling

ii. Introduction to Clinical service Types of Hospitals
   a. Organization and administration of various clinical services: Outpatient services- In-

patient services, Emergency services, Operation theatres, Nursing services and ICU,,s.

iii. Hospital Support services
   a. Organization and Administration of various Support services
      - CSSD
      - Diet
      - Medical records

iv. Hospital Ancillary Services
   a. Organization and Administration of various Ancillary services:
      - Housekeeping – Linen and Laundry-
      - Engineering services – Transportation

v. Hospital Diagnostic and Therapeutic services
   a. Organization and Administration of various Diagnostic and Therapeutic services:
      - Radiology
      - Laboratory
      - Pharmacy
      - Blood bank

vi. Safety and Risk management
   a. Hospital waste management
   b. Nosocomial infection
   c. Disaster management
   d. Hospital security service
   e. Occupational safety in hospitals

Introduction to Quality Assurance in Dialysis and Patient Safety (75 Hours)

Course Outcome

CO NO.	COURSE OUTCOMES	Bloom's Taxonomy Level
CO1	Define the concepts of quality assurance, patient safety, dialysis adequacy, infection control, and safety standards in hemodialysis and peritoneal dialysis.	**L1**
CO2	Explain quality indicators, NABH and JCI standards, vascular access surveillance techniques, and safety protocols used in dialysis units.	**L2**
CO3	Apply universal precautions, RO water quality monitoring, infection control measures, emergency preparedness, and dialysis safety practices in clinical settings.	**L3**
CO4	Analyze the effectiveness of vascular access surveillance methods, peritoneal dialysis quality management, and renal transplantation quality assurance techniques.	**L4**
CO5	Analyze disaster preparedness, fire safety, employee safety, electrical safety, and emergency evacuation procedures in dialysis units.	**L4**
CO6	Evaluate patient safety measures, quality improvement strategies, and infection control practices to ensure safe and effective dialysis care	**L4**

Course Content

1. Quality assurance in Hemodialysis
   a. Dialysis Adequacy
   b. Infection control in dialysis unit
   c. Universal Precaution
   d. RO water quality monitoring
   e. Hemodialysis unit management
   f. Quality indicators in Hemodialysis
   g. Hazardous materials use and safety in Hemodialysis
   h. Disaster management in Hemodialysis unit
   i. NABH Standards
   j. JCI standards

2. Hemodialysis Vascular Access Surveillance
   a. Clinical monitoring of vascular access

b. Recirculation
c. Flow based techniques
d. Rule of Six in AV fistula
e. Pressure based techniques
f. Other surveillance techniques

3. Quality Assurance in Peritoneal Dialysis
   a. Peritoneal dialysis quality management
   b. Kinetic Modeling in peritoneal dialysis
   c. Peritoneal Dialysis patient and catheter survival
   d. Quality improvement in peritoneal dialysis
   e. Quality indicators in peritoneal dialysis

4. Quality Assurance in Renal transplantation coordination
   a. Quality indicators in renal transplantation
   b. Graft and Patient survival in renal transplantation
   c. Assessment techniques for renal donors and recipients

5. Safety in dialysis
   a. IPSG
   b. Advanced disaster preparedness
   c. Preparations to perform an emergency dialysis
   d. Fire safety
   e. Safety access of needle
   f. Violence at dialysis unit
   g. Employee safety
   h. Electrical safety in dialysis unit
   i. Emergency evacuation.
   j. Infection control

Basic and Advanced Cardiac Life Support (30 Hours)

COURSE OUTCOMES

CO NO.	COURSE OUTCOMES	Bloom's Taxonomy Level
CO1	Explain the principles of Basic Life Support (BLS), Advanced Cardiac Life Support (ACLS), and emergency cardiovascular care algorithms.	**L1**
CO2	Describe the management algorithms for ventricular fibrillation, pulseless ventricular tachycardia, PEA, asystole, bradycardia, and tachycardia.	**L2**
CO3	Apply appropriate techniques of airway management, oxygenation, ventilation, AED use, and defibrillation during cardiac emergencies.	**L3**
CO4	Demonstrate the administration of ACLS drugs, emergency cardiac pacing, and management of hypotension, shock, and acute myocardial infarction in simulated situations.	**L3**
CO5	Analyze paediatric advanced life support (PALS) scenarios and select suitable emergency interventions based on patient condition.	**L4**
CO6	Evaluate the role and responsibilities of dialysis technologists and dialysis therapists during cardiac and emergency care management.	**L4**

COURSE CONTENT:

1. BLS & ACLS
2. The universal algorithm for adult ECC
3. Ventricular fibrillation/Pulseless ventricular tachycardia algorithm
4. Pulseless electrical activity (PEA) / asystole algorithm
5. Bradycardia treatment algorithm
6. Tachycardia Treatment algorithm
7. Hypotension / Shock
8. Acute myocardial infarction
9. Paediatric Advanced life support
10. Airway management
11. Defibrillation
12. Drugs used in ACLS
13. Emergency Cardiac pacing
14. AED
15. Techniques for oxygenation and ventilation
16. Role of dialysis technologist & dialysis therapist

Basic and Advanced Cardiac Life Support Practical (30 Hours)

COURSE OUTCOMES

CO NO.	COURSE OUTCOMES	Bloom's Taxonomy Level
CO1	Identify the principles and steps of Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS) during emergencies.	**L1**
CO2	Explain the indications and procedures for using defibrillators and Automated External Defibrillators (AED).	**L2**
CO3	Demonstrate the practical application of BLS, ACLS, defibrillation, and AED techniques in simulated emergency situations.	**L3**
CO4	Analyze and manage cases of shock and hypotension using appropriate emergency cardiac care interventions and protocols.	**L4**

1. ACLS and
   BLS
2. Use of defibrillator and AED
3. Management of Shock and Hypotension

Clinical Postings V (CT) (270 Hours)

Students will continue with their previous clinical procedures and other special procedures with the assistance of a senior dialysis technologist. They are also allowed to view the renal transplant procedure along with internee.

Areas to be covered:

- Dialysis unit
- ICU
- Operation Theater for Observing AVF/AVG Creation, PD catheter Insertion & Renal Transplantation.
- BLS and ACLS

Semester VII & Semester VIII

Compulsory Rotatory Internship (2160 Hours)

The internship will span 1 year/ 2 semesters. This will include 8 hours of practice a day, totaling to 2160 hours for two semesters.
As a part of this, the students will choose a relevant subject and prepare an in-depth project report of not less than 1000 words which will be handed over to the supervisor or trainer. The report can include objective, scope of the project and an in-depth report.

The internship time period provides the students the opportunity to continue to develop confidence and increased skill in simulation and treatment delivery. Students will demonstrate competence in beginning and intermediate procedures. Students will observe the advanced and specialized treatment procedures. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. The students are expected to work for minimum 8 hours per day and this may be more depending on the need and the healthcare setting.

Project/ Thesis/ Dissertation (180 Hours)

Each candidate will have to carry out a dissertation/ Project on the related subject. The dissertation will be guided by one or two members of the faculty of the department

Elective courses

Introduction to Healthcare Delivery system in in India (30 Hours)

COURSE OUTCOMES

CO No.	Course Learning Outcomes	Bloom's Taxonomy Level
CO1	Describe the structure and functioning of the healthcare delivery system in India, including primary, secondary, and tertiary levels of care, National Health Mission, and National Health Policy.	**L2**
CO2	Explain the objectives, components, achievements, and challenges of major National Health Programmes and the role of community participation in healthcare delivery.	**L2**
CO3	Discuss the principles and applications of AYUSH systems of medicine and the need for integration of different healthcare systems in India.	**L2**
CO4	Apply the concepts of demography, vital statistics, census data, and health indicators in understanding population health and health policy planning.	**L3**
CO5	Analyze the health scenario of India and evaluate the factors influencing healthcare delivery and public health outcomes.	**L4**
CO6	Analyze the principles of epidemiology, disease transmission, immunization, surveillance, and epidemiological methods in the prevention and control of communicable and non-communicable diseases.	**L4**

COURSE CONTENT:

The course provides the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world. Topics to be covered under the subject are as follows:

1. Introduction to healthcare delivery system
    a. Healthcare delivery system in India at primary, secondary and tertiary care
    b. Community participation in healthcare delivery system
    c. Health system in developed countries.
    d. Private Sector
    e. National Health Mission

f. National Health Policy
g. Issues in Health Care Delivery System in India

2. National Health Program- Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Program

3. Introduction to AYUSH system of medicine
    a. Introduction to Ayurveda.
    b. Yoga and Naturopathy
    c. Unani
    d. Siddha
    e. Homeopathy
    f. Need for integration of various system of medicine

4. Health scenario of India- past, present and future

5. Demography & Vital Statistics-
    a. Demography – its concept
    b. Vital events of life & its impact on demography
    c. Significance and recording of vital statistics
    d. Census & its impact on health policy

6. Epidemiology
    a. Principles of Epidemiology
    b. Natural History of disease
    c. Methods of Epidemiological studies
    d. Epidemiology of communicable & non-communicable diseases, disease transmission, host defense immunizing agents, cold chain, immunization, disease monitoring and surveillance.

Basic computer and information Science (45 Hours)

COURSE OUTCOMES

CO NO.	COURSE OUTCOMES	Bloom's Taxonomy Level
CO1	Define the basic concepts of computers, characteristics, generations, computer languages, and components of computer systems.	**L2**
CO2	Explain the functions of input-output devices, processor, memory, storage devices, and operating systems.	**L2**
CO3	Demonstrate the use of MS Windows for file handling, folder management, shortcuts, and window operations.	**L3**
CO4	Apply MS Word, MS Excel, and PowerPoint tools for creating documents, worksheets, graphs, and presentations.	**L4**
CO5	Analyze different types of computer networks, network topologies, internet services, and their applications in communication systems.	**L4**
CO6	Evaluate the role and applications of computers and internet technologies in clinical and healthcare settings.	**L2**

COURSE CONTENT:

The students will be able to appreciate the role of computer technology. The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation. Topics to be covered under the subject are as follows:

1. Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
2. Input output devices: Input devices (keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices (monitors, pointers, plotters, screen image projector, voice response systems).
3. Processor and memory: The Central Processing Unit (CPU), main memory.
4. Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.
5. Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).

6. Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.
7. Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
8. ntroduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
9. Introduction of Operating System: introduction, operating system concepts, types of operating system.
10. Computer networks: introduction, types of networks (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
11. Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
12. Application of Computers in clinical settings.

Fundamentals of computers Practical

CO NO.	COURSE OUTCOMES	Bloom's Taxonomy Level
CO1	Recall the basic functions and features of MS Word, MS Excel, MS PowerPoint, and computer software.	**L1**
CO2	Explain the steps involved in using MS Office applications and installing different software programs.	**L2**
CO3	Demonstrate practical skills in creating documents, presentations, worksheets, and performing software installation and data entry tasks.	**L3**
CO4	Analyze and improve data entry accuracy and efficiency using appropriate computer applications and tools.	**L4**

COURSE CONTENT:

1. Learning to use MS office: MS word, MS PowerPoint, MS Excel.
2. To install different software.
3. Data entry efficiency

COMMUNICATION AND SOFT SKILLS (30 Hours)

COURSE OUTCOMES

CO No.	Course Outcomes	Bloom's Taxonomy Level
CO1	Describe the structure and functioning of the healthcare delivery system in India, including primary, secondary, and tertiary levels of care, National Health Mission, and National Health Policy.	**L2**
CO2	Explain the objectives, components, achievements, and challenges of major National Health Programmes and the role of community participation in healthcare delivery.	**L2**
CO3	Discuss the principles and applications of AYUSH systems of medicine and the need for integration of different healthcare systems in India.	**L2**
CO4	Apply the concepts of demography, vital statistics, census data, and health indicators in understanding population health and health policy planning.	**L3**
CO5	Analyze the health scenario of India and evaluate the factors influencing healthcare delivery and public health outcomes.	**L4**
CO6	Analyze the health scenario of India and evaluate the factors influencing healthcare delivery and public health outcomes.	**L4**

COURSE CONTENT:

Topics to be covered under Communication & Soft Skills course –

1. Basic Language Skills: Grammar and Usage.
2. Business Communication Skills. With focus on speaking - Conversations, discussions, dialogues, short presentations, pronunciation.
3. Teaching the different methods of writing like letters, E-mails, report, case study, collecting the patient data etc. Basic compositions, journals, with a focus on paragraph form and organization.
4. Basic concepts & principles of good communication
5. Special characteristics of health communication
6. Types & process of communication
7. Barriers of communication & how to overcome

Topics to be covered under English course –

1. Spoken Communication
    a. Learning to read the phonetic symbols
    b. Stress
    c. Intonation
    d. Rhythm

e. Commonly mispronounced words
f. Correct pronunciation of important commonly used words in hospital practice

2. Vocabulary and Reading
    a. Special features of English vocabulary
    b. Common errors in choice of word
    c. Semi technical vocabulary
    d. Collecting material from library on scientific topics
    e. Comprehensive exercises
3. Writing
    a. Writing letters regarding permission, leave, opening bank account etc.
    b. Taking notes from lecture / reading materials
    c. Writing reports on patient care
    d. Summarizing scientific passages
4. Grammatical and Idiomatic Usage
    a. Correction of errors
    b. Types of interrogative sentences
    c. Active-Passive voice
    d. Tense
    e. Principles of procession, clarity and specificity

Competency

Professional conduct: Backed by philanthropy, compassion, integrity, and excellence, a dialysis technologist is to adhere to the utmost conduct of professionalism. They are to provide their services, to patients with renal failure requiring renal replacement therapies, with professional codes and ethical conduct as their core values. They are to be a team player, effective in communication, provide the best care, to keep the patients safe & protected. They are to understand their limitations while continuing to keep themselves educated and updated with the current dialysis therapy practices.

PERFORMANC E CRITERIA	INDICATOR			*Measurement criteria*
	Knowledge	***Skill***	***Behaviour***	
Ability to consider a patient's health as their utmost priority.	1. Understand & explain the basic concept of health sciences related to human anatomy, physiology, pathology, biochemistry, microbiology, and pharmacology . 2. Comprehend & explain applied renal anatomy, physiology, microbiology, pathology, pharmacology , biochemistry & renal nutrition. 3. Understand & explain the practice of medical sociology & psychology in dialysis therapy.	1. Identify the patient's needs & requirements based on their clinical presentation & lab workups. 2. Explain Renal Replacement Therapy options & demonstrate patient education to help them choose the optimal therapy. 3. Plan the prescription of dialysis therapy. 4. Identify & plan a dynamic patient-tailored renal diet consultation & plan renal diet/nutrition.	1. Greet & respect patient & their attendants with care & appropriate manners. 2. Understand & empathize with a patient's psychological & social issues while constructively communicating with them. 3. Ensure equal care & treatment are given to all patients. 4. Respect patients regarding their care plan decisions.	1.Class tests (debates, essay questions, MCQs, etc.) 2. Summative assessment 3. Formative assessment 4. OSCE, OSPE 5. Clinical posting & logbooks 6. Self-assessment & Peer- assessment 7. Viva-voce

Ability to independently deliver the best quality dialysis therapies & extracorporeal blood therapies with excellent clinical competency.	1. Comprehend & explain the principles of renal replacement therapies & each modality, their technical requirements, complications & management, apparatus, troubleshooting, vascular access, etc. 2. Comprehend & explain the principles & modalities of extracorporeal blood therapies, their technical requirements, complications & management, apparatus, troubleshooting, vascular access, etc. 3. Comprehend & explain the concept of renal transplantation & coordination (both pre & post transplantation).	OVERALL DIALYSIS THERAPY CARE TO THE PATIENT: a. Independently demonstrate & perform hemodialysis, peritoneal dialysis, and extracorporeal blood therapies. b. Independently demonstrate & perform AVF/AVG cannulation & Central Venous catheter handling. c. Demonstrate basic renal nursing care in dialysis patients- safe injection practices, blood & blood products transfusion, IV cannula insertion, IV antibiotic administrations, emergency medication administration during intradialytic complications, anticoagulant iv injections, EPO & iron injections, the	1. Demonstrate good interpersonal relationships with the dialysis team. 2. Demonstrate critical thinking & conflict management. 3. Demonstrate leadership & navigation qualities at the workplace. 4. Demonstrate adaptability to different situations & environment at the workplace. 5. Demonstrate good working conduct under stressful situations. 6. Respect patient's decision of discontinuing therapies/treatment under the supervisor/nephrologists" supervision.	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4.OSCE, OSPE 5.Clinical posting & logbooks 6.Seminar presentation 7.Case presentation 8.Self-assessment & Peer- assessment 9.Problem- based learning exercises 10.Viva voce 11.Patient simulation 12.Student projects 13.Problem & Cases Based Learning

	4. Comprehend & explain the complications of dialysis therapies their management & treatment. 5. Understand & describe the concept of biomedical instrumentations/electronics used in dialysis therapies. 6. Understand & describe the basic nursing care in dialysis therapies to provide total patient care. 7. Understand & describe the concept of research methodology. 8. Emphasize & understand the recent advances in dialysis therapies & the utilization of AI in dialysis therapies.	concept of the crash cart, etc. d. Demonstrate BLS & ACLS. ASSEMBLE PATIENT HISTORY: 1. Obtains the case history. 2. Makes general observations of patients. 3. Obtains and interprets patient information from other professionals. PATIENT ASSESSMENT: 1. Formulates an examination plan. 2. Implements the plan. 3. Pre & post assessment of dialysis INFECTION CONTROL PRACTISES AND UNIVERSAL PRECAUTION a. Demonstrates appropriate use of barrier precautions. b. Recalls and demonstrates sharp instruments and prevents needle stick injuries through education.		

		c. Properly demonstrates appropriate cleaning and disinfecting of surfaces and equipment. d. Properly dispose of contaminated or infectious waste. e. Properly performs isolation procedures for patient care during dialysis. f. Properly obtains and handles isolation blood specimens and infection control measures. OPERATION AND MAINTENANCE OF DELIVERY SYSTEM a. Properly demonstrate the operational handling of the HD delivery system. b. Properly initiates, performs & documents all types of disinfections & rinses. c. Properly demonstrates sodium profiling and UF profiling.		

		d. Operate routine maintenance, identification of a malfunction, troubleshooting , and minor repair for all equipment used in dialysis units such as hemodialysis machines, water treatment plants, dialyzer reprocessing machines, etc. VASCULAR ACCESS PROCEDURES: a) Ability to properly assess the vascular access for function, and integrity, handling all types of vascular access for Hemodialysis. b) Efficiently initiate the use of all types of vascular access (temporary & permanent) for hemodialysis as well as terminate the use of the same. MANAGING ACUTE EMERGENT COMPLICATIONS ON DIALYSIS: a. Recalls and/or responds properly to all types of intradialytic		

		complications & patient clinical complaints pertaining to the hemodialysis therapy. (Hypotension, cramps, nausea, body pain, chest pain, breathlessness, etc.) b. Ability to properly handle mechanical complications such as air embolism, hemolysis, blood leak, dialyzer reactions, etc. c. Recalls and/or responds properly to all vascular access-related complications such as infected catheter handling, needle infiltration, bleeding, swelling, hematoma, etc. DIALYSATE PREPARATION PROCEDURES: a. Efficiently demonstrates the preparation of both manual & machine preparation of dialysate concentrates.		

		complications & patient clinical complaints pertaining to the hemodialysis therapy. (Hypotension, cramps, nausea, body pain, chest pain, breathlessness, etc.) d. Ability to properly handle mechanical complications such as air embolism, hemolysis, blood leak, dialyzer reactions, etc. e. Recalls and/or responds properly to all vascular access-related complications such as infected catheter handling, needle infiltration, bleeding, swelling, hematoma, etc. DIALYSATE PREPARATION PROCEDURES: b. Efficiently demonstrates the preparation of both manual & machine preparation of dialysate concentrates.		

		b. Efficiently performs manual conductivity, temperature, and pH tests of the dialysate concentrates. c. Efficiently demonstrates the disinfection of the dialysate preparing equipment & the microbiological surveillance of the dialysate concentrates. WATER TREATMENT PROCEDURES: a. Efficiently demonstrates the operation of the RO equipment and the various parts of the water treatment plant. b. Efficiently performs tests for the system such as TDS, water hardness test, chlorine or chloramine test, water pressure drops monitoring, microbiological surveillance sample collection, etc. c. Efficiently demonstrates documentation skills of each procedure.		

		PERITONEAL DIALYSIS: a. Demonstrates the ability to assess a patient for PD & initiate PD therapy & perform CAPD exchanges according to unit policy and complete the prescription. b. Demonstrates the delivery of efficient patient education/counseling. c. Demonstrates efficient patient pre/post-PD catheter insertion care. d. Demonstrates the ability to line/set up the home choice machine. e. Demonstrates the ability to troubleshoot PD complications (infectious & mechanical complications) including peritonitis while administering permitted drugs as per hospital policy (e.g., Heparin during dialysis).		

		f. Demonstrates the ability to collect PD samples and follow unit protocol, documents findings correctly & perform adequacy and PET test. g. Demonstrates the ability to train a patient or carer to perform CAPD or APD and an exit site dressing. RENAL TRANSPLANTATION: a. Assess the physiological and psychological functioning of the transplant recipient with monitoring and review of treatment plans in conjunction with the renal transplant team. b. Facilitate the donor and recipient preparation such as motivation and the psychosocial readiness of the prospective		

		donor, medical screening prior to transplant and post-transplant follow-up along with the transplant team along with assessing the health and suitability of a prospective living organ donor. c. Demonstrate efficiently the pre-transplantation counseling and guidance, pertaining informed consent forms from donor and recipient along with the transplant team following all the protocols. d. Identify, counsel, and influence patients who are not adhering to their medication regime, help facilitate them in developing approaches to lifestyle and health management and educate the patient on post-transplant immunosuppre		

		ssive medications along with the treating nephrology team. e. Patient and donor workup including committee approval and coordinating between a nephrologist, urologist, donor surgeon, and anesthesia team. f. Facilitate the updating of the cadaver transplant waitlist. ICU RRT and CRRT: a. Perform dialysis therapies & extracorporeal blood therapies in critically ill patients in different types of ICUs- Surgical, Medical, Isolation, Cardio-thoracic, Pediatric, Neuro, Coronary Care ICU, etc. b. Perform dialysis therapy & extracorporeal blood therapies for infectious patients- Covid-19,		

		H1N1, Viro-positive, MRSAs, TB, etc. c. Perform dialysis therapies & extracorporeal blood therapies in special cases- Pediatric, geriatric, autistic, pregnant women, differently abled patients, etc. d. Identifies all the various parts of the extracorporeal blood therapy equipment & assembles equipment required for the CRRT circuit including the emergency equipment required at the bedside & their efficient utilization. e. Efficiently demonstrate the troubleshooting of alarms & clinical complications. f. Demonstrates the apparatus preparation, connection & termination efficiently.		

		REPROCESSING OF DIALYSER, TUBING, etc.: a. Initiate, monitor, and terminate both manual and automated reprocessing of dialyzer and tubing. b. Efficiently demonstrate the dilution & storage of disinfectants. c. Efficiently demonstrates the troubleshooting of automatic dialyzer reprocessing machine. d. Efficiently demonstrates the visual identification of a condemned dialyzer/blood tubing. PLASMAPHERESIS: a. Demonstrate and perform the safe and appropriate operation of the apheresis machines currently. b. Be able to demonstrate knowledge of the relevant standard operating procedure(s).		

		c. Procedure commencement, monitoring, and post-procedure care. OTHER SPECIAL PROCEDURES: Hemoperfusion, MARS, Liver Dialysis, and other extracorporeal therapies: a. Initiate, and perform safe termination of appropriate operation of the Hemoperfusion technique, including management of alarm conditions, troubleshooting, and maintenance. b. Initiate, and perform safe termination of appropriate operation of the MARS technique, including management of alarm conditions, troubleshooting, and maintenance. c. Initiate, and perform safe termination of appropriate operation of the Liver Dialysis technique, including management of		

		alarm conditions, troubleshooting, and maintenance. d. Initiate, and perform safe termination of appropriate operation of the extracorporeal techniques including management of alarm conditions, troubleshooting, and maintenance. MANAGERIAL ROLES: a. Development & planning of a dialysis unit for a standalone organization or a healthcare set-up. b. Assist the dialysis unit manager/supervisor in inventory & logistic management. COORDINATE WITH NEPHROLOGISTS / PHYSICIAN/ SURGEONS IN CERTAIN PROCEDURES: a. Coordinate with nephrologists in a renal biopsy, central venous line catheterization & PD catheter insertion & OrganTransplantation		

Ability to administer prescribed medications during dialysis.	1. Comprehend & explain the pharmacology related to dialysis therapy. 2. Explain the common medications & emergency medications administered in dialysis patients. 3. Knowledge of the International Patient Safety Goals & the rights of drug administration .	1. Demonstrate administration of anticoagulant (e.g., Injection heparin) & coagulant agents used during dialysis. 2. Demonstrate efficient application of the International Patient Safety Goals & the rights of drug administration during dialysis therapy. 3. Demonstrate administration of common drugs & emergency drugs via different routes during dialysis therapy such as ESA injections, iron sucrose injections, MVI, antihistamines, NSAIDs, antibiotics, etc., under the supervision of the nephrologist/physicians	1. Demonstrate honesty & integrity while medication handling. 2. Avoids discrimination & malpractice which may impair their professional judgment/actions, compromising the delivery of dedication for the best interest of the patients.	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4.OSCE, OSPE 5.Clinical posting & logbooks 6.Seminar presentation 7.Case presentation 8.Self-assessment & Peer-assessment 9.Problem- based & Case based learning exercises. 10.Viva voce
Ability to understand & respect a patient‟s rights, dignity & confidentiality, as well as that of other	1. Understand & describe the patients‟ rights & responsibilities and confidentiality in a healthcare set-up & in a	1. Maintains confidentiality of patient records. 2. Ensures that data is organized in a legible, secure, accessible,	1. Restrict from discussing patients‟ confidential information & conditions/matters related to this in any open forum/external	1.Summative assessment 2.Formative assessment 3.OSCE, OSPE 4.Clinical posting & logbooks

Healthcare professionals	dialysis unit. 2. Understand & describe the rights & responsibilities of healthcare workers in a dialysis unit.	permanent, and unambiguous manner. 3. Demonstrate excellent documentation skills with record-keeping abilities. 4. Maintain cordial relationships with other healthcare professionals	communications. 2. Demonstrate good communication skills & IPR with the dialysis therapists, nephrologists, nurses & the multidisciplinary team at the workplace. 3. Honesty & understanding of self-limitations	5.Self- asse ssment & Peer-assessment 6.Problem- based & Case based learning exercises. 7.Viva voce

Ability to adhere to healthcare & safety policies and quality assurance.	1. Understand & explain hospital infection control policies, quality assurance & patient safety, and basic principles of management in healthcare & in the dialysis units.	1. Understand & demonstrate the emergency codes protocols- Code Red, Code Blue, Code Yellow, Code Pink, Code Violet, etc. 2. Develop SOPs for a dialysis therapy unit. 3. Demonstrate hospital infection control practices- hand hygiene, machine disinfection, dialyzer reprocessing, RO water system disinfection, handling seropositive & infectious patients, etc.	1. Proactive approach & alertness to the surrounding for any health & safety issues. 2. Courteous & friendly support to the patients making the dialysis therapists accessible, promoting patient satisfaction.	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4.OSCE, OSPE 5.Clinical posting & logbooks 6.Seminar presentation 7.Case presentation 8.Self-assessment & Peer-assessment 9.Problem- based & Case based learning exercises. 10.Viva voce

Ability to adhere to legal, professional, and ethical guidelines, laws & codes.	1. Understand & describe the medical terminologies & medical ethics, law & codes in a healthcare set-up & dialysis unit.	1. Explain invasive procedures & collect informed consent forms for central venous line insertion, high-risk consent forms, dialysis consent forms, etc. 2. Legal documents handling in the coordination of pre & post-renal transplantation. 3. Follow the code of conduct regulated by the respective authorities.	1. Honesty & integrity in observing medical ethics, laws & codes. 2. Respect the patient's right to information & confidentiality. 3. Dress appropriately with IDs & as per the institute's policy. 4. Establish professionalism & ethical values in the workplace.	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4.OSCE, OSPE 5.Clinical posting & logbooks 6.Self-assessment & Peer-assessment
Ability to continue in the academic arena, training & facilitating the students as well as dialysis staff.	1. Comprehend all the basic health sciences, and their implementations in the clinical arena. 2. Comprehend the dialysis therapy modalities, their prescription, complications & treatment/management. 3. Comprehend renal transplantation & coordination.	1. Demonstrate & facilitate students, trainees & interns on dialysis therapy modalities as a clinical demonstrator/instructor. 2. Function as a Tutor in the academic arena. 3. Develop training curriculums & materials for clinical training, demonstrations, externship candidates, etc.	1. Always presentable & dress appropriately. 2. Respects & greets the faculties & students. 3. Show good communication & comprehensive proficiency. 4. Maintains good IPR with the clinical team.	1.Class tests (debates, essay questions, MCQs, etc.) 2.Summative assessment 3.Formative assessment 4. OSCE, OSPE 5.Clinical posting & logbooks 6.Seminar presentation 7.Case presentation 8.Self-assessment & Peer-assessment

	4. Comprehend & explain the dialysis therapies in special populations & circumstances .	4. Participate & assist in research activities.		9.Problem-based & Case based learning exercises

Competency Domains for Alignment

Domain	Representative Competencies
Cognitive & Technical	Clinical reasoning, diagnostic accuracy, QC protocols
Affective & Ethical	Professionalism, patient safety, lab ethics
Psychomotor	Skill-based performance, automation handling, specimen processing
Communication & Collaboration	Documentation, interdisciplinary teamwork
Research & Innovation	Literature review, evidence synthesis, scientific writing
Leadership & Entrepreneurship	Initiative, mentorship, resource management

Internship Logbooks

- **Daily Tracking**: Structured entries with dates, tasks, and supervisor validation
- **Weekly Goals**: Intern sets rotation-specific targets
- **Competency Checklist**: Per module, includes skill validation (e.g., staining, cryostat handling)
- **Supervisor Feedback**: 5-point scale on independence, safety, and professional behavior

Formative Assessment

- Objective Structured Practical Examination (OSPE)
- Mini Clinical Evaluation Exercise (Mini-CEX)
- Reflective Portfolios
- Supervisor Evaluations
- Peer-Reviewed Research Logs

- Recorded Demonstrations

Certification: Internship completion certificate includes:

- Clinical rotation postings and total hours
- Externship and research details
- Authenticated by HOD/Coordinator and HOI
- **Note**: Degree awarded only upon validated internship completion

Cover Page of Log book

University/College logo University/

College Name

INTRENSHIP LOG BOOK

BDTT (VII/VIII SEMESTER)

(YEAR)

Name **:** ……..….

Semester **:** ……...

Enrollment No. :……..….

Session **:** ……..……

…….….. ……..……..

Signature of Principal Signature of Student

DECLARATION BY THE STUDENT

Madam/Sir,

I, Mr/Ms ..... a student of ……..….. bearing Registration No. …… declare that I have completed ……..... hours of Internship duty, out of the assigned …… hours and have performed my duties in the hospital/laboratory as stated in my logbook

Students Signature

(COLLEGE/UNIVERSITY LOGO)

INSTITUTE/UNIVERSITY/ COLLEGE NAME

LOGBOOK CERTIFICATE

This is to certify that the candidate Mr/Ms…… registration number …… admitted in the academic year.....of ……college, has satisfactorily completed/ Not completed all requirements mentioned in this logbook for seventh/ eighth semester of Bachleor in Dialysis Therapy Technology during the period from ……to …… in the …..Hospital/Laboratory.

Signature of the Faculty in-Charge (hospital/laboratory)

Name

Date

Signature of the Principal/Dean HoD (University/College)

Name

Date

SKILL ASSESSMENT SHEET

Hospital/Laboratory: **Department:**

Date	Name of Experiment	Observed / Assisted/ Performed	Signature of supervisor/In-charge

List of Recommended Books for UG

1. Human anatomy by B.D.Chaurasia's
2. Gray's Anatomy
3. Manual of practical physiology – A.K.Jain
4. Medical Physiology- Guyton
5. Text Book of Pathology - Harsh Mohan
6. Basic Pathology – pocket Robbins
7. Harper's Biochemistry – 26th edition
8. Text Book of Biochemistry – DM Vasudevan
9. Psychology – The Sciences of Behaviour - Fifth edition 1982 - Neil Carlson -William Bulkist - Allyn and Bacon.
10. Psychology made simple - Abraham Sperling, Ph D - Advisory editor - M.S Gill. MA., Ph D - 'Made simple books' - W.H.Allen, London.
11. Developmental Psychology - David R Schaffer - 2nd edition 1989 - Books/Cole publishing companyPacific Gnaue, California
12. Psychology - Lefton. L - III edition 1985 - Allyn and Bacan
13. Medical Terminology: A Short Course,7th Edition, Author: Davi-Ellen Chabner, Saunders Publishers
14. Medical Terminology & Anatomy for Coding , 3rd Edition (2017), Author : Betsy J Shiland, Mosby Publisher
15. Introduction to computers & Data processing – Shelly, Gray. B
16. Information Technology – Dennis P Curtin
17. An Introduction to Computer Applications in Medicine – N. F. Kember
18. Medical Records Organization & Management – G.D Mogli
19. Computer Aided Tomography & Ultrasonics in Medicine – J. Raviv, J.F. Greeniat
20. Introduction to Biostatistics and Research Methods by Sunder Rao PSS Y Richard J . PHI publishers 2012.
21. Biostatistics: A Foundation for Analysis of Health Sciences by Danial WW. John Wiley Publishers
22. Research Methods: Methods and Techniques by Kothari CR. New Age International Publishers- 2004
23. Research Methodology: A step by Step Guide to Beginners by Ranjit Kumar. SAGE Publishers-2014.
24. Mosby's paramedic text book,
25. Barbara paramedic practice today
26. Medical Pharmacology – PadmajaUdaykumar
27. ECG made easy – John R. Hampton
28. Medical pharmacology – Padmaja Udaykumar
29. Handbook of Dialysis – Daugirdas
30. Essentials of Medical Pharmacology- K.D.Tripati, 8th edition
31. Textbook of Pathology- P.HarshMohan , 8th edition (2018)
32. Basic pathology -Robbin , 10th edition, Elseivier
33. Principle and Practices of Medicine -Davidson , 23rd edition (2018)
34. Kidney Diseases in Primary care-Anil K. Mandal, N.StanleyNahman, (1998)
35. Pocket companion to Robbins andCotran Pathologic Basics of Diseases, 8th edition (2011)
36. Primer on Kidney Diseases-Arthur GreenBerg , 5th edition(2010), Elsevier
37. Oxford Textbook of Clinical Nephrology -Neiljuna,Norbert Lameire, David

J. Goldsmith, Christopher G.Winarls, Jonathan Himmil farb, Giuseppe Remuzzi ,4th edition (2015)
38. Handbook of Dialysis Therapy- Allen .R. Nisseson,RichardN.Fine ,5th edition
39. Principles and Practice of Dialysis -Henrich, 5th edition(2016), Wolterskluwer
40. Oxford Handbook of Dialysis - Jeremy Levy, Edwina Brown, Anastasia Lawrence, 4th edition (2016)
41. Handbook of Kidney Transplantation- Gabriel M. Danovitch, Wolters Kluwer
42. Textbook of Peritoneal Dialysis-Nolph and Gokal, 3rd edition(2009), Springer
43. .Handbook of Kidney Transplantation- Gabrieb M. Danovilch, 6th edition (2017),Wolters

List of Abbreviations

AC	Alternating Current
ACLS	Advanced Cardiac Life Support
ADH	Anti-Diuretic Hormone
AED	Automated External Defibrillator
AHPs	Allied and Healthcare Professionals
AKI	Acute Kidney injury
ALS	Advance Life Support
ANCA	Antineutrophil Cytoplasmic Antibody
ANS	Autonomic Nervous System
AntiGBM	Anti–Glomerular Basement Membrane
APD	Automated Peritoneal Dialysis
ARF	Acute/Advanced Renal Failure
ASO/ASLO	Antistreptolysin O
ATN	Acute Tubular Necrosis
ATP	Adenosine Triphosphate
AVF	Arterio-Venous Fistula
AVG	Arterio-Venous Grafts
AYUSH	Ayurveda, Yoga and Naturopathy, Unani, Siddha, Homeopathy
AZA	Azathioprine
BDTT	Bachelors in Dialysis Therapy Technology
BLD	Blood Leak Detector
BLS	Basic life support
BM	Biomedical
BMR	Basal Metabolic Rate
BMW	Bio Medical Waste
BP	Blood Pressure
BT	Bleeding Time
BUN	Blood Urea Nitrogen
BVMs	Bag Valve Masks
BVSC	Bachelor of Veterinary Science
C-ANCA	Cytoplasmic – Antineutrophil Cytoplasmic Antibody
CAPD	Continuous Ambulatory Peritoneal Dialysis
CATS	Credit Accumulation and Transfer System
CAVH	Continuous Arterio-Venous Hemofiltration
CBCS	Choice-Based Credit System
CBD	Case-based discussion
CCPD	Continuous Cycling Peritoneal Dialysis
CEX	Mini Case Evaluation Exercise
CHC	Community Health Centre

CHF	Congestive Heart Failure
CKD	Chronic Kidney Disease
CMV	Cytomegalovirus
CNS	Central Nervous System
CPR	Cardio Pulmonary Resuscitation
CPU	Central Processing Unit
CRF	Chronic Renal Failure
CRP	C-Reactive Protein
CRRT	Continuous Renal Replacement Therapy
CSA	Cyclosporin A
CSF	Cerebro Spinal Fluid
CT	Clotting Time
DC	Direct Current
DT	Dialysis Therapy
DDT	Diploma in Dialysis Technology
DGF	Delayed Graft Function
DH	District Hospital
DNA	Deoxyribonucleic Acid
DOPs	Direct observation of procedures
DSA	Donor Specific Antibodies
DTT	Dialysis Therapy Technology
EBV	Epstein-Barr virus
ECG	Electrocardiogram
ECTS	European Credit Transfer System
EEG	Electroencephalogram
ELISA	Enzyme-Linked Immuno Sorbent Assay
EMG	Electromyogram
EMR	Electronic Medical Records
EMS	Emergency Medical Services
EPROM	Erasable Programmable Read Only Memory
ESR	Erythrocyte Sedimentation Rate
ESRD	End Stage Renal Disease
FISH	Fluorescence In Situ Hybridization
G	Gravity
GFR	Glomerular Filtration Rate
GIT	Gastro-Intestinal Tract
H & E Staining	Hematoxylin and Eosin Staining
Hb	Hemoglobin
HBsAg	Hepatitis B Surface Antigen (or protein)
HBV	Hepatitis B virus
HCV	Hepatitis C virus
HIV	Human immunodeficiency virus

HLA	Human Leukocyte Antigen
HLS	Histocompatibility
HoD	Head of Department
HRQOL	Health-Related Quality Of Life
HSSC	Healthcare Sector Skill Council
ICAHP	Interim Commission for Allied and Healthcare Professions
ICT	Information and Communications Technology
ICU	Intensive Care Unit
IgA	Immunoglobulin A
IgD	Immunoglobulin D
IgE	Immunoglobulin E

IgG	Immunoglobulin G
IgM	Immunoglobulin M
ISO	International Organization for Standardization
IV	Intravenous
IVP	Intra Venous Pyelogram
JCI	Joint Commission International
JD	Job description
JG	Juxtaglomerular
K	Clearance
KoA	Mass Transfer Coefficient
KT/V	Number used to quantify hemodialysis and peritoneal dialysis treatment adequacy, where K - dialyzer clearance of urea, t - dialysis time and V - volume of distribution of urea, approximately equal to patient's total body water
Kuf	Ultrafiltration Coefficient
L J media	Löwenstein–Jensen medium
L.S.	Longitudinal Section
LAN	Local Area Network
LD	Level Detector
LF	Lactose Fermenting
LMWH	Low Molecular Weight Heparin
LS	Longitudinal Section
M.Sc.	Master of Science
MDT	Master in Dialysis Therapy
MAb	Monoclonal Antibody
MAN	Metropolitan area network
MARS	Molecular Adsorbent Recirculating System
MCH	Mean Cell Haemoglobin
MCHC	Mean Corpuscular Hemoglobin Concentration
MCV	Mean Cell (or Corpuscular) Volume
ME	Microscopic Examination

MHC	Major Histocompatibility Complex
MLC	Medico legal case
MoHFW	Ministry of Health and Family Welfare
MoU	Memorandum of Understanding
MS	Microsoft
NA	Nutrient Agar
NABH	National Accreditation Board for Hospitals & Healthcare Providers
NCAHP	National Commission for Allied and Healthcare Professionals
NIPD	Nocturnal Intermittent Peritoneal Dialysis

NK cell	Natural Killer cell
NLF	Non-Lactose Fermenting
NMJ	Neuromuscular Junction
OSCE	Objective Structured Clinical Examination
OSLER	Objective Structured Long Examination Record
OSPE	Objective Structured Practical Examination
OT	Operation Theatre
P-ANCA	Perinuclear – Antineutrophil Cytoplasmic Antibody
PAOP	Pulmonary Artery Occlusion Pressure
PCM/B	Physics, Chemistry, Maths/ Biology
PCR	Polymerase Chain Reaction
PCTs	Patient Care Technologists
PCV	Packed Cell Volume
PD	Peritoneal Dialysis
PEA	Pulseless Electrical Activity
PET	Peritoneal Equilibrium/Equilibration Test
PG	Post Graduate
Ph.D.	Doctor of Philosophy
Ph.D. D.T	Doctor of Philosophy Dialysis Therapy
PHC	Primary Health Centre
PPE	Personal Protective Equipment
PRA	Panel Reactive Antibodies
PT	Prothrombin Time
PTH	Para-Thyroid Hormone
PTT	Partial Thromboplastin Time
RAM	Random Access Memory
RBC	Red Blood Cells
RDA	Recommended Dietary Allowances
RF	Rheumatoid Factor
RNA	Ribonucleic Acid
RO	Reverse Osmosis
ROM	Read-Only Memory

RPM	Revolutions Per Minute
RQ	Respiratory Quotient
RS	Respiratory System
SC/ST/OBC	Schedules Castes/ Scheduled Tribes/ Other Backward Classes
SCA	Sudden Cardiac Arrest
SCUF	Slow Continuous Ultrafiltration
SDA	Specific Dynamic Action
SDH	Sub District Hospital
SI	System International
SLED	Slow Low Efficiency Dialysis/Sustained Low-Efficiency Dialysis
TS	Transverse Section
TIBC	Total Iron Binding Capacity
TmG	Transport maximum for Glucose
TMP	Trans Membrane Pressure
TNF	Tumor Necrosis Factor
TSC	Technical safety checks
UF	Ultrafiltration
UGC	University Grants Commission
UHC	Universal Health Care
UTI	Urinary Tract Infection
UV	Ultra-Violet
VDE test	Verband der Elektrotechnik
VDRL	Venereal Disease Research Laboratory
VF	Ventricular Fibrillation
VT	Ventricular Tachycardia
WAN	Wide area network
WBC	White Blood Cells
WWW	World Wide Web

MODEL PAPER

B.DTT Semester-I
Paper Code: BDTT-001

Bachelor of Dialysis Therapy Technology (BDTT)
Semester I
Medical Terminology and Record Keeping
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

(a) Explain the origin, purpose, derivation, and formation of medical terminology. (CO1, L2)
(b) Describe medical terminologies related to the musculoskeletal, respiratory, urinary, and reproductive systems. (CO2, L2)
(c) Discuss the formats, contents, documentation requirements of medical records, and the role of electronic health record systems in healthcare documentation. (CO6, L4)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

(a) Explain the uses and importance of medical terminology in healthcare practice. (CO1, L2)
(b) Describe common prefixes, suffixes, and combining forms used in medical terminology. (CO1, L2)
(c) Explain the conventions for combined morphemes and formation of plurals in medical terminology. (CO3, L3)
(d) Describe basic anatomical medical terms used in clinical practice. (CO2, L2)
(e) Explain the formation of medical terms using roots, prefixes, suffixes, and combining forms with examples. (CO3, L3)
(f) Interpret commonly used medical abbreviations and symbols. (CO3, L3)
(g) Discuss diagnostic, surgical, and procedural terminologies related to the respiratory and cardiovascular systems. (CO4, L4)
(h) Explain the interpretation of medical orders and healthcare reports. (CO4, L4)
(i) Describe the formats and contents of medical records maintained in hospitals. (CO5, L4)
(j) Explain data entry and management in electronic health record systems. (CO6, L3)

Q.3. Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

(a) Define medical terminology. (CO1, L1)
(b) Define word root. (CO1, L1)
(c) Define prefix. (CO1, L1)
(d) Define suffix. (CO1, L1)
(e) Define combining form. (CO1, L1)
(f) Define morpheme. (CO3, L1)
(g) Define medical abbreviation. (CO3, L1)
(h) Define anatomical position. (CO2, L1)
(i) Define diagnostic terminology. (CO4, L1)
(j) Define medical record. (CO5, L1)
(k) Define electronic health record (EHR). (CO6, L1)
(l) List the contents of a patient medical record. (CO5, L1)

MODEL PAPER

B. DTT Semester-I
Paper Code: BDTT-002

Bachelor of Dialysis Therapy Technology (BDTT)
Semester I
Professionalism and Values & Indian Constitution
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) 2 × 15 = 30 Marks

(a) Explain professional values in healthcare with special reference to integrity, confidentiality, professional competence. (CO1, L2)
(b) Describe the making of the Indian Constitution and discuss its salient features, and fundamental rights. (CO4, L2)
(c) Explain the doctrine of separation of powers and describe the structure and functions of the legislature. (CO5, L2)

Q.2. Short Essay Questions (Attempt any 8) 8 × 5 = 40 Marks

(a) Explain personal values and ethical values in healthcare practice. (CO1, L2)
(b) Describe professional behaviour and the importance of treating people equally. (CO2, L2)
(c) Explain the importance of teamwork and interprofessional in healthcare. (CO2, L2)
(d) Describe cultural issues encountered in the healthcare environment. (CO2, L2)
(e) Explain the significance of fundamental rights and fundamental duties. (CO4, L2)
(f) Describe the bicameral system. (CO5, L2)
(g) Explain the functions of the Election Commission. (CO5, L2)
(h) Describe the constitutional provisions for women, children, Scheduled Castes, backward classes, and minorities. (CO5, L2)
(i) Explain the procedure for amending the Constitution of India. (CO5, L2)
(j) Describe the concept of sustainable development in the context of the Indian Constitution. (CO6, L3)

Q.3. Short Answer Questions (Attempt any 10) 10 × 3 = 30 Marks

(a) Define professionalism. (CO1, L1)
(b) Define confidentiality in healthcare practice. (CO1, L1)
(c) What is professional accountability (CO1, L1)
(d) Define misconduct. (CO3, L1)
(e) Define Constitution. (CO4, L1)
(f) State any two fundamental rights. (CO4, L1)
(g) Name any two fundamental duties of Indian citizens. (CO4, L1)
(h) What is meant by Directive Principles of State Policy. (CO4, L1)
(i) Name the three organs of the Government of India. (CO5, L1)
(j) What is the function of the Election Commission of India. (CO5, L1)
(k) Name any two writs provided by the Constitution. (CO6, L1)
(l) Define sustainable development. (CO6, L1)

MODEL PAPER

B.DTT Semester-I
Paper Code: BDTT-003

Bachelor of Dialysis Therapy Technology (BDTT)
Semester I
Human Anatomy
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

(a) Describe the location, chambers, and valves of the heart with a neat diagram. (CO2, L2)
(b) Explain the structure and types of joints with suitable examples. (CO4, L2)
(c) Explain the parts of the urinary tract and the functions of the kidneys. (CO2, L2)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

(a) Explain the types of body membranes with examples. (CO1, L2)
(b) Write the classification of epithelial tissue with suitable examples. (CO1, L1)
(c) Describe the structure of cartilage. (CO2, L2)
(d) Explain the parts of a long bone. (CO2, L2)
(e) Describe the structure of lungs and pleura. (CO2, L2)
(f) Explain the structure of a neuron. (CO2, L2)
(g) Write a short note on lymphatic system. (CO3, L2)
(h) Describe the structure of the liver. (CO2, L2)
(i) Explain the structure of male reproductive system. (CO2, L2)
(j) Describe the endocrine glands and their functions. (CO2, L2)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

(a) Define axillary artery. (CO1, L1)
(b) Name the basic tissues of the body. (CO1, L1)
(c) Define gland and give one example of serous gland. (CO1, L1)
(d) List the bones of the upper limb. (CO2, L1)
(e) Name the layers of the heart wall and writes one function of each layer. (CO2, L1)
(f) Name the parts of the respiratory system. (CO2, L1)
(g) List the parts of a nephron. (CO2, L1)
(h) Name the meninges of the brain. (CO2, L1)
(i) Define fertilization. (CO6, L1)
(j) Name the parts of the female reproductive system. (CO2, L1)
(k) Name the different types of joints in the human body. (CO4, L1)

MODEL PAPER

B.DTT Semester-I
Paper Code: BDTT-004

Bachelor of Dialysis Therapy Technology (BDTT)
Semester I
Human Physiology
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) 2 × 15 = 30 Marks

(a) Explain the basic organization of the human body including cell structure, epithelial tissues, glands, and basic tissues with suitable examples. (CO1, L1)
(b) Describe the anatomy of the cardiovascular system including the heart, major arteries, veins, lymphatic system, and their clinical relevance in vascular access procedures. (CO3, L2)
(c) Discuss the anatomy and histology of the urinary and reproductive systems with special emphasis on kidney, urinary bladder, urethra, testis, ovary, and uterus. (CO2, CO5, L2/L3)

Q.2. Short Essay Questions (Attempt any 8) 8 × 5 = 40 Marks

(a) Describe the classification and histology of cartilage and bone. (CO2, L2)
(b) Explain the classification of joints with suitable examples and describe a synovial joint. (CO4, L2)
(c) Discuss the classification and histology of muscular tissue. (CO4, L2)
(d) Describe the anatomy of the stomach, small intestine, large intestine, liver, gall bladder, and pancreas. (CO2, L2)
(e) Explain the anatomy and histology of the respiratory system including trachea, lungs, and pleura. (CO2, L2)
(f) Describe the gross anatomy and histology of endocrine glands including pituitary, thyroid, parathyroid, and suprarenal glands. (CO2, L2)
(g) Explain the structure and classification of the nervous system including cerebrum, cerebellum, spinal cord, and cranial nerves. (CO2, L2)
(h) Discuss the anatomy of the eye and ear with their important components. (CO4, L2)
(i) Explain fetal circulation and the structure and functions of the placenta. (CO6, L2)
(j) Describe spermatogenesis, oogenesis, ovulation, and fertilization. (CO6, L2)

Q.3. Short Answer Questions (Attempt any 10) 10 × 3 = 30 Marks

(a) Define anatomy and mention its divisions. (CO1, L1)
(b) Define epithelium and classify it. (CO1, L1)
(c) Define serous and mucous glands. (CO1, L1)
(d) Name the parts of a long bone. (CO2, L1)
(e) Define synovial joint. (CO4, L1)
(f) Define portal vein. (CO3, L1)
(g) Define broncho-pulmonary segment. (CO2, L1)
(h) Define nephron. (CO5, L1)
(i) Define neuron. (CO2, L1)
(j) Define cerebrospinal fluid (CSF). (CO2, L1)
(k) Define placenta (CO6, L1)
(l) Define fertilization. (CO6, L1)

MODEL PAPER

B.DTT Semester-I
Code: BDTT-005

Bachelor of Dialysis Therapy Technology (BDTT)
Semester I
Biochemistry
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

(a) Explain the collection of blood, urine, and other body fluids with precautions. (CO1, L1)
(b) Describe the structure of an atom. Briefly Explain protons. (CO2, L2)
(c) Define and classify carbohydrates giving suitable examples of biological importance. (CO3, L2)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

(a) Write a note on laboratory pipettes and their uses. (CO1, L1)
(b) Explain the uses of a centrifuge in a laboratory. (CO1, L2)
(c) Differentiate between molarity and normality. (CO4, L3)
(d) Write a note on bioenergetics (ATP). (CO3, L2)
(e) Explain pH and its importance. (CO2, L2)
(f) Describe buffers and their functions. (CO2, L2)
(g) Explain the functions of enzymes. (CO3, L2)
(h) Define Vitamins and the classification of vitamins. (CO3, L2)
(i) Explain the importance of ATP in the body. (CO3, L2)
(j) Describe quality control in a clinical laboratory. (CO1, L2)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

(a) Define spectrophotometer. (CO5, L3)
(b) Name any two anticoagulants. (CO1, L1)
(c) What is a volumetric flask. (CO1, L1)
(d) Define centrifuge. (CO1, L1)
(e) State Bohr's atomic theory. (CO2, L2)
(f) Define pH. (CO2, L1)
(g) Name any two acids. (CO2, L1)
(h) Define lipid. (CO3, L1)
(i) Name any two proteins. (CO3, L1)
(j) Define coenzyme. (CO3, L1)
(k) Name any two digestive enzymes. (CO3, L1)
(l) What is ATP. (CO3, L1)

MODEL PAPER

B.DTT Semester-I
Code: BDTT-006

Bachelor of Dialysis Therapy Technology (BDTT)
Semester I
Introduction to Dialysis Therapy
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

(a) Explain the functions of the normal kidney and compare them with dialysis. (CO1, L1)
(b) Describe Hemodialysis. Explain its components and mechanism. (CO2, L2)
(c) Explain Peritoneal Dialysis. Describe its components, and mechanism of action. (CO2, L2)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

(a) Define Chronic Kidney Disease (CKD). (CO1, L1)
(b) Write a short note on the history of dialysis. (CO2, L2)
(c) Discuss the components of the dialysis delivery system. (CO2, L2)
(d) Define Dialysate and explain its functions during dialysis. (CO2, L2)
(e) Define Osmosis and describe its application in dialysis therapy. (CO2, L2)
(f) Explain the role of dialysis in renal failure management. (CO3, L2)
(g) Define organ transplantation and classify its types. (CO4, L2)
(h) Describe importance of Kidney Transplantation. (CO2, L2)
(i) Describe the various areas of a dialysis unit and their importance. (CO6, L2)
(j) Write a short note on palliative care in ESRD. (CO5, L3)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

(a) Define Acute kidney Injury. (CO1, L1)
(b) Define RRT (CO1, L1)
(c) Define End-Stage Renal Disease (ESRD). (CO1, L1)
(d) Name any three components of a hemodialysis machine. (CO2, L1)
(e) Define Ultrafiltration. (CO2, L1)
(f) Name any two functions of a normal kidney. (CO3, L1)
(g) Mention any three indications for dialysis. (CO3, L1)
(h) Define organ transplantation. (CO4, L1)
(i) Define kidney transplantation. (CO4, L1)
(j) Define conservative management. (CO5, L1)
(k) List the members of the dialysis unit team. (CO6, L3)
(l) Name any three members of a dialysis unit staff. (CO6, L1)

MODEL PAPER

B.DTT Semester II
Code: BDTT-011

Bachelor of Dialysis Therapy Technology (BDTT)
Semester II
Pathology
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

(a) Describe the mechanisms of reversible and irreversible cell injury. (CO1, L2)
(b) Describe acute inflammation. Explain its causes. (CO2, L2)
(c) Define Automated tissue processor. Write a note on microtome knives (CO4, L2)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

(a) Differentiate between benign and malignant tumors. (CO2, L2)
(b) Describe the types of cell adaptation with examples. (CO2, L2)
(c) Explain the different types of necrosis. (CO2, L2)
(d) Describe healing by first intention. (CO2, L2)
(e) Define edema and its types. (CO2, L2)
(f) Explain the branches of pathology. (CO1, L1)
(g) Describe the gross and microscopic features of tuberculosis. (CO2, L2)
(h) Describe the collection and preservation of urine specimens. (CO5, L2)
(i) Explain blood grouping and Rh typing. (CO6, L1)
(j) Describe the use of anticoagulants in hematology. (CO6, L1)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

(a) Define etiology. (CO1, L1)
(b) Define lesion. (CO1, L1)
(c) Define hypertrophy. (CO2, L1)
(d) Define inflammation. (CO2, L1)
(e) What is granulation tissue. (CO2, L1)
(f) Define neoplasia. (CO2, L1)
(g) Define metastasis. (CO2, L1)
(h) Name any two fixatives used in histopathology. (CO4, L1)
(i) Define CSF. (CO5, L1)
(j) Define anticoagulant. (CO6, L1)
(k) What is ESR. (CO6, L1)
(l) Define cross-matching. (CO6, L1)

MODEL PAPER

B.DTT Semester-II
Code: BDTT-012

Bachelor of Dialysis Therapy Technology (BDTT)
Semester II
Microbiology
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

(a) Explain the classification, morphology and structure of bacteria. (CO1, L1)
(b) Describe the principles of sterilization and disinfection. Explain the use of autoclave. (CO2, L2)
(c) Explain the morphology, diseases caused, specimen collection and laboratory diagnosis of Staphylococci. (CO4, L2)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

(a) Explain the growth and nutrition of bacteria. (CO1, L1)
(b) Describe different types of culture media and their uses. (CO2, L2)
(c) Explain antimicrobial sensitivity testing. (CO2, L2)
(d) Describe immunity and types of vaccines. (CO2, L2)
(e) Explain the principle of Widal test. (CO3, L2)
(f) Describe the morphology and laboratory diagnosis of Salmonella. (CO4, L2)
(g) Explain the morphology and life cycle of Plasmodium. (CO5, L2)
(h) Describe Candida and the diseases caused by it. (CO5, L2)
(i) Explain the general properties of viruses. (CO5, L2)
(j) Describe hospital-acquired infections. (CO6, L2)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

(a) Define microbiology. (CO1, L1)
(b) Name the common shapes of bacteria. (CO1, L1)
(c) Define culture media. (CO2, L1)
(d) Define sterilization. (CO2, L1)
(e) Define disinfection. (CO2, L1)
(f) What is a vaccine. (CO2, L1)
(g) Expand ELISA. (CO3, L1)
(h) Name the causative organism of malaria. (CO5, L1)
(i) Name one fungus causing candidiasis. (CO5, L1)
(j) Name the virus causing AIDS. (CO5, L1)
(k) Define biomedical waste. (CO2, L1)
(l) Name any two sources of hospital infection. (CO6, L1)

MODEL PAPER

B.DTT Semester-II
Paper Code: BDTT-013

Bachelor of Dialysis Therapy Technology (BDTT)
Semester II
General Pharmacology
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

(a) Define pharmacology. Explain routes of drug administration. (CO1, L1)
(b) Describe cholinergic drugs and anticholinergic drugs with their therapeutic uses. (CO2, L2)
(c) Explain the classification and therapeutic uses of drugs acting on the cardiovascular system. (CO4, L2)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

(a) Explain drug toxicity and drug safety. (CO1, L1)
(b) Describe adrenergic drugs and their actions. (CO2, L2)
(c) Write a note on neuromuscular blocking drugs. (CO2, L2)
(d) Explain general anesthetics and their uses. (CO3, L2)
(e) Describe NSAIDs and their therapeutic uses. (CO3, L2)
(f) Explain drugs used in peptic ulcer. (CO4, L2)
(g) Describe anticoagulants and their uses. (CO4, L2)
(h) Explain antihypertensive drugs with examples. (CO4, L2)
(i) Describe antidiabetic drugs and their uses. (CO6, L2)
(j) Explain thyroid and anti-thyroid drugs. (CO6, L2)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

(a) Define Local anesthetics. (CO1, L1)
(b) Define pharmacokinetics. (CO1, L1)
(c) Name any four routes of drug administration. (CO1, L1)
(d) Define cholinergic drugs. (CO2, L1)
(e) Define adrenergic drugs. (CO2, L1)
(f) Name one local anesthetic drug. (CO3, L1)
(g) Name one opioid analgesic. (CO3, L1)
(h) Define anticoagulant. (CO4, L1)
(i) Name one drug used in bronchial asthma. (CO4, L1)
(j) Name one beta-lactam antibiotic. (CO5, L1)
(k) Name one antidiabetic drug. (CO6, L1)
(l) Define immunosuppressor. (CO6, L1)

MODEL PAPER

B.DTT Semester-II
Paper Code: BDTT-014

Bachelor of Dialysis Therapy Technology (BDTT)
Semester II
Applied Anatomy & Physiology Related to Dialysis Therapy
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

(a) Describe the anatomy of the urinary system. Explain the structure of kidney. (CO1, L1)
(b) Explain the blood supply of the kidney and discuss the anatomy of arteries and veins commonly used for dialysis access. (CO2, L2)
(c) Describe acid-base balance and explain common electrolyte disturbances in renal diseases. (CO4, L2)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

(a) Describe the histology of the kidney. (CO1, L1)
(b) Explain the development of the kidney in brief. (CO2, L2)
(c) Describe the anatomy of the peritoneum and mention. (CO1, L2)
(d) Explain the anatomy of upper limb used in dialysis. (CO2, L2)
(e) Describe renal circulation and its importance. (CO3, L2)
(f) Explain the hormones produced by the kidney. (CO4, L2)
(g) Describe coagulation factors and the coagulation cascade. (CO4, L2)
(h) Explain acid-base balance and its importance in the body. (CO4, L2)
(i) Describe basic nutrition in renal diseases. (CO5, L2)
(j) Explain the structure and functions of the Juxtaglomerular Apparatus. (CO6, L2)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

(a) Define nephron. (CO1, L1)
(b) Name the layers of the urinary bladder. (CO1, L1)
(c) Name the blood vessels supplying the kidney. (CO2, L1)
(d) Define GFR. (CO3, L1)
(e) Define clearance test. (CO3, L1)
(f) Name any two hormones produced by the kidney. (CO4, L1)
(g) Define hemostasis. (CO4, L1)
(h) Define pH. (CO4, L1)
(i) Name any two electrolyte abnormalities seen in renal disease. (CO4, L1)
(j) Expand ECG. (CO5, L1)
(k) Expand ECHO. (CO5, L1)
(l) Define micturition. (CO6, L1)

MODEL PAPER

B.DTT Semester-II
Paper Code: BDTT-015

Bachelor of Dialysis Therapy Technology (BDTT)
Semester II
Fundamental of Dialysis Therapy
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

(a) Define Hemodialysis. Explain the principles of hemodialysis and discuss the role of diffusion. (CO2, L2)
(b) Define Peritoneal Dialysis. Explain the principles of peritoneal dialysis. (CO2, L2)
(c) Describe the structure, properties and importance of semipermeable membranes used in dialysis therapy. (CO4, L2)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

(a) Define dialysis and explain its indications. (CO1, L1)
(b) List and explain the types of hemodialysis. (CO1, L2)
(c) List and explain the types of peritoneal dialysis. (CO1, L2)
(d) Explain the factors affecting diffusion in hemodialysis. (CO2, L2)
(e) Define Kuf and KoA and mention their significance. (CO2, L2)
(f) Explain biocompatibility and its importance in dialysis. (CO4, L2)
(g) Describe the components of a hemodialysis apparatus. (CO3, L2)
(h) Explain the components of a peritoneal dialysis apparatus. (CO3, L2)
(i) Write a short note on alarms in a hemodialysis machine. (CO6, L2)
(j) Describe common complications of hemodialysis. (CO6, L2)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

(a) Define PD Fluids (CO1, L1)
(b) Define peritoneal dialysis. (CO1, L1)
(c) Name any two indications for dialysis. (CO1, L1)
(d) Define diffusion. (CO2, L1)
(e) Define ultrafiltration. (CO2, L1)
(f) Define osmosis. (CO2, L1)
(g) What is a semipermeable membrane. (CO4, L1)
(h) Define vascular access. (CO3, L1)
(i) What is dialysate. (CO3, L1)
(j) Define priming. (CO5, L1)
(k) Define dialyzer reuse. (CO5, L1)
(l) Name any two parameters monitored during dialysis. (CO6, L1)

MODEL PAPER

B.DTT Semester-III
Paper Code: BDTT-021

Bachelor of Dialysis Therapy Technology (BDTT)
Semester III
Sociology in Healthcare
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

(a) Define medical sociology. Explain its objectives and scope. (CO1, L1)
(b) Explain the influence of social class, gender, age and culture on health and illness. (CO2, L2)
(c) Describe medical social services in hospitals and explain. (CO4, L2)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

(a) Differentiate between sociology of medicine and sociology in medicine. (CO1, L2)
(b) Write a short note on the historical development of medical sociology. (CO1, L1)
(c) Explain the role of ethnicity in health and disease. (CO2, L2)
(d) Describe the impact of marital and cultural factors on health. (CO2, L2)
(e) Define social epidemiology and explain its importance. (CO3, L2)
(f) Describe common occupational diseases and their prevention. (CO3, L2)
(g) Explain the professional qualities of a physician. (CO4, L2)
(h) Describe the characteristics and functions of social groups. (CO5, L2)
(i) Explain social control and its importance in society. (CO5, L2)
(j) Describe health and healthcare challenges in developing countries. (CO6, L2)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

(a) What is meant by civilization. (CO5, L1)
(b) Define healthcare administration. (CO6, L1)
(c) What is social class. (CO2, L1)
(d) Define ethnicity. (CO2, L1)
(e) Define social epidemiology. (CO3, L1)
(f) Name any two occupational diseases. (CO3, L1)
(g) Define medical social service. (CO4, L1)
(h) What is a social group. (CO5, L1)
(i) Define culture. (CO5, L1)
(j) Define civilization. (CO5, L1)
(k) What is health care administration. (CO6, L1)
(l) Name any two public health challenges in India. (CO6, L1)

MODEL PAPER

B.DTT Semester-III
Paper Code: BDTT-022

Bachelor of Dialysis Therapy Technology (BDTT)
Semester III
Biomedical Waste Management
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) 2 × 15 = 30 Marks

(a) Define Biomedical Waste (BMW). Explain the categories. (CO1, L1)
(b) Describe the principles of biomedical waste segregation, collection, transportation. (CO2, L2)
(c) Explain biomedical waste management methods and various methods of disinfection used in healthcare settings. (CO4, L2)

Q.2. Short Essay Questions (Attempt any 8) 8 × 5 = 40 Marks

(a) Explain waste minimization and its importance. (CO2, L2)
(b) Describe the color-coding system used in biomedical waste management. (CO2, L2)
(c) Explain the management of liquid biomedical waste. (CO3, L2)
(d) Describe the disposal of chemical and pharmaceutical waste. (CO3, L2)
(e) Explain the management of radioactive waste. (CO3, L2)
(f) Write a short note on modern technologies used in biomedical waste management. (CO4, L2)
(g) Explain the use and importance of Personal Protective Equipment (PPE). (CO5, L2)
(h) Describe measures for prevention and control of cross infection in hospitals. (CO5, L2)
(i) Explain the Biomedical Waste Management Rules and Regulations. (CO6, L2)
(j) Write a short note on HAZMAT. (CO6, L2)

Q.3. Very Short Answer Questions (Attempt any 10) 10 × 3 = 30 Marks

(a) Define Waste Minimization. (CO1, L1)
(b) Name any four sources of biomedical waste. (CO1, L1)
(c) Define waste minimization. (CO2, L1)
(d) What is segregation of waste. (CO2, L1)
(e) Define Personal protective equipment (PPE) (CO1, L1)
(f) Define liquid biomedical waste. (CO3, L1)
(g) Define radioactive waste. (CO3, L1)
(h) Define disinfection. (CO4, L1)
(i) Expand PPE. (CO5, L1)
(j) Name any two personal protective equipment items. (CO5, L1)
(k) Expand HAZMAT. (CO6, L1)
(l) Name any two biomedical waste management regulations. (CO6, L1)

MODEL PAPER

B.DTT Semester-III
Paper Code: BDTT-023

Bachelor of Dialysis Therapy Technology (BDTT)
Semester III
Pathophysiology of the Kidney Diseases
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

(a) Explain Acute Kidney Injury (AKI). Discuss its causes, classification. (CO1, L1)
(b) Describe Chronic Kidney Disease (CKD). Explain its causes. (CO1, L2)
(c) Explain the pathology of glomerular diseases with references. (CO2, L2)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

(a) Define inherited renal diseases. (CO2, L2)
(b) Explain the importance of renal biopsy in kidney diseases. (CO2, L2)
(c) Describe urinary tract infections (UTI) and their complications. (CO1, L2)
(d) Explain renal stone disease and its causes. (CO1, L2)
(e) Describe congenital abnormalities of the urinary system. (CO2, L2)
(f) Explain inherited renal diseases. (CO2, L2)
(g) Describe tumors of the kidney and urinary bladder. (CO3, L2)
(h) Explain renal diseases associated with pregnancy. (CO3, L2)
(i) Describe hepatotropic viruses and their modes of transmission. (CO4, L2)
(j) Explain HIV infection and universal precautions in healthcare settings. (CO4, L2)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

(a) Define Opportunistic infection. (CO1, L1)
(b) Define Basic tropical Disease. (CO1, L1)
(c) Define nephrotic syndrome. (CO1, L1)
(d) Define nephritic syndrome. (CO1, L1)
(e) What is renal biopsy. (CO2, L1)
(f) Define obstructive uropathy. (CO2, L1)
(g) Define renal tuberculosis. (CO3, L1)
(h) What is peritonitis (CO3, L1)
(i) Expand HIV. (CO4, L1)
(j) Define opportunistic infection. (CO4, L1)
(k) What is culture and sensitivity testing (CO5, L1)
(l) Define reflux nephropathy. (CO6, L1)

MODEL PAPER

B.DTT Semester-III
Paper Code: BDTT-024

Bachelor of Dialysis Therapy Technology (BDTT)
Semester III
Subject: Instrumentation Specific to Dialysis Therapy
Time: 3 Hours | Maximum Marks: 100

Q.1. Essay Questions (Attempt any 2) **2 × 15 = 30 Marks**

(a) Describe the components and functions of a hemodialysis machine. (CO2, L2)
(b) Explain the purpose and components of a water treatment system used in dialysis. (CO2, L2)
(c) Describe the principles and clinical applications of Online Hemodiafiltration. (CO4, L2)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

(a) Write a short note on dialyzers and their functions. (CO1, L1)
(b) Explain the importance of OCM (Online Clearance Monitoring). (CO1, L2)
(c) Describe cleaning and disinfection of a hemodialysis machine. (CO2, L2)
(d) Explain AAMI and ISO standards for RO water. (CO2, L2)
(e) Describe the RO system and its importance in dialysis. (CO2, L2)
(f) Explain automated dialyzer reprocessing equipment. (CO3, L2)
(g) Describe CRRT equipment and its components. (CO3, L2)
(h) Explain the functions of a PD cycler. (CO3, L2)
(i) Write a short note on cardiac monitors and defibrillators. (CO3, L2)
(j) Explain the role of MARS, SPAD. (CO4, L2)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

(a) Define Filtration. (CO1, L1)
(b) What is a dialyzer. (CO1, L1)
(c) Define water treatment system. (CO2, L1)
(d) Expand RO. (CO2, L1)
(e) What is UV irradiation. (CO2, L1)
(f) Define Online hemodiafiltration. (CO3, L1)
(g) Define PD cycler. (CO3, L1)
(h) Expand ECMO. (CO4, L1)
(i) Define plasmapheresis. (CO4, L1)
(j) What is a bioimpedance analysis machine. (CO3, L1)
(k) Define blood volume monitor. (CO3, L1)
(l) What is an ultrasound machine. (CO6, L1)

MODEL PAPER

BDTT Semester-III
Paper Code: BDTT-025

Bachelor of Dialysis Therapy Technology (B.DTT)
Semester III
Basic Principles of Nursing Care
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

(a) Explain vital signs monitoring. Temperature and pulse. (CO2, L2)
(b) Describe the principles and procedure of specimen collection. (CO3, L2)
(c) Explain wound cleaning and dressing. vascular access sites. (CO3, L2)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

(a) Describe the purpose and types of bed making. (CO1, L1)
(b) Explain the importance of an input and output chart. (CO2, L2)
(c) Write a short note on emergency crash carts. (CO2, L2)
(d) Describe bladder catheterization. (CO3, L2)
(e) Explain intravenous, intramuscular and subcutaneous injections. (CO4, L2)
(f) Describe the procedure of intravenous cannulation. (CO4, L2)
(g) Explain the care of bedridden patients. (CO1, L2)
(h) Describe the importance of documentation in patient care. (CO2, L2)
(i) Explain the principles of aseptic precautions during specimen collection. (CO3, L2)
(j) Describe suturing. (CO4, L2)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

(a) Define Deionizer. (CO1, L1)
(b) Define vital signs. (CO2, L1)
(c) What is an input-output chart. (CO2, L1)
(d) Define crash cart. (CO2, L1)
(e) Define bladder catheterization. (CO3, L1)
(f) Name the three common routes of injection. (CO4, L1)
(g) Define intravenous cannula. (CO4, L1)
(h) What is wound dressing. (CO3, L1)
(i) Define Enuresis monitor. (CO3, L1)
(j) What is documentation. (CO2, L1)
(k) Define suture. (CO4, L1)
(l) Name any two specimens commonly sent to the laboratory. (CO3, L1)

MODEL PAPER

BDTT Semester-III
Paper Code: BDTT-026

Bachelor of Dialysis Therapy Technology (B.DTT)
Semester III
Medical Law and Ethics
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

(a) Define medical ethics. Explain its goals, and importance in healthcare practice. (CO1, L1)
(b) Explain patient autonomy, informed consent, in healthcare services. (CO2, L2)
(c) Describe the medico-legal aspects of medical records, and release of medical information. (CO4, L2)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

(a) Write a short note on the code of conduct for healthcare professionals. (CO1, L1)
(b) Explain the principle of confidentiality in medical practice. (CO2, L2)
(c) Describe malpractice and negligence in healthcare. (CO3, L2)
(d) Write a short note on rational drug therapy. (CO3, L2)
(e) Explain euthanasia and its ethical issues. (CO3, L2)
(f) Describe organ transplantation and its ethical considerations. (CO3, L2)
(g) Explain the ownership and retention of medical records. (CO4, L2)
(h) Write a short note on professional indemnity insurance policy. (CO4, L2)
(i) Explain the importance of standardized protocols. (CO4, L2)
(j) Describe the steps involved in obtaining informed consent. (CO2, L2)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

(a) Define Autonomy. (CO1, L1)
(b) What is a code of conduct. (CO1, L1)
(c) Define confidentiality. (CO2, L1)
(d) Define patient autonomy. (CO2, L1)
(e) What is informed consent. (CO2, L1)
(f) Define malpractice. (CO3, L1)
(g) Define negligence. (CO3, L1)
(h) What is euthanasia. (CO3, L1)
(i) Define organ transplantation. (CO3, L1)
(j) What is a medico-legal case (MLC). (CO4, L1)
(k) Define professional indemnity insurance. (CO4, L1)
(l) What is a standardized protocol. (CO4, L1)

MODEL PAPER

B.DTT Semester-IV
Code: BDTT-029

Bachelor of Dialysis Therapy Technology (BDTT)
Semester IV
Pharmacology Related to Dialysis Therapy
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

A. Explain intravenous fluid therapy in renal diseases. Discuss the principles of fluid therapy. (CO2, L2)
B. Describe erythropoiesis stimulating agents (ESAs) with reference to their types, mechanism of action. (CO2, L2)
C. Explain the principles of drug dialyzability. Discuss the factors affecting drug clearance during dialysis. (CO3, L2)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

A. Classify diuretics and explain. (CO1, L1)
B. Describe antihypertensive drugs used in dialysis patients. (CO2, L2)
C. Explain the basics of fluid therapy. (CO2, L2)
D. Describe the Commonly used IV fluids. (CO2, L2)
E. Explain the adverse reactions of protamine sulphate. (CO1, L2)
F. Describe the Factors affecting the dialyzability. (CO4, L2)
G. Explain the composition of peritoneal dialysis fluid. (CO4, L2)
H. Describe the mechanism of action potassium exchange resins. (CO1, L2)
I. Explain the role of emergency drugs used during dialysis. (CO5, L3)
J. Describe CRRT replacement solutions and their clinical applications. (CO4, L2)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

A. Define Adverse effect of heparin. (CO1, L1)
B. Name any two commonly used intravenous fluids. (CO2, L1)
C. Define drug dialyzability. (CO3, L1)
D. What is a calcimimetic agent? (CO1, L1)
E. Name any two erythropoiesis stimulating agents. (CO2, L1)
F. Define heparin induced thrombocytopenia (HIT). (CO1, L1)
G. Name any two newer anticoagulants used in dialysis. (CO1, L1)
H. List any three chemicals used in dialysis units. (CO1, L1)
I. What is the normal buffer used in PD fluid? (CO4, L1)
J. Define Online Hemodiafiltration (HDF). (CO4, L1)
K. Name any two IV iron preparations. (CO1, L1)
L. Define organ preservation solution. (CO4, L1)

MODEL PAPER

B.DTT Semester-IV
Code: BDTT-030

Bachelor of Dialysis Therapy Technology (BDTT)
Semester IV
Psychology
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

A. Define psychology. Explain its branches, and importance in health sciences. (CO1, L2)
B. Describe attention and perception. Explain the types of attention. (CO2, L2)
C. Explain learning and memory. Discuss the types of memory. (CO2, L2)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

A. Write a short note on major schools of psychology. (CO1, L2)
B. Explain any two methods used in the study of psychology. (CO1, L2)
C. Describe the structure and functions of neurons. (CO2, L2)
D. Explain the stages of human development. (CO2, L2)
E. Write a short note on personality. (CO2, L2)
F. Explain Thorndike's laws of learning. (CO2, L2)
G. Describe Spearman's two-factor theory of intelligence. (CO2, L2)
H. Explain motives and needs. (CO3, L2)
I. Write a short note on stress and coping behavior. (CO3, L2)
J. Explain communication and its importance in healthcare settings. (CO3, L2)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**
A. Define psychology. (CO1, L1)
B. Name any four branches of psychology. (CO1, L1)
C. Define observation method. (CO1, L1)
D. What is a Ethical issue in Psychotherapy? (CO2, L1)
E. Define attention. (CO2, L1)
F. Define perception. (CO2, L1)
G. What is personality? (CO2, L1)
H. Define intelligence. (CO2, L1)
I. What is memory? (CO2, L1)
J. Define motivation. (CO3, L1)
K. What is stress? (CO3, L1)
L. Define communication. (CO3, L1)

MODEL PAPER

B.DTT Semester-IV
Code: BDTT-031

Bachelor of Dialysis Therapy Technology (BDTT)
Semester IV
Renal Nutrition
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

A. Explain nutritional screening and assessment methods used in kidney disease patients. (CO1, L2)
B. Describe the nutritional management of patients undergoing Hemodialysis (HD). Discuss dietary recommendations. (CO3, L3)
C. Explain Chronic Kidney Disease–Mineral Bone Disorder (CKD-MBD) and discuss the role of calcium. (CO5, L4)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

A. Explain the Mini Nutritional Assessment in renal patients. (CO1, L2)
B. Describe the effect of kidney disease on amino acid metabolism. (CO2, L2)
C. Explain the impact of kidney disease on carbohydrate metabolism. (CO2, L2)
D. Describe the dietary management and fluid pre-dialysis CKD patients. (CO3, L3)
E. Discuss the nutritional management of Peritoneal Dialysis (PD) patients. (CO3, L3)
F. Explain the principles of nutritional management in Acute Kidney Injury (AKI). (CO3, L3)
G. Describe the nutritional management of renal transplant recipients. (CO3, L3)
H. Explain the influence of kidney disease on acid-base balance. (CO2, L2)
I. Discuss the factors affecting nutritional status in Hemodialysis patients. (CO4, L4)
J. Explain the role of biochemical assessment and laboratory data in renal patients. (CO1, L2)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

A. Define goals of nutrition. (CO1, L1)
B. What is Mini Nutritional Assessment (MNA)? (CO1, L1)
C. Define Subjective Global Assessment (SGA). (CO1, L1)
D. Define Dialysis Malnutrition Score (DMS). (CO1, L1)
E. List any four anthropometric measurements used in nutritional assessment. (CO1, L1)
F. Define metabolic alterations in kidney disease. (CO2, L1)
G. Name any four factors influencing nutritional status in HD patients. (CO4, L1)
H. Define Chronic Kidney Disease–Mineral Bone Disorder (CKD-MBD). (CO5, L1)
I. List the major electrolytes requiring monitoring in CKD patients. (CO2, L1)
J. Define malnutrition. (CO4, L1)
K. What is the purpose of nutritional care in Peritoneal Dialysis patients? (CO3, L1)
L. Name any four laboratory parameters of renal patients. (CO1, L1)

MODEL PAPER

B.DTT Semester-IV
Code: BDTT-032

Bachelor of Dialysis Therapy Technology (BDTT)
Semester IV
Dialysis Therapies Part-I
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

A. Explain the types of vascular access used for hemodialysis. Discuss AVF, AVG, complications. (CO2, L2)
B. Describe the components and working principles of the dialysis water treatment unit (WTU). (CO1, L2)
C. Discuss infection control practices and universal precautions followed in the dialysis unit. (CO5, L4)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

A. Explain the structure of hollow fiber dialyzers. (CO1, L2)
B. Describe the indications for initiation of dialysis therapy. (CO1, L2)
C. Explain the preparation and composition of dialysis solution. (CO1, L2)
D. Describe the steps of cannulation and explain. (CO3, L3)
E. Explain vascular access surveillance. (CO4, L4)
F. Discuss the principles of anticoagulation during hemodialysis. (CO5, L4)
G. Explain urea reduction ratio (URR) and. (CO4, L4)
H. Describe the procedure of dialyzer reprocessing. (CO3, L3)
I. Explain home hemodialysis. (CO1, L2)
J. Describe the drugs commonly used in dialysis patients. (CO2, L2)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

A. Define extracorporeal circuit. (CO1, L1)
B. Name any four components of the dialysis delivery system. (CO1, L1)
C. Define biocompatibility of a dialyzer membrane. (CO1, L1)
D. List any four synthetic dialyzer membranes. (CO1, L1)
E. Define catheter lock. (CO2, L1)
F. State the Rule of 6's for AV fistula maturation. (CO2, L1)
G. What is vascular access recirculation? (CO4, L1)
H. Define dialyzer reprocessing. (CO3, L1)
I. What is heparin rebound phenomenon? (CO5, L1)
J. Define urea reduction ratio (URR). (CO4, L1)
K. Name any four contaminants present in dialysis water. (CO1, L1)
L. List any four universal precautions followed in dialysis units. (CO5, L1)

MODEL PAPER

B.DTT Semester-IV
Code: BDTT-033

Bachelor of Dialysis Therapy Technology (BDTT)
Semester IV
Medical Electronics for Health Sciences
Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

A. . Explain the principles and applications of semiconductor devices. and applications of semiconductor diode. (CO1, L2)
B. Discuss various types of transducers and display devices used in biomedical instrumentation. (CO4, L4)
C. Explain the principles and clinical applications of diagnostic equipment used in health sciences. (CO5, L4)

Q.2. Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

A. Describe the basic configuration and types. (CO2, L2)
B. Explain the principles of feedback amplifiers. (CO2, L2)
C. Differentiate between RC and LC oscillators. (CO2, L2)
D. Explain the applications of operational amplifiers. (CO3, L3)
E. Describe A/D and D/A converters and their applications in medical instrumentation. (CO3, L3)
F. Explain the principles of transducers used in biomedical equipment. (CO4, L4)
G. Describe different types of oscilloscopes in healthcare electronics. (CO4, L4)
H. Explain the principle of ultrasonography. (CO6, L3)
I. Describe the principle of radiography and its applications in diagnosis. (CO6, L3)
J. Explain the role of bio-potential recording devices in healthcare. (CO5, L4)

Q.3. Very Short Answer Questions (Attempt any 10) **10 × 3 = 30 Marks**

A. Define semiconductor diode. (CO1, L1)
B. What is a Zener diode? (CO1, L1)
C. Expand BJT and FET. (CO1, L1)
D. Define frequency response of an amplifier. (CO2, L1)
E. State the condition for sustained oscillation. (CO2, L1)
F. Define operational amplifier. (CO3, L1)
G. What is an active filter? (CO3, L1)
H. Define transducer. (CO4, L1)
I. Name any two types of oscilloscopes. (CO4, L1)
J. Expand ECG, EEG. (CO5, L1)
K. Define ultrasonography. (CO6, L1)
L. What are radioisotopes? (CO6, L1)

MODEL PAPER

B.DTT Semester-IV
Code: BDTT-034

Bachelor of Dialysis Therapy Technology (BDTT)
Semester IV
Research Methodology and Biostatistics

Time: 3 Hours | Maximum Marks: 100

Q.1. Long Questions (Attempt any 2) **2 × 15 = 30 Marks**

A. Define research. Explain the steps involved in the research process. (CO1, L2)
B. Describe in detail qualitative, quantitative, research (CO2, L2)
C. Explain descriptive and analytical epidemiological studies. (CO3, L2)

Q.2 Short Essay Questions (Attempt Any 8) **(8 × 5 = 40 Marks)**

A. Write a short note on research design. (CO1, L2)
B. Explain the importance of review of literature in research. (CO1, L2)
C. Describe the characteristics of qualitative research. (CO2, L2)
D. Explain validity and reliability of a research instrument. (CO2, L2)
E. Define disease frequency and mention its significance. (CO3, L2)
F. Explain any two sampling methods used in research. (CO4, L2)
G. Write a short note on normal distribution. (CO4, L2)
H. Explain mean and median with suitable examples. (CO5, L2)
I. Define hypothesis testing and explain. (CO6, L2)
J. Write a short note on correlation. (CO6, L2)

Q.3 Very Short Answer Questions (Attempt Any 10) **(10 × 3 = 30 Marks)**

A. Define research. (CO1, L1)

B. What is a research hypothesis (CO1, L1)
C. Define informed consent. (CO1, L1)
D. What is qualitative research with example? (CO2, L1)
E. What is quantitative research with example? (CO2, L1)
F. Define epidemiology. (CO3, L1)
G. What is sampling? (CO4, L1)
H. Define probability. (CO4, L1)
I. What is mean? (CO5, L1)
J. Define standard deviation. (CO5, L1)
K. What is p-value? (CO6, L1)
L. Define correlation. (CO6, L1)

MODEL PAPER

B.DTT Semester-V
Code: BDTT-038

Bachelor of Dialysis Therapy Technology (BDTT)
Semester V
Dialysis Therapies- Part-II
Time: 3 Hours | Maximum Marks: 100

Q.1. Essay Questions (Attempt any 2) **2 × 15 = 30 Marks**

A. Explain the hemodialysis procedure including patient assessment before, during, and after dialysis. (CO1, L2)

B. Describe the principles, indications, contraindications, and apparatus of peritoneal dialysis. (CO2, L2)

C. Explain the causes, signs, symptoms, prevention, and management of intradialytic hypotension. (CO4, L4)

***Q*.2. Short Essay Questions** *(*Attempt any *8)* 8 × 5 = 40 Marks

A. Acute hemodialysis prescription. (CO3, L3)
B. Chronic hemodialysis prescription. (CO3, L3)
C. Dialysis Disequilibrium Syndrome (DDS). (CO4, L4)
D. Air embolism during hemodialysis. (CO4, L4)
E. Infectious complications of peritoneal dialysis. (CO4, L4)
F. Non-infectious complications of peritoneal dialysis. (CO4, L4)
G. Role of laboratory investigations in kidney disease. (CO3, L3)
H. Hemodialysis in children. (CO5, L4)
I. Vascular access for pediatric hemodialysis. (CO5, L4)
J. Nutrition in peritoneal dialysis patients. (CO6, L3)

Q.3 Very Short Answer Questions (Attempt any 10) **10 × 3 = 30Marks**

A. Urea Reduction Ratio (URR). (CO2, L2)
B. Define hemodialysis. (CO1, L1)
C. List any three indications of dialysis. (CO2, L1)
D. What is PET (Peritoneal Equilibration Test)? (CO2, L1)
E. State two complications of peritoneal dialysis. (CO4, L1)
F. Mention two indications for dialysis during pregnancy. (CO5, L1)
G. List any three laboratory tests used to assess kidney function. (CO3, L1)
H. What is a transfer set in PD? (CO2, L1)
I. What is an arteriovenous fistula (AVF)? (CO2, L1).
J. What is catheter lock? (CO2, L1)
K. List any three signs of exit-site infection. (CO4, L1)
L. Mention any three causes of intradialytic hypotension. (CO4, L2)

MODEL PAPER

B.DTT Semester-V
Code: BDTT-039

Bachelor of Dialysis Therapy Technology (BDTT)
Semester V
Renal transplantation and coordination
Time: 3 Hours | Maximum Marks: 100

Q.1. Essay Questions (Attempt any 2) **2 × 15 = 30 Marks**

A. Explain the concepts of organ donation, types of transplantation, brain stem death, and the legal and ethical aspects of organ transplantation. (CO1, L2)
B. Describe the principles of immunology related to kidney transplantation, including HLA system, cross-matching, sensitization, and immunological testing. (CO2, L2)
C. Analyze the role of immunosuppressive therapy, graft rejection, post-transplant complications, and their management in renal transplant recipients. (CO4, L4)

Q.2. Short Essay Questions *(*Attempt any 8) 8 × 5 = 40 Marks

A. Human Organ Transplantation Act and its amendments. (CO1, L2)
B. Ethical issues in organ transplantation. (CO1, L2)
C. HLA inheritance and its importance in renal transplantation. (CO2, L2)
D. CDC, ELISA and Flow Cytometry tests in transplantation. (CO2, L2)
E. Kidney preservation techniques and organ storage. (CO3, L3)
F. post-operative care of kidney transplant recipients. (CO3, L3)
G. Maintenance therapy and triple-drug therapy in renal transplantation. (CO4, L4)
H. Early and late post-transplant complications. (CO4, L4)
I. Living donor kidney transplantation process. (CO5, L3)
J. Deceased donor kidney transplantation process. (CO5, L3)

Q.3 Very Short Answer Questions (Attempt any 10) **10 × 3 = 30Marks**

A. Define brain stem death. (CO1, L1)
B. Define kidney transplantation. (CO1, L1)
C. List any three types of transplantation. (CO1, L1)
D. Define immunity. (CO2, L1)
E. What is HLA? (CO2, L1)
F. Define cross-match test. (CO2, L1)
G. What is panel reactive antibody (PRA)? (CO2, L1)
H. Define warm ischemia time. (CO3, L1)
I. Define cold ischemia time. (CO3, L1)
J. What is induction therapy? (CO4, L1)
K. Define transplant coordinator. (CO5, L1)
L. What is grief counselling? (CO6, L1)

MODEL PAPER

B.DTT Semester-V
Code: BDTT-040

Bachelor of Dialysis Therapy Technology (BDTT)
Semester V
Clinical Problems in Dialysis & Evidence Practice in Dialysis Therapy
Time: 3 Hours | Maximum Marks: 100

Q.1. Essay Questions (Attempt any 2) **2 × 15 = 30 Marks**

A. Explain the pathophysiology, clinical features, diagnosis, and management of anemia in dialysis patients. (CO1, L2)
B. Analyze the neurological complications of uremia, including uremic encephalopathy, peripheral neuropathy, autonomic neuropathy, and sleep disorders. (CO3, L4)
C. Explain the epidemiology, risk factors, clinical manifestations, diagnosis, and management of blood-borne infections in dialysis patients, with special reference to Hepatitis B, Hepatitis C, and HIV. (CO2, L3)

Q.2. Short Essay Questions *(*Attempt any 8) 8 × 5 = 40 Marks

A. Interpretation of diagnostic tests in Hepatitis B infection. (CO2, L3)
B. . Prevention of blood-borne infections in dialysis units. (CO5, L3)
C. . Role of PTH, Vitamin D, and FGF-23 in CKD-MBD. (CO5, L3)
D. Dialysis amyloidosis: risk factors and manifestations. (CO3, L4)
E. Psychological problems in ESRD patients. (CO4, L4)
F. Clinical features and management of APKD. (CO3, L4)
G. Dialysis modality selection in geriatric patients. (CO6, L4)
H. Gastrointestinal manifestations in kidney disease. (CO5, L3)
I. Nutritional assessment in dialysis patients. (CO3, L4)
J. Causes and treatment of anemia in CKD patients. (CO1, L2)

Q.3 Very Short Answer Questions (Attempt any 10) 10 × 3 = 30Marks

A. Define malnutrition. (CO5, L1)
B. List three GI symptoms in CKD. (CO5, L1)
C. Define geriatric dialysis. (CO6, L1)
D. Define secondary hyperparathyroidism. (CO2, L1)
E. Define depression. (CO4, L1)
F. List three skin manifestations of ESRD. (CO5, L1)
G. Define intradialytic hypertension. (CO1, L1)
H. Define Quality of Life . (CO4, L1)
I. What is uremic encephalopathy? (CO3, L1)
J. Define geriatric dialysis. (CO6, L1)
K. Left ventricular hypertrophy in dialysis patients. (CO1, L2)
L. Define geriatric dialysis. (CO6, L1)

MODEL PAPER

B.DTT Semester-V
Code: BDTT-041

Bachelor of Dialysis Therapy Technology (BDTT)
Semester V
Advanced Extracorporeal Therapies
Time: 3 Hours | Maximum Marks: 100

Q.1. Essay Questions (Attempt any 2) **2 × 15 = 30 Marks**

A. Analyze the principles, indications, contraindications, procedure, replacement fluids, and complications of plasmapheresis. (CO3, L4)
B. Discuss the principles of ECMO, indications, contraindications, risks, complications, and its integration with dialysis therapies. (CO5, L4)
C. Explain the principles, systems, toxins removed, complications, and management of Liver Dialysis (Extracorporeal Albumin Dialysis). (CO6, L4)

Q.2. Short Essay Questions *(Attempt any 8)* **8 × 5 = 40 Marks**

A. Slow Low Efficiency Dialysis (SLED): indications, advantages, and disadvantages. (CO2, L3)
B. Types of CRRT. (CO1, L2)
C. Prescription of SLED. (CO2, L3)
D. Pharmacokinetic basis of therapeutic plasma exchange (TPE). (CO3, L4)
E. Complications of ECMO. (CO5, L4)
F. Dialysis in ICU patients. (CO4, L3)
G. Ventilator modes used in critically ill patients. (CO4, L3)
H. Common uro-surgical procedures in renal care. (CO4, L3)
I. Hemodiafiltration (HDF): techniques and advantages. (CO6, L4)
J. Adsorption techniques used in extracorporeal therapies. (CO3, L4)

Q.3 Very Short Answer Questions **(Attempt any 10)** **10 × 3 = 30Marks**

A. Define High-Flux Dialysis. (CO1, L1)
B. What is hemoperfusion? (CO3, L1)
C. Name any four types of CRRT. (CO1, L1)
D. What is Hemodiafiltration (HDF)? (CO1, L1)
E. Mention two advantages of HDF. (CO6, L2)
F. Define Sorbent Dialysis. (CO1, L1)
G. Mention any three indications for dialysis in ICU patients. (CO4, L2)
H. Define ESWL. (CO4, L1)
I. List any three toxins removed by Liver Dialysis. (CO6, L2)
J. Adsorption techniques used in extracorporeal therapies. (CO3, L4)
K. Common uro-surgical procedures in renal care. (CO4, L3)
L. Define ESWL. (CO4, L1)

MODEL PAPER

B.DTT Semester-VI
Code: BDTT-046

Bachelor of Dialysis Therapy Technology (B.DTT)
Semester VI
Recent Advancements in Renal Replacement Therapies
Time: 3 Hours | Maximum Marks: 100

Q.1. Essay Questions (Attempt any 2) **2 × 15 = 30 Marks**

A. Analyze the organization, functions, and coordination of clinical, diagnostic, therapeutic, ancillary, and support services in hospital administration. (CO5, L4)
B. Evaluate hospital safety and risk management practices, including biomedical waste management, nosocomial infection control, disaster management, occupational safety, and hospital security services. (CO6, L5)
C. Analyze the technical, psychological, training, legal, and safety considerations required for successful Home Hemodialysis programs. (CO4, L4)

Q.2. Short Essay Questions *(Attempt any 8)* **8 × 5 = 40 Marks**

A. Apply mobile applications and SMS services for patient monitoring and dialysis care management. (CO3, L3)
B. Role of Artificial Intelligence in dialysis technology. (CO2, L2)
C. Nanotechnology in renal replacement therapy. (CO2, L2)
D. Psychological aspects of home dialysis patients. (CO4, L2)
E. Explain nocturnal hemodialysis and its clinical benefits. (CO2, L2)
F. Analyze the role and coordination of diagnostic and therapeutic services in hospital administration. (CO5, L4)
G. Analyze the importance and implementation of nosocomial infection control measures in healthcare settings. (CO6, L4)
H. Analyze the principles and importance of disaster management in hospitals. (CO6, L4)
I. Demonstrate the applications of telemedicine in dialysis care. (CO3, L3)
J. Demonstrate the use of Dialysis Therapy Management System (TDMS) in dialysis unit management. (CO3, L3)

Q.3 Very Short Answer Questions (Attempt any 10) 10 × 3 = 30Marks

A. Define Home Hemodialysis. (CO1, L1)
B. Define Nocturnal Dialysis. (CO1, L1)
C. Expand TDMS. (CO3, L1)
D. What is Telemedicine? (CO1, L1)
E. Define Wearable Artificial Kidney. (CO2, L1)
F. Define Bio-Artificial Kidney. (CO2, L1)
G. Mention any three advantages of Home Hemodialysis. (CO2, L2)
H. What is Nanotechnology? (CO2, L1)
I. What is a nosocomial infection? (CO6, L1)
J. Define biomedical waste management. (CO6, L1)
K. List any three occupational hazards in hospitals. (CO6, L1)
L. State the meaning of disaster management. (CO6, L1)

MODEL PAPER

B.DTT Semester-VI
Code: BDTT-047

Bachelor of Dialysis Therapy Technology (B.DTT)
Semester VI
Principals of Management
Time: 3 Hours | Maximum Marks: 100

Q.1. Essay Questions (Attempt any 2) **2 × 15 = 30 Marks**

A. Explain the principles, functions, and importance of management in healthcare organizations. Discuss the role of planning, organizing, staffing, directing, and controlling in hospital administration. (CO3, L3)
B. Analyze the functioning and interdepartmental coordination of ICU, Operation Theatre, Laboratory, Radiology, Pharmacy, and Blood Bank services in a hospital. (CO4, L4)
C. Evaluate hospital safety and risk management practices with special reference to biomedical waste management, occupational safety, hospital security, and disaster preparedness**.** (CO6, L5)

Q.2 Short Essay Questions *(*Attempt any 8) **8 × 5 = 40 Marks**

A. Principles of healthcare management. (CO1, L2)
B. Organization of diagnostic services in a hospital. (CO2, L2)
C. Staffing process in healthcare organizations. (CO3, L3)
D. Functions of therapeutic services in patient care. (CO2, L2)
E. Coordination between ICU and emergency services. (CO4, L4)
F. Role of pharmacy services in hospital administration. (CO4, L4)
G. Functions of Central Sterile Supply Department (CSSD). (CO5, L4)
H. Importance of medical record services in hospitals. (CO5, L4)
I. Measures for prevention of nosocomial infections. (CO6, L4)
J. Occupational safety measures for healthcare workers. (CO6, **L4)**

Q.3 Very Short Answer Questions (Attempt any 10) 10 × 3 = 30Marks

A. State any four functions of management. (CO1, L1)
B. What is a therapeutic service? (CO2, L1)
C. Define blood bank. (CO2, L1)
D. What is CSSD? (CO5, L1)
E. Mention any three functions of housekeeping services. (CO5, L1)
F. Define medical records. (CO5, L1)
G. What is hospital transportation service? (CO5, L1)
H. Define nosocomial infection. (CO6, L1)
I. What is biomedical waste management? (CO6, L1)
J. List any three occupational hazards in hospitals. (CO6, L1)
K. Define disaster management. (CO6, L1)
L. Mention any three hospital security services. (CO6, L1)

MODEL PAPER

B.DTT Semester-VI
Code: BDTT-048

Bachelor of Dialysis Therapy Technology (B.DTT)
Semester VI
Introduction to Quality Assurance in Dialysis and Patient Safety
Time: 3 Hours | Maximum Marks: 100

Q.1. Essay Questions (Attempt any 2) **2 ×1 5 = 30 Marks**

A. Analyze the effectiveness of vascular access surveillance methods, including access recirculation monitoring, Allen's Test, and stenosis detection techniques used in dialysis units. (CO4, L4)
B. Analyze disaster preparedness, fire safety, employee safety, electrical safety, procedures in dialysis units. (CO5, L4)
C. Evaluate patient safety measures, quality improvement strategies, and infection control practices to ensure safe and effective dialysis care. (CO6, L5)

Q.2 Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

A. Quality indicators in dialysis units. (CO2, L2)
B. NABH standards applicable to dialysis centers. (CO2, L2)
C. JCI standards for patient safety in dialysis care. (CO2, L2)
D. Application of universal precautions in dialysis practice. (CO3, L3)
E. RO water quality monitoring in dialysis units. (CO3, L3)
F. Infection control measures in hemodialysis units. (CO3, L3)
G. Vascular access surveillance techniques. (CO2, L2)
H. Quality management in peritoneal dialysis. (CO4, L4)
I. Quality assurance practices in renal transplantation programs. (CO4, L4)
J. Emergency preparedness protocols in dialysis units. (CO5, L4)

Q.3 Very Short Answer Questions (Attempt any 10) 10 × 3 = 30Marks
A. Define quality assurance. (CO1, L1)
B. Define patient safety. (CO1, L1)
C. What is dialysis adequacy? (CO1, L1)
D. Define infection control. (CO1, L1)
E. Define universal precautions. (CO3, L1)
F. Define access stenosis. (CO4, L1)
G. What is access recirculation? (CO4, L1)
H. Define fire safety. (CO5, L1)
I. What is emergency evacuation? (CO5, L1)
J. Define electrical safety. (CO5, L1)
K. What is a sentinel event? (CO6, L1)
L. Define quality improvement in healthcare. (CO6, L1)

MODEL PAPER

B.DTT Semester-VI
Code: BDTT-049

Bachelor of Dialysis Therapy Technology (B.DTT)
Semester VI
Basic and Advanced Cardiac Life Support
Time: 3 Hours | Maximum Marks: 100

Q.1. Essay Questions (Attempt any 2) **2 ×1 5 = 30 Marks**

A Explain the principles of Basic Life Support (BLS), Advanced Cardiac Life Support (ACLS), and the Chain of Survival in emergency cardiovascular care. (CO1, L2)
B. Discuss the management algorithms for ventricular fibrillation, pulseless ventricular tachycardia, pulseless electrical activity (PEA), and asystole. (CO2, L2)
C. Evaluate the role and responsibilities of dialysis technologists and dialysis therapists in managing cardiac arrest and emergency situations in dialysis units. (CO6, L5)

Q.2 Short Essay Questions (Attempt any 8) **8 × 5 = 40 Marks**

A. Components of high-quality CPR. (CO1, L2)
B. Recognition and management of bradycardia. (CO2, L2)
C. Recognition and management of tachycardia. (CO2, L2)
D. Techniques of bag-mask ventilation. (CO3, L3)
E. Indications and precautions of defibrillation. (CO3, L3)
F. Emergency cardiac pacing and its clinical applications. (CO4, L3)
G. ACLS drugs used during cardiac arrest. (CO4, L3)
H. Management of hypotension and shock in emergency settings. (CO4, L3)
I. Analyze the approach to paediatric airway management during resuscitation. (CO5, L4)
J. Emergency interventions in paediatric cardiac arrest. (CO5, L4)

Q.3 Very Short Answer Questions (Attempt any 10) 10 × 3 = 30Marks

A. What is the Chain of Survival? (CO1, L1)
B. Define ventricular fibrillation. (CO2, L1)
C. Define pulseless electrical activity (PEA). (CO2, L1)
D. What is asystole? (CO2, L1)
E. Define defibrillation. (CO3, L1)
F. What is an Automated External Defibrillator (AED)? (CO3, L1)
G. Define oxygenation. (CO3, L1)
H. Name any two ACLS drugs used during cardiac arrest. (CO4, L1)
I. Define cardiac pacing. (CO4, L1)
J. What is cardiogenic shock? (CO4, L1)
K. Define Paediatric Advanced Life Support (PALS). (CO5, L1)
L. What is pulseless ventricular tachycardia (pVT)? (CO2, L1)

Principal
MG Institute of Allied Health Sciences
Jaipur

Dr. Bushra Fiza
Dean, Faculty of Allied and
Healthcare Professions
MGUMST, Jaipur