SHRI
DHARMASTHALA
MANJUNATHESHWARA
UNIVERSITY

TRUTH LIBERATES

ORDINANCE GOVERNING
B.SC. IN ALLIED HEALTH SCIENCES
BACHELOR OF SCIENCE IN
RENAL DIALYSIS TECHNOLOGY
CURRICULUM 2020-21

SHRI DHARMASTHALA MANJUNATHESHWARA UNIVERSITY

(A State Private University established under the Shri Dharmasthala Manjunatheshwara University
Act No 19 of 2018 of Government of Karnataka and Notification No. ED 261 URC 2018 dated 19th December 2018)

Manjushree Nagar, Sattur, Dharwad - 580 009, Karnataka, India
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|| Om Shri Manjunathaya Namaha ||

Shree Kshethra Dharmasthala

Edition Year : 2020-21

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THE LOGO

Poojya Dr D. Veerendra Heggade, Hon'ble Chancellor of the University, while searching for an appropriate Logo for the University, saw a photograph picked from Temple Architecture showing Wings of a Bird, sculpted in Indian style and wanted it to be incorporated in the logo for the University, as the Wings symbolize 'Spreading of Knowledge beyond Boundaries'. Further it was felt that the Central theme of the logo should be 'Rudra' (The Linga) with wings on each side. In this way, the logo of the University was conceptualized.

Hence:

1. The central part represents **Rudra** who Demolishes Darkness.
2. The Three **horizontal lines on The Linga** stand for Samyak Darshan (Right Belief), Samyak Gyan (Right Knowledge) and Samyak Charitra (Right Conduct).
3. The **Wings** symbolize spreading of Knowledge across the boundaries.
4. Base line **"Truth Liberates"** highlights the Purpose of Education: to liberate oneself unconditionally. It shows that it is not discipline, nor knowledge nor the efforts to freedom that liberate but Truth is what liberates you from all your conditioning and ignorance.

The overall significance of Shri Dharmasthala Manjunatheshwara University's Logo is:

Darkness of ignorance is destroyed by the flow of knowledge to bring Liberty to everyone, by realizing the truth. And, it should spread globally without the boundaries as hindrance.

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VISION

Shri Dharmasthala Manjunatheshwara University will set the highest standards of teaching and learning by awakening the intelligence of the students and nurturing the creativity hidden in them by creating an environment where the ancient wisdom blends with modern science, to transform them into whole human beings to face the challenges.

MISSION

- To ensure that the journey of education is inspiring, pleasant and enjoyable.
- Attract the best of teachers and students.
- Achieve high principles of trust, love and spirituality in the students.
- Create a collaborative, diverse and exclusive community.
- Transform the student of today to be a leader of tomorrow and a better human being.
- Produce passionate teachers.
- Evolve innovative teaching techniques.
- Create a peaceful environment.
- Prepare the student to face the social challenges.
- Create a University of which the Nation is proud of.
- Be an effective partner in Nation Building.
- Create an Eco-friendly University.
- Create a University based on the principles of beauty, love and justice.

||Om Shanti! Om Shanti! Om Shanti||

SHRI
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MANJUNATHESHWARA
UNIVERSITY

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SDMU/ACD/DEN/CRM/369A/2019 Date: 28-08-2019

NOTIFICATION

Ordinance governing Curricula of Medical Allied Sciences - 2019

Ref:
1. Minutes of the 1st Meeting of Academic Council held on 20th March 2019 (Letter No: SDMU/AC/M-01/093/2019; Dated:21-03-2019)
2. Minutes of the 1st Meeting of Joint Faculties held on 19th March 2019 (Letter No: SDMU/JF/85/2019; Dated:21-03-2019)
3. Minutes of the 1st Meeting of Board of Studies (Allied Health Sciences) held on 19th March 2019 (Letter dated:20-03-2019)

In exercise of the powers conferred under Statutes 1.4(Powers and functions - Para ix & x), 1.5b(Powers and functions - Para b & c) & 1.8(Powers and functions - Para i) of Shri Dharmasthala Manjunatheshwara University, the Academic Council is pleased to approve and notify the Ordinance governing Regulations and Curricula of the below listed Medical Allied Sciences as shown in the annexure appended herewith.

1	BSc Medical lab Technology
2	BSc Medical Imaging Technology
3	BSc in Renal Dialysis Technology
4	BSc Optometry

The ordinance shall be effective for the students joining the courses during the academic year 2019-20 and onwards.

REGISTRAR
REGISTRAR,
Shri Dharmasthala Manjunatheshwara
University, Dharwad

To: The Principal, SDM College of Medical Sciences & Hospital.

Copy for kind information to:
1. Hon'ble Vice Chancellor - Shri Dharmasthala Manjunatheshwara University.
2. Pro Vice Chancellor (Academics) - Shri Dharmasthala Manjunatheshwara University.
3. Controller of Examinations - Shri Dharmasthala Manjunatheshwara University.

1. Title of the course	**Bachelor of Science in Renal Dialysis Technology: B. Sc. RDT**
2. Eligibility for Admission	A candidate seeking admission to the Bachelor of Science Degree Courses in the BSc RDT course shall have studied English as one of the principal subject during the tenure of the course and for those seeking admission to the Bachelor of Science Degree Courses in the Allied Health Sciences courses Two year Pre-University examination Physics, Chemistry and Biology as principle subjects of study OR Candidates with two years diploma from a recognized Government Board in a subject for which the candidate desires to enrol, in the respective Allied Health Sciences mentioned course shall have passed plus12 [10+2] with Physics, Chemistry and Biology, as principal subjects OR Candidates with 3 years diploma from a recognized Government Board in a subject for which the candidate desires to enrol, in the respective Allied Health Sciences course mentioned should have studied Physics, Biology and Chemistry as principal subjects during the tenure of the course.
3. Intake	05 seats per year
4. Lateral entry	Lateral entry to second year for allied health science courses for candidates who have passed diploma program from the Government Boards and recognized by SDMU, Dharwad, are eligible to take admission on lateral entry system only in the same subject studied at diploma level.
5. Duration of Course	**4 Years including 1 year Internship**
6. Medium of Instruction	**English**

7. Attendance & Eligibility to appear final exam	Every candidate should have attended at least **80%** of the total number of classes conducted in an academic year and **35% IA marks** obtained in the average of Two IA exams from the date of commencement of the term to the last working day as notified by university in each of the subjects prescribed for that year **separately in theory and practical**. Only such candidates are eligible to appear for the university examinations in their first attempt. Special classes conducted for any purpose shall not be considered for the calculation of percentage of attendance for eligibility. A candidate lacking in prescribed percentage of attendance in any subjects either in theory or practical in the first appearance will not be eligible to appear for the University Examination in that subject
8. Internal Assessment	There shall be a minimum of two periodical tests preferably one in each term in theory and practical of each subject in an academic year. The average marks of the two tests will be calculated and sent to the university. 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. **For eligibility to appear for university exams students should score 35% IA marks** obtained in the average of Two IA exams from the date of commencement of the term to the last working day as notified by university in each of the subjects prescribed for that year **separately in theory and practical**. 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.

9. Subjects and hours of teaching for theory and practicals I/II/III Year

I Year B. Sc. RDT

Subjects	Theory	Practical	Postings	Total
Anatomy	70 Hrs	20 Hrs	-	90 hrs
Physiology	70 Hrs	20 Hrs	-	90 hrs
Biochemistry	70 Hrs	20 Hrs	-	90 hrs
Pathology	70 Hrs	20 Hrs	-	90 hrs
Microbiology	70 Hrs	20 Hrs	-	90hrs

II Year B. Sc. RDT

Subjects	Theory	Practical	Postings	Total
Paper 1- Applied anatomy & physiology related to dialysis technology	40+40= 80	15+15= 30	---	110
Paper 2- Applied aspects of pathology & microbiology	40+40= 80	15+15= 30	---	110
Paper 3- Pharmacology related to dialysis technology	40	10	--	50
Paper 4- Concepts of Renal Disease and its Management, Basics of Renal Dialysis & Nutrition	160	220	630	780

<table>
<tr><td></td><td>
<table>
<tr><th></th><th>Subjects</th><th>Theory</th><th>Practical</th><th>Postings</th><th>Total</th></tr>
<tr><td rowspan="2">III Year B. Sc. RDT</td><td>Applied Dialysis Technology Paper I</td><td>125</td><td>100</td><td>300</td><td>525</td></tr>
<tr><td>Applied Dialysis Technology Paper II</td><td>125</td><td>100</td><td>300</td><td>525</td></tr>
</table>
</td></tr>
<tr><td>10. Schedule of Examination</td><td>The university shall conduct annual examinations as notified by the university from time to time. A candidate who satisfies the requirement of attendance, progress and conduct as stipulated by the university shall be eligible to appear for the university examination. Certificate to that effect shall be produced from the Head of the institution along with the application for examination and the prescribed fee. The students who are failed in previous university examination can appear for the failed subjects after six months (Supplementary examination)</td></tr>
<tr><td>11. Scheme of examination (Total marks & distribution of type of questions and marks)</td><td>
THEORY
For 100Marks
<table>
<tr><th>Type of Question</th><th>No. of Questions</th><th>Marks</th></tr>
<tr><td>Essay Type</td><td>3 (2 × 10)</td><td>20</td></tr>
<tr><td>Short essay type</td><td>12(10×5)</td><td>50</td></tr>
<tr><td>Short Answer type</td><td>12 (10×3)</td><td>30</td></tr>
</table>
For 70Marks
<table>
<tr><th>Type of Question</th><th>No. of Questions</th><th>Marks</th></tr>
<tr><td>Essay Type</td><td>3(2×10)</td><td>20</td></tr>
<tr><td>Short essay type</td><td>8(6×5)</td><td>30</td></tr>
<tr><td>Short Answer type</td><td>10 × 2</td><td>20</td></tr>
</table>
PRACTICAL – No University practical examination for First year, only Second year and final year University practical Exam
</td></tr>
<tr><td>12. Pass Criteria</td><td>A candidate is declared to have passed the Examination in a subject if he/she secures 40% of the marks in theory and 40% in practical separately. For a pass in theory & Practical, a candidate has to secure a minimum of 50% marks in the University conducted written examination in aggregate</td></tr>
</table>

	including internal assessment and Viva-Voce.
13. Carry over benefit	Students who appear for annual examination and failed will be promoted to the next year, irrespective of results, up to supplementary exam results. The candidate should clear all the remaining failed subjects of the previous year in forth coming supplementary exam. If candidate is failing to clear all the failed subjects of previous year in the supplementary exam, He/she will not be allowed for 2nd year annual examination. Supplementary exam for failed candidates shall be conducted within 60 days after the announcement of annual examination results. The candidates who all are unable to pass in all subjects of the previous year, He/ She will not be promoted to the next year
14. Eligibility for award of degree	A candidate shall have passed in all the subjects of first, second and third year to be eligible for award of degree.

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FIRST YEAR BACHALORE OF SCIENCE IN RENAL DIALYSIS TECHNOLOGY (1ST B. Sc. RDT)

BSC RDT – FIRST YEAR COURSE CONTENT

BSC RDT – FIRST YEAR COURSE CONTENT

SUBJECT- ANATOMY

Theory - 70 hours + Practicals - 20 hours: Total teaching hours 90

Sl. No.	CONTENT	Theory (Hours)	Practical (Hours)
1.	**Introduction: human body as a whole:** Definition of anatomy and its divisions Terms of location, positions and planes Cell and its organelles Epithelium-definition, classification, describe with examples, function Glands- classification, describe serous & mucous glands with examples Basic tissues – classification with examples **Practical:** Histology of types of epithelium Histology of serous, mucous & mixed salivary glands	6	2
2	**Locomotion and support:** Cartilage – types with example & histology Bone – Classification, names of bone cells, parts of long bone, microscopy of compact bone, names of all bones, vertebral column, intervertebral disc, fontanelles of foetal skull , Joints – Classification of joints with examples, synovial joint (in detail for radiology)Muscular system: Classification of muscular tissue & histology Names of muscles of the body	6	2
3	**Cardiovascular system:** Heart-size, location, chambers, exterior & interior Blood supply of heart Systemic & pulmonary circulation Branches of aorta, common carotid artery,	6	2

	subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery Peripheral pulses Inferior venacava, portal vein, porto systemic anastomosis Great saphenous vein Dural venous sinuses Lymphatic system- cisterna chili & thoracic duct Histology of lymphatic tissues Names of regional lymphatic's, axillary and inguinal lymph nodes in brief		
4.	**Gastro-intestinal system:** Parts of GIT, Oral cavity lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Waldeyer's ring) Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas **Radiographs of abdomen**	5	2
5.	**Respiratory system:** Parts of RS, nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments Histology of trachea, lung and pleura Names of paranasal air sinuses	4	2
6.	**Peritoneum:** Theory: Description in brief Practical: Demonstration of reflections	4	1
7.	**Urinary system:** Kidney, ureter, urinary bladder, male and female urethra Histology of kidney, ureter and urinary bladder Practical: demonstration of parts of urinary system Histology of kidney, ureter, urinary bladder Radiographs of abdomen-IVP, retrograde cystourethrogram	8	2
8.	**Reproductive system** Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross &	6	2

	histology) Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology) Mammary gland - gross		
9.	**Endocrine glands** Names of all endocrine glands in detail on pituitary gland, thyroid gland, parathyroid gland, suprarenal glad - (gross & histology)	6	1
10.	**Nervous system** Neurons, neuroglial cells Classification of NS Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (gross &histology) Meninges, Ventricles & cerebrospinal fluid Names of basal nuclei Blood supply of brain Cranial nerves Sympathetic trunk & names of parasympathetic ganglia	6	2
11.	**Sensory organs:** Skin: Skin-histology Appendages of skin Eye: Parts of eye & lacrimal apparatus Extra-ocular muscles & nerve supply Ear: parts of ear- external, middle and inner ear and contents	5	1
12.	**Embryology:** Spermatogenesis & oogenesis ,Ovulation, fertilization, Foetal circulation, Placenta	8	1
	Total Teaching Hours -90	**70**	**20**

TEACHING LEARNING ACTIVITIES

The course contents in Anatomy will be covered by

1. Didactic lectures
2. Practicals
3. Demonstration of dissected parts
4. Demonstration of museum specimens
5. Demonstration of charts and models
6. Demonstration of histology slides
7. Demonstration of human skeleton and individual bones
8. Demonstration of embryology models
9. Assignments –Practical record book

EXAMINATION PATTERN

Section	Maximum marks	Duration
Theory examination 1 paper	70	3 hours
Practical examination	NA	NA
Viva voce	NA	--
Internal Assessment- Theory	20	
Internal Assessment- Practicals	10	
Total marks -Theory + IA Theory	100	
Practicals + IA Practicals	NA	
Grand Total	100	

There shall be no University Practical Examination

Examiner: One internal and external examiner for university examinations

TEXT BOOKS RECOMMENDED (LATEST EDITIONS)

1. Human Anatomy By B. D. Chaurasia, 8th edition Vol-1, 2 ,3 ,4
2. B. D. Chaurasia's Hand book of General Anatomy, 6th edition
3. Text book of Anatomy & Physiology for nurses – P. R. Asha Lata & G Deepa , 3rd edition
4. Inderbir Singh's Text book of Human Histology with colour atlas and Practical Guide, 2016
5. Principles and Techniques in Histology Microscopy and Photomicrography 2nd edition, 2018 by D R Singh

SCHEME OF EXAMINATION: **Marks distribution:**

Paper	Subjects	Theory		*Practical/Viva		Total
		UE	IA	UE	IA	
1	**Anatomy**	70	20	-	10	100

*There shall be NO University practical examination in Anatomy

Marks Distribution: Total - 70 marks

- **Long essay:** 2 Questions X 10 marks each = 20 marks (answer 2 out of 3 questions)
- **Short essay:** 6 Questions X 5 marks each = 30 marks (answer 6 out of 8 questions)
- **Short answer:** 10 Questions X 2 marks each = 20 marks (answer all questions)

SUBJECT – PHYSIOLOGY

Teaching hours; Theory: 70 Hrs. Practical: 20 Hrs: Total: 90 hrs

THEORY:

Sl. No.	CONTENT	Teaching hours
1	**General physiology-** Homeostasis. Cell- structure, organelles, cell junctions, stem cells, cell aging and death.	3 hours
2	**Blood-** composition and function of blood Red blood cells - Erythropoiesis, stages of differentiation, function, count physiological Variation. Haemoglobin -structure , functions , concentration physiological variation Methods of Estimation of Hb. White blood cells - Production , function, life span, count, differential count Platelets - Origin, normal count, morphology functions. Plasma Proteins - Production, concentration, types, albumin, globulin, Fibrinogen, Prothrombin functions. Haemostasis& Blood coagulation Haemostasis - Definition, normal haemostasis, clotting factors, mechanism of clotting, disorders of clotting factors. Blood Bank Blood groups - ABO system, Rh system, Blood grouping & typing, Cross matching Rh system - Rh factor, Rh in compatibility. Blood transfusion - Indication, universal donor and recipient concept. Selection criteria of a blood donor. transfusion reactions	14 hours

	Anticoagulants - Classification, Examplesand uses Anaemias: Classification - morphological and etiological. effects of anemia on body Blood indices – Colour index , MCH, MCV, MCHC Erythrocyte sedimentation Rate (ESR) and Packed cell volume- Normal values, Definition, determination, Blood Volume -Normal value, determination of blood volume and regulation of blood volume Body fluid - pH, normal value, regulation and variation Lymph - lymphoid tissue formation, circulation, composition and function of lymph	
3	**Cardiovascular system-** Heart - Physiological Anatomy, Nerve supply Properties of Cardiac muscle, Cardiac cycle-systole, diastole. Intraventricular pressure curves. Cardiac Output - only definition Heart sounds- Normal heart sounds Areas of auscultation, cause characteristics and signification. Heart rate. Blood Pressure - Definition, normal value, clinical measurement of blood pressure. Physiological variations, regulation of heart rate, cardiac shock, hypotension, hypertension. Pulse - Jugular, radial pulse, Triple response Electrocardiogram (ECG) -significance.	6 hours
4	**Digestive System –** Physiological anatomy of Gastro intestinal tract, Functions of digestive system Salivary glands -Structure and functions. Deglutition -stages and regulation Stomach - structure and functions secretion - Composition function regulation of gastric juice secretion Pancreas - structure, function, composition, regulation of	6 hours

	pancreatic juice Liver - functions of liver Bile secretion, composition, function regulation of bile secretion. Bilirubin metabolism types of bilirubin, Vandenberg reaction, Jaundice- types, significance. Gall bladder - functions Intestine - small intestine and large intestine Small intestine - Functions- Digestive, absorption, movements. Large intestine - Functions, Defecation.	
5	**Respiratory system-** Functions of Respiratory system, Physiological Anatomy of Respiratory system, Respiratory tract, Respiratory Muscles, Respiratory organ-lungs, Alveoli, Respiratory membrane, stages of respiration. Mechanism of normal and rigorous respiration. Forces opposing and favouring expansion of the lungs. Intra pulmonary pleural pressure, surface tension, recoil tendency of the wall. Transportation of Oxygen: Direction, pressure gradient, Forms of transportation, Oxygenation of Hb. Quantity of Oxygen transported. Lung volumes and capacities Regulation of respiration- Mechanisms of Regulation, nervous and chemical regulation. Respiratory centre. Hearing Brier, Reflexes. Applied Physiology and Respiration : Hypoxia, Cyanosis, Asphyxia, Dyspnea, Dysbarism, Artificial Respiration, Apnoea.	6 hours
6	**Endocrine System –** Definition Classification of Endocrine glands & their Hormones Properties of Hormones.	6 hours

	Thyroid gland hormone - Physiological, Anatomy, Hormones secreted, Physiological function, regulation of secretion. Disorders - hypo and hyper secretion of hormone Adrenal gland, Adrenal cortex physiologic anatomy of adrenal gland, Adrenal cortex, cortical hormones - functions and regulation Adrenal medulla - Hormones, regulation and secretion. Functions of Adrenaline and noradrenaline. Pituitary hormones - Anterior and posterior pituitary hormones, secretion, function Pancreas - Hormones of pancreas Insulin - secretion, regulation, function and action Diabetes mellitus - Regulation of blood glucose level Parathyroid gland - function, action, regulation of secretion of parathyroid hormone. Calcitonin - functions and actions.	
7	**Special senses-** Vision - structure of eye. Function of different parts. Structure of retina Hearing structure and function of can mechanism of hearing Taste - Taste buds, functions. Smell physiology, Receptors	6 hours
8	**Nervous system-** Functions of Nervous system, Neurone structure, classification and properties. Neuroglia, nerve fiber, classification, conduction of impulses, salutatory conduction. Velocity of impulse transmission and factors affecting. Synapse - structure, types, properties. Receptors - Definition, classification, properties. Reflex action - unconditioned properties of reflex action. Babinski's sign. Spinal cord nerve tracts.	8 hours

	Ascending tracts, Descending tracts- pyramidal tracts, Extrapyramidal tracts. Functions of Medulla, pons, Hypothalamic disorders. Cerebral cortex lobes and functions, Sensory cortex, Motor cortex, Cerebellum functions of Cerebellum. Basal ganglia-functions. Cerebro-Spinal Fluid(CSF): formation, circulation, properties, composition and functions lumbar puncture. Autonomic Nervous System: Sympathetic and parasympathetic distribution and functions and comparison of functions.	
9	**Excretory System-** Excretory organs Kidneys: Functions of kidneys structural and functional unit nephron, vasa recta, cortical and Juxta medullary nephrons - Comparison, Juxta Glomerular Apparatus -Structure and function. Renal circulation peculiarities. Mechanism of Urine formation : Ultrafiltration criteria for filtration GFR, Factors affecting GFR. Determination of GFR. Selective reabsorption- sites of reabsorption, substance reabsorbed, mechanisms of reabsorption Glucose, urea, H + Cl, aminoacids etc. TMG, Tubular lead, Renal threshold % of reabsorption of different substances, selective secretion. Properties and composition of normal urine, urine output. Abnormal constituents in urine , Mechanism of urine concentration. Counter - Current Mechanisms: Micturition, Innervation of Bladder, Cysteurethrogram. Diuretics : Water, Diuretics, osmotic diuretics, Artificial kidney. Renal function tests – plasma clearance.	6 hours

10	**Reproductive system-** Function of Reproductive system, Puberty, Male reproductive system- Functions of testes, Spermatogenesis- site, stages, factors influencing semen. Endocrine functions of testes Androgens - Testosterone structure and functions. Female reproductive system. Ovulation, menstrual cycle. Physiological changes during pregnancy, pregnancy test. Lactation : Composition of milk factors controlling lactation.	4 hours
11	**Muscle physiology** Classification of muscle, structure of skeletal muscle, Sarcomere contractile proteins, Neuromuscular junction. Transmission across Neuromuscular junction. Excitation contraction coupling. Mechanism of muscle contraction, fatigue Rigor mortis	3 hours
12	**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	2 hours

Demonstration of Practicals:

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

Internal Assessment

Theory - Average of two exams conducted- 20 marks
Practical's: Record & Lab work* - 10 marks
* There shall be no University Practical Examination and internal assessment marks secured in Practical need not be sent to the University.
Examiner: One internal and External examiner for university examinations

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 70 marks. Distribution of type of questions and marks for Physiology shall be as given under.

TYPE OF QUASTION	NUMBER OF QUASTIONS	MARKS	SUB – TOTAL
LONG ESSAY(LE)	3 (To attempt 2)	2x10	20
SHORT ESSAY(SE)	8 (To attempt 6)	6x5	30
SHORT ANSWER (SA)	All are compulsory	10x2	20
TOTAL MARKS			70

NO UNIVERSITY PRACTICAL EXAMINATION

REFERENCE BOOKS

PHYSIOLOGY

1. Guyton (Arthur) Text Book of Physiology. Latest Ed. Prism publishers
2. Chatterjee(CC) Human Physiology Latest Ed. Vol-1, Medical Allied Agency
3. Choudhari (Sujith K) Concise Medical Physiology Latest Ed. New Central Book,
4. Ganong (William F) Review of Medical Physiology. Latest Ed . Appleton
5. Anatomy and Physiology- Ashalata.
6. Physiology for B.Sc- A.K. Jain.

SUBJECT: BIOCHEMISTRY
BASICS INSTRUMENTS & REAGENTS
Total teaching hours: 90: Theory - 70 hrs + Practical - 20 hrs

Sl. no	Content	Hours
1	**Specimen collection: Pre-analytical variables:** Collection of blood, Collection of CSF & other fluids, Urine collection, Use of preservatives Anticoagulants	02
2.	**Introduction to Laboratory apparatus:** Pipettes- Calibration of glass pipettes, Burettes, Beakers, Petri dishes, depression plates. Flasks - Volumetric, round bottomed, Erlenmeyer conical etc., Funnels – different types, Conical, Buchner etc. Bottles – Reagent bottles – graduated and common, Wash bottles – different type, Specimen bottles etc.	02
3.	**Measuring cylinders, Porcelain dish:** Tubes – Test tubes, centrifuge tubes, test tube draining rack, Tripod stand, Wire gauze, Bunsen burner, Cuvettes, significance of cuvettes in colorimeter, cuvettes for visible and UV range, cuvette holders Racks – Bottle, Test tube, Pipette, Desiccators, Stop watch, scissors, Dispensers – reagent and sample, Glass and plastic ware in Laboratory, use of glass: significance of borosilicate glass; care and cleaning of glass ware, different cleaning solutions of glass, Care and cleaning of plastic ware, different cleaning solutions	10
4.	**Instruments:** Water bath: Use, care and maintenance, Oven & Incubators: Use, care and maintenance. Water Distillation plant and water deionizers. Use, care and maintenance, Refrigerators, cold box, deep freezers – Use, care and maintenance, Reflux condenser: Use, care and maintenance, Centrifuges - Definition, Principle, Svedberg unit, centrifugal force, centrifugal field rpm, Ref. Conversion of G to rpm and vice versa. Different types of centrifuges - Use care and maintenance of a centrifuge, Laboratory balances - Manual balances: Single pan, double pan, trip balance, Direct read out electrical balances. Use care and maintenance. Guidelines to be followed and precautions to be taken while weighing - Weighing different types of chemicals, liquids, Hygroscopic compounds etc. pH meter - Principle, parts, Types of electrodes, salt bridge solution. Use, care and maintenance of pH meter and electrodes	10

5.	**Laboratory Safety and Biomedical waste disposal**	**02**
6.	**Conventional and SI units**	**01**
7.	**Atomic structure:** Dalton's theory, Properties f 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, Pauli's exclusion principle, etc.,m Valency and bonds - different types of strong and weak bonds in detail with examples Theory &Practicals for all the following under this section Molecular weight, equivalent weight of elements and compounds, normality molarity Preparation of molar solutions (mole/litre solution) eg: 1 M Nacl, 0.15 M NaCL 1 M NaOH, 0.1 M HCl, 0.1 M H 2S04 etc., Preparation of normal solutions.eg., IN Na2CO3, O IN Oxalic acid, 0.1 N HCl, 0.1N H2504, 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	**07**
8.	**Dilutions:** Diluting solutions: e.g. Preparation of 0.1 N NaCl from 1 N NaCl from 2 NHCl 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, Standard 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 units	**07**
9.	**Acids, bases, salts and indicators:** Acids and Bases: Definition, physical and chemical properties with examples. Arrehenius concept of acids and bases, Lowery – Bronsted theory of acids and bases classification of acids and bases **Acid- base indicators:** Theory – Definition, concept, mechanism of	**08**

	dissociation of an indicator, colour change of an indicator in acidic and basic conditions, use if 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 **Acid Base Titration** Regulation of Acid Base status: Henderson Hasselbach Equations, Buffers of the fluid, pH Regulation, Disturbance in acid Base Balance, Anion Gap, Metabolic acidosis, Metabolic acidosis, Metabolic alkalosis, Respiratory acidosis, Respiratory alkalosis, Basic Principles and estimation of Blood Gases and pH	
10.	**Water and electrolyte balance:** Functions of sodium, potassium and chloride and associated disturbances, Basic principles and estimation of Electrolytes	**05**
11.	**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	**05**
12	**Quality Control:** Accuracy, precision. Specificity, sensitivity, limits of error allowable in laboratory, percentage error.	**04**
13	**Clinical Biochemistry** Reference values of biochemical analytes measured in serum/blood and their clinical significance of- • Plasma glucose • Renal Function Tests • Liver Function Tests • Lipid Profile • Thyroid profile Arterial blood gas analysis, Blood gas analyser (Principle & Applications) Electrolyte analysis, electrolyte analyser (Principle & Applications) Urinary/Renal calculus Common renal diseases - Renal failure, nephrotic syndrome, glomerulonephritis, UTI through case chart interpretations	**07**

Practical/Demonstrations: 20 Hours

1. Composition of urine and Analysis of Normal Urine
2. Urine examination for detection of abnormal constituents
3. Procedure for routine lab screening tests
4. Urinary screening for inborn errors of metabolism
5. Protein Electrophoresis
6. Urinary calculus analysis
7. Estimation of Blood Urea, Serum and urine creatinine and clearance
8. Estimation of Plasma glucose, Demonstration of Strips and Glucometer
9. Blood gas analysis and estimation of Electrolytes
10. Interpretation and Diagnosis through charts
    a. Liver Function tests
    b. Lipid Profile
    c. Renal Function test
    d. Cardiac markers

Internal Assessment

Total - 30 marks

Theory - Average of two exams conducted. 20 marks

Practical's: Record & Lab work* 10 marks

* There shall be no University Practical Examination and internal assessment marks secured in Practical's need not be sent to the University.

Examiner: One internal and External examiner for university examinations

Scheme of Examination

University Examination

There shall be one theory paper of three hours duration carrying 70 marks.

Distribution of type of questions and marks for Biochemistry shall be as given under.

TYPE OF QUESTION	NUMBER OF QUASTIONS	MARKS	SUB – TOTAL
LONG ESSAY(LEQ)	3 (To attempt 2)	2x10	20
SHORT ESSAY(SEQ)	8 (To attempt 6)	6x5	30
SHORT ANSWER (SAQ)	All are compulsory	10x2	20
TOTAL MARKS			70

NO PRACTICAL EXAMINATION

Text Book References -

1. Vasudevan, Sreekumari -Text book of Biochemistry for Medical students , Latest Ed
2. Biochemistry –U Sathyanarayana & U Chakrapani
3. Biochemistry-3rd edition by Pankaja Naik
4. DAS – Debajyothi – Biochemistry
5. Godkar – Text book of Medical Laboratory Technology
6. Medical Laboratory technology 6th edition by Ramnik Sood.
7. Manipal Manual of Clinical Biochemistry for medical laboratory and M.Sc., students-3rd edition by Shivananda Nayak B
8. Tietz textbook of clinical chemistry - Tietz, Norbert W.
9. Clinical chemistry - Marshall, William J.;Bangert, Stephen K.
10. Varley's Practical Clinical Biochemistry - 4th, 5th and 6th editions
11. Kaplan - Clinical Biochemistry
12. Bishop. Clinical Chemistry

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SUBJECT - PATHOLOGY
Theory: 70 Hrs. + Practical: 20 Hrs: Total teaching hours 90

Sl. No	Content	Hours
	HistoPathology - Theory	**20**
1.	**-** Introduction to Histo Pathology - Receiving of Specimen in the laboratory - Grossing Techniques - Mounting Techniques – various Mountants - Maintenance of records and filing of the slides. - Use & care of Microscope - Various Fixatives, Mode of action, Preparation and Indication. - Bio-Medical waste management - Section Cutting - Tissue processing for routine paraffin sections - Decalcification of Tissues. - Staining of tissues - H& E Staining - Bio-Medical waste management	
	Clinical Pathology – Theory	**20**
2.	**-** Introduction to Clinical Pathology - Collection, Transport, Preservation, and Processing of various clinical specimens - Urine Examination – Collection and Preservation of urine. Physical, chemical, Microscopic Examination - Examination of body fluids. - Examination of cerebro spinal fluid (CSF) - Sputum Examination. - Examination of feces	
	Haematology – Theory	**20**

3.	- Introduction to Haematology - Normal constituents of Blood, their structure and function. - Collection of Blood samples - Various Anticoagulants used in Haematology - Various instruments and glassware used in Haematology, Preparation and use of glassware - Laboratory safety guidelines - SI units and conventional units in Hospital Laboratory - Hb,PCV - ESR - Normal Haemostasis Bleeding Time, Clotting Time, Prothrombin Time, Activated Partial Thromboplastin Time.	
	Blood Bank	**10**
4.	Introduction Blood grouping and Rh Types Cross matching	

PRACTICALS: 20Hours

- Urine Examination.
- Physical
- Chemical
- Microscopic
- Blood Grouping Rh typing.
- Hb Estimation, Packed Cell Volume [PCV], Erythrocyte Sedimentation rate{ESR]
- Bleeding Time, Clotting Time.
- Histopathology – Section cutting and H &E Staining

Internal Assessment

Theory - Average of two exams conducted. 20

Practical's: Record & Lab work* 10

* There shall be no University Practical Examination and internal assessment marks secured in Practical's need not be sent to the University.

Examiner: One internal and External examiner for university examinations

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 70 marks. Distribution of type of questions and marks for Pathology shall be as given under.

TYPE OF QUASTION	NUMBER OF QUASTIONS	MARKS	SUB – TOTAL
LONG ESSAY(LE)	3 (To attempt 2)	2x10	20
SHORT ESSAY(SE)	8 (To attempt 6)	6x5	30
SHORT ANSWER (SA)	All are compulsory	10x2	20
TOTAL MARKS			70

NO PRACTICAL EXAMINATION

REFERENCE BOOKS

Pathology

1. Culling Histopathology techniques
2. Bancroft Histopathology techniques
3. Koss - cytology
4. Winifred greg - Diagnostic cytopathology
5. Orell - Cyto Pathology
6. Todd & Sanford Clinical Diagnosis by laboratory method
7. Dacie& Lewis - Practical Haematology
8. RamanicSood, Laboratory Technology (Methods and interpretation) 4th Ed. J.P. Bros,New Delhi -1996)
9. Satish Gupta Short text book of Medical Laboratory for technician J.P. Bros, New Delhi - 1998
10. Sachdev K.N. Clinical Pathology and Bacteriology 8th Ed, J.P. Bros, New Delhi-1991.
11. Krishna - Text book of Pathology, Orient Longman PVT Ltd.

MICROBIOLOGY

Theory: 70 Hrs. + Practical: 20 Hrs: Total teaching hours 90

MICROBIOLOGY

Objective: This course introduces the principles of Microbiology with emphasis on applied aspects of Microbiology of infectious diseases particularly in the following areas

- Principles & practice of sterilization methods
- Collection and transport of specimens for routine microbiological investigations
- Interpretation of commonly done bacteriological and serological investigations
- Control of Hospital infections & Biomedical waste management
- Immunization schedule

Theory - 70 hours

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

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

2. Growth and nutrition **4 hours**

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

3. Sterilisation and Disinfection **4 hours**

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

Antimicrobial sensitivity test

4. Immunology **10 hours**

Immunity Vaccines, Types of Vaccine and immunization schedule Principles and interpretation of commonly done serological tests namely Widal, VDRL, ASLO, CRP, RF & ELISA. Rapid tests for HIV and HbsAg (Technical details to be avoided)

5. Systematic Bacteriology **25 hours**

Morphology, cultivation, diseases caused , laboratory diagnosis including specimen collection of the following bacteria(the classification, antigenic structure and pathogenicity are not to be taught) Staphyloccci, Streptococci, Pneumococci, Gonococci, Menigococci, C

diphtheriae, Mycobacteria, Clostridia, Bacillus, Shigella, Salmonella, Esch coli, Klebsiella, Proteus, Vibrio cholerae, Pseudomonas & Spirochetes

7. Mycology **4 hours**

Morphology, diseases caused and lab diagnosis of following fungi.

Candida, Cryptococcus, Dermatophytes, opportunistic fungi.

8. Virology **10 hours**

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

9. Hospital infection Control **5 hours**

Causative agents, transmission methods, investigation, prevention and control

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

Practical 20 hours

Compound Microscope

Demonstration and sterlization of equipments - Hot Air oven, Autoclave, Bacterial filters.

Demonstration of commonly used culture media, Nutrient broth, Nutrient agar, Blood agar,

Chocolate agar, Mac conkey medium, LJ media, Robertson Cooked meat media, Potassium

tellurite media with growth, Mac with LF & NLF, NA with staph

Antibiotic susceptibility test

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

Grams stain

Acid Fast staining

Visit to hospital for demonstration of Biomedical waste management.

Anaerobic culture methods

Internal Assessment

Theory - Average of two exams conducted – Marks 20

Practical's: Record & Lab work* - Marks - 10

**There shall be no University Practical Examination and internal assessment marks secured in Practical's need not be sent to the University.*

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 70 marks.

Distribution and type of questions and marks for Microbiology shall be as given under

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB – TOTAL
LONG ESSAY(LE)	3 (To attempt 2)	2x10	20
SHORT ESSAY(SE)	8 (To attempt 6)	6x5	30
SHORT ANSWER (SA)	All are compulsory	10x2	20
TOTAL MARKS			70

NO PRACTICAL EXAMINATION

REFERENCE BOOKS

1. Essentials of Medical Microbiology Apurba Shankar Sastry 2nd ed
2. Textbook of Microbiology Ananthnarayan and Paniker's 11 ed
3. Essentials of Medical Microbiology Apurba Shankar Sastry 3rd ed
4. Roberty Cruckshank - Medical Microbiology - The Practice of Medical Microbiology
5. Rippon - Medical Mycology
6. Emmons - Medical mycology
7. Basic laboratory methods in Parasitology, 1st Ed, J P Bros, New Delhi - 199
8. Basic laboratory procedures in clinical bacteriology, 1st Ed, J P Brothers, New Delhi

Examiner: One internal and External examiner for university examinations

Subsidiary Subjects

FIRST YEAR

Sl No	Subject	Teaching hours
1	Computer basics	20
2	English and Communication Skills	20
3	Health care	20
4	Basic Science with Skill Development Training and Hospital Procedure and Records	40

FIRST YEAR

I. COMPUTER BASICS

Teaching Hours: 20

1. Introduction to Computers
2. Definition: Input. Output & CPU
3. Input and output devices: types
4. Basis of computer system: Switching on & off, what is Bias? And computer generations
5. Keyboard practices
6. Definitions of terms: Desktop & Software
7. Computer systems: Hardware & software definitions
8. Windows operating system (win7, 8, 10 etc): Definition & Why, Calculator - Word pad - Short cuts - Start menu - Media player - Note pad - Win amp – Paint - Control panel
9. Microsoft word: Opening, saving, deleting, typing, print , Page border, spelling, table, grammar, margin, Clip art, BIU, word art, Colour text &background, Picture drawing using word
10. Excel: Formulas - Design charts- Format tables
11. PowerPoint: Designing a presentation - Inserting some animation with sound
12. Internet &its applications: Interconnection to HTML, E- mailing – Browsing – Chatting

II. ENGLISH AND COMMUNICATION SKILLS

Teaching Hours: 20

ENGLISH

1. Functional English –Grammar: Components of a sentence – Verb - Transformation of sentences – Voice - Reported speech - Positive/ negative -Statement/ Interrogative - Subject verb agreement - Common errors – Exercises
2. Vocabulary: Synonyms and antonyms - Idioms and phrases – Similies - Words denoting assemblage
3. Writing skills: Note making – Summarizing - Report writing - Letter writing - Expansion of an idea
   - Comprehension
4. Reading: What is efficient and fast reading? - What is Awareness of existing reading habits - Tested techniques for improving speed - Improving concentration and comprehension through systematic study

COMMUNICATION

5. Introduction: Communication process - Elements of communication - Barriers of communication and how to overcome them.
6. Speaking: Importance of speaking efficiently - Voice culture - Preparation of speech - secrets of good delivery - Audience psychology handling - Presentation skills - Conference/Interview technique
7. Listening: Importance of listening - Self-awareness about listening -Action plan execution - Barriers in listening - Good and persuasive listening
8. Nonverbal Communication: Basics of nonverbal communication
9. Memory: What is memory, Brain- mind potential? - Systems for memorizing - Summary page
   - Building positive mental habits
10. Self-awareness: Self-image - Self talk – Relaxation - Personality development

III. HEALTH CARE

Teaching Hours: 20

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

2. **Introduction to Nursing**
   - Nursing principles. Inter-Personnel relationships. Bandaging: Basic turns; Bandaging extremities; Triangular Bandages and their application. Nursing Position, Bed making, prone, lateral, dorsal, dorsal recumbent, Fowler's positions, comfort measures, Aids and rest and sleep. Lifting and Transporting Patients: Lifting patients up in the bed. Transferring from bed to wheel chair. Transferring from bed to stretcher.
   - Bed Side Management: Giving and taking Bed pan, Urinal : Observation of stools, urine. Observation of sputum, Understand use and care of catheters, enema giving.
   - Methods of Giving Nourishment: Feeding, Tube feeding, drips, transfusion
   - Care of Rubber Goods
   - Recording of body temperature, respiration and pulse, Simple aseptic technique, sterilization and disinfection. Surgical Dressing: Observation of dressing procedures

3. **First Aid:** Syllabus as for Certificate Course of Red Cross Society of St. John's Ambulance Brigade.

Reference Books:

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

IV. BASIC SCIENCE WITH SKILL DEVELOPMENT TRAINING AND HOSPITAL PROCEDURE AND RECORDS

Teaching Hours: 40

1. **Basic science with skill development training**

- Medical ethics & the relevant medico legal aspects
- Responsibilities & duties
- Ethical behaviour & conduct
- Medico-legal aspects and its relation to consumer protection act
- Biomedical waste & Its management
- Cardiopulmonary resuscitation- basic cardiac life support & advanced cardiac life support
- Critical care nephrology - management of renal failure in ICU
- Basic principles of blood transfusion & fluid therapy
- Sterilization - material & methods
- Biochemistry, Microbiology, Pathology & other related instrumentation: Basic principles of commonly used instruments, care & maintenance

2. Infection control

- The cycle of infection
- Infectious organisms
- The reservoir of infection
- The susceptible host Transmission of disease Practical asepsis
- Handling linen
- Disposal of contaminated waste
- Environmental asepsis
- Isolation technique
- The isolation patient in radiology dept.
- Precaution for the comprised patient Surgical asepsis

3. Medication and their administration (nursing classes)

- The role of the radiographer Medication information
- The topical route
- The oral route
- The parenteral route Preparation of injection
- The intravenous route Charting

4. Dealing with acute situations (emergency medicine classes)

- Accident victims: Head injury/ Fractures/ Burns
- Life threatening emergencies: Respiratory arrests, Heart attacks and cardiac arrests, Shocks
- Other emergencies - Epitaxis, Postural hypotension and vertigo Seizures, Diabetic coma and insulin reaction Asthma

5. CARDIOPULPONARY RESUSCITATION (C.P.R)

- Basics of CPR - How to give CPR? Precautiosn during CPR
- Basic cardiac life support & advanced cardiac life support

6. HOSPITAL PROCEDURE AND RECORDS

General idea about the role, importance and procedures of the following within the hospital set up -

- Medical records
- Medical photography
- Computer networking system
- Laboratory services
- Sample collection and transport
- Biomedical waste disposal

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SECOND YEAR

BACHALORE OF SCIENCE

IN

RENAL DIALYSIS TECHNOLOGY

(2ND B. Sc. RDT)

PAPER 1: APPLIED ANATOMY & PHYSIOLOGY RELATED TO DIALYSIS TECHNOLOGY

Applied ANATOMY

1. Basic Anatomy of Urinary System – Structural Anatomy of Kidney, bladder, ureter, urethra, Prostrate
2. Histology of Kidney
3. Blood supply of Kidney
4. Development of Kidney in Brief
5. Anatomy and peritoneum including concept of abdominal hernias
6. Anatomy of vascular system
    - Upper limb vessels – Course, distribution, branches, origin & abnormalities
7. Neck vessels – Course, distribution, branches, origin & abnormalities
8. Femoral Vessels - Course, distribution, branches, origin & abnormalities

- **PHYSIOLOGY**

1. Mechanism of urine formation
2. Glomerular Filtration rate (GFR)
3. Clearance studies
4. Physiological Values – Urea, Creatinine, Uric acid, magnesium, glucose
5. 24 hour urinary studies - Urea, Creatinine, electrolytes calcium, magnesium
6. Physiology of renal circulation
7. Factors contributing & modifying renal circulation
8. Auto-regulation
9. Hormones produced by kidney & Physiologic alterations in pregnancies
10. Haemostasis – Coagulation cascade, coagulation factors, auto-regulation, BT, CT, PT, PTT, Thrombin time
11. Acid Base Balance – Basic principles & Common abnormalities like hypokalemia, hyponitremia, hyperkalemia, hypernitremia, hypocalcemia, hypercalcemia, pH etc
12. Basic Nutrition in renal disease

Internal Assessment:
Total: 30 Marks

Theory - Average of two exams conducted – Marks 20
Practical's: Record & Lab work* - Marks - 10

**There shall be no University Practical Examination and internal assessment marks secured in Practical's need not be sent to the University.*

Scheme of Examination Theory

There shall be one university theory paper of three hours duration carrying 70 marks. Distribution of type of questions and marks for APPLIED ANATOMY & PHYSIOLOGY RELATED TO DIALYSIS TECHNOLOGY PAPER1 Shall be as given under;

Type of Questions	No. of	Marks	Sub-total
Long Essay(LE)	2	2x10	20
Short Essay(SE)	8 (To attempt6)	6	30
Short Answer(SA)	All are compulsory	10 x2	20
Total Marks			70

NO PRACTICAL EXAMINATION

PAPER-2: APPLIED ASPECTS OF PAHTOLOGY & MICROBIOLOGY

PATHOLOGY

1. CONGENITAL ABNORMALITIES OF URINARY SYSTEM
2. CLASSIFICATION OF RENAL DISEASES
3. GLOMERULAR DISEASES – CAUSES, TYPPES &PATHOLOGY
4. TUBULOINTERSTITIAL DISEASES
5. RENAL VASCULAR DISORDERS
6. END STAGE RENAL DISEASES – CAUSES &PATHOLOGY
7. PATHOLOGY OF KIDNEYIN HYPERTENSION, DIABETES MELLITUS, PREGNANCY
8. PATHOLOGY OF PERITONEUM– PERITONITIS– BACTERIAL, TUBULAR & SCLEROSING PERITONITIS DIALYSISINDUCEDCHANGES
9. PATHOLOGY OF URIANRY TRACTINFECTIONS
10. PYELONEPHRITIS &TUBERCULOUS PYELONEPHRITIS

MICROBIOLOGY

1. HEPATOTROPHIC VIRUSES IN DETAIL – MODEOF TRANSFUSION, UNIVERSAL PRECAUTIONS, VACCINATIONS
2. HUMANIMMUNODEFICIENCY VIRUS (HIV), MODEOF TRANSFUSION, UNIVERSAL PRECAUTIONS
3. OPPURTUNISTICINFECTIONS
4. MICROBIOLOGY OF URINARY TRACTINFECTIONS
5. MICROBIOLOGY OF VASCULAR ACCESSINFECTION (FEMORAL, JUGULA, SUBCLAVIAN CATHETERS)
6. SAMPLING METHODOLOGIES FOR CULTURE &SENSITIVITY

Internal Assessment:

Total 30 marks:

Theory - Average of two exams conducted – Marks 20 (Applied Pathology 10 + Microbiology 10)
Practical's: Record & Lab work* - Marks - 10

**There shall be no University Practical Examination and internal assessment marks secured in Practical's need not be sent to the University.*

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying Applied Pathology 35 + Microbiology 35 =70 marks. Distribution of type of questions and marks for APPLIED ASPECTS OF PAHTOLOGY & MICROBIOLOGY PAPER II

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS FOR EACH QUESTION	Sub-total
ESSAY TYPE	2	10	20
SHORT ESSAY TYPE	12 (6 ×5)	5	30
SHORT ANSWER TYPE	10	2	20
Total			70

PAPER-3: PHARMACOLOGY RELATED TO HAEMO & PERITONEAL DIALYSIS

1. IVFLUID THERAPY WITH SPECIAL EMPHASISIN RENAL DISEASES
2. DIURETICS – CLASSIFICATION, ACTIONS, DOSAGE, SIDE EFEECTS &CONTRAINDICATIONS
3. ANTIHYPERTENSIVES – CLASSIFICATION, ACTIONS, DOSAGE, SIDE EFEECTS
4. & CONTRAINDICATIONS, SPECIAL REFERENCE DURING DIALYSIS, VASOPRESSORS, DRUGS USEDIN HYPOTENTION
5. DRUGS &DIALYSIS – DOSE & DURATION OF ADMINISTRATIONC OF DRUGS
6. DIALYSABLEDRUGS –PHENOBARBITONE, LITHIUM, METHANOL etc.
7. VITAMIN D&ITS ANALOGUES, PHOSPHATE BINDERS, IRON, FOLIC ACID &OTHER VITAMINS OF THERAPEUTIC VALUE
8. ERYTHROPOIETININ DETAIL
9. HEPARININCLUDING LOW MOLECULAR WEIGHTHEPARIN
10. PROTAMINE SULPHATE
11. FORMALIN, SODIUMHYPOCHLORITE, HYDROGEN PEROXIDE – ROLEAS DISINFACTANTS & ADVERSE EFFECTS OF RESIDUAL PARTICLES APPLICABLE TO FORMALIN
12. HAEMODIALYSIS CONCENTRATES– COMPOSITION&DILUTION (ACETATE &BICORBONATES)
13. PERITONEAL DIALYSISFLUIDIN PARTICULARHYPERTONIC SOLUTIONS – COMPOSITION
14. POTASSIUM EXCHANGERESINS WITH SPECIAL EMPHASIS ON MODE OF ADMINISTRATION

Internal Assessment:
Total 30 Marks
Theory - Average of two exams conducted – Marks 20
Practical's: Record & Lab work* - Marks – 10
**There shall be no University Practical Examination and internal assessment marks secured in Practical's need not be sent to the University.*

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 70 marks. Distribution of type of questions and marks for PHARMOCOLOGY RELATED TO HAEMO & PERITONEAL DIALYSIS Shall be given as under;

Type of Questions	No. of Questions	Marks	Sub-total
Long Essay(LE)	2	2x10	20
Short Essay(SE)	8 (To attempt 6)	6x	30
Short Answer(SA)	All are compulsory	10 x2	20
Total Marks			70

NOPRACTICALEXAMINATION

PAPER-4: CONCEPTS OF RENAL DISEASES, BASICS OF DIALYSIS TECHNOLOGY & NUTRITION

A. CONCEPTS OF RENAL DISEASES: CLINICAL MANIFESTATIONS EVALUATION & MANAGEMENT OF THE FOLLOWING DISEASES

1. ACUTE RENAL FAILURE
2. NEPHROTIC SYNDROME – PRIMARY&SECONDARY
3. NEPHRITIC SYNDROME
4. UTI– URINARY TRACT INFECTIONS
5. ASYMPTOMATIC URINARY ABNORMALITIES
6. CHRONIC RENAL FAILURE
7. RENAL STONE DISEASES
8. OBSTRUCTIVE UROPATHIES
9. CONGENITAL &INHERITED RENAL DISEASES
10. TUMORS OFKIDNEY
11. PREGNANCY ASSOCIATED RENAL DISEASES
12. RENAL VASCULAR DISORDERS & HYPERTENSION ASSOCIATED RENAL DISEASES

B. BASICS OF DIALYSIS TECHNOLOGY

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

C. NUTRITION

INTRODUCTION TOSCIENCE OFNUTRITION

- DEFINITION
- FOOD PATTERN AND ITS RELATION TO HEALTH
- FACTORS INFLUENCING FOOD HABITS, SELECTION AND FOOD STUFFS
- SUPERSTITIONS, CULTURE, RELIGION, INCOME, COMPOSITION OF FAMILY, AGE, OCCUPATION, SPECIAL GROUP etc
- FOOD SELECTION, STORAGE &PRESERVATION
- PREVENTION OF BLOOD ADULTERATION

CLASSIFICATION OF NUTRIENTS

- MACRONUTRIENTS AND MICRONUTRIENTS
- PROTEINS – TYPES, SOURCES, REQUIREMENTS AND DEFIENCIES OF PROTEINS
- CARBOHYDRATES SOURCES, REQUIREMENTS & DEFICIENCY
- FATS –TYPES, SOURCES, REQUIREMENTS AND DEFICIENCY OF FATS
- WATER – SOURCES OFDRINKING WATER, REQUIREMENTS, PRESERVATION OF WATER
- MINERALS – TYPES, SOURCES, REQUIREMENTS DEFFICIENCIES OF MINERALS
- VITAMINS-TYPES, SOURCES, REQUIREMENTS DEFFICIENCIES OF VITAMINS

PLANNING DIETS

- NEED FOR PLANNING DIETS
- CONCEPTOF A BALANCED DIET
- FOOD GROUP &BALANCED DIET
- INFLUENCE OF AGE, SEX, OCCUPATION &PHYSIOLOGICAL STATE
- RECOMMENDED DIETARYINTAKE IN PLANNING DIET
- STEPS IN PLANNING BALANCED DIET
- PLANNING RENAL DIET

INTRODUCTION TOCOOKERY

- PURPOSES AND METHODS OF COOKING
- EFFECTS OF HEAT ON COOKING OF FOODS
- PREPARATION OF BASIC RECIPES – CLEAR FLUIDS
- FULL FLUIDS, VEGETABLE PREPARATION, EGG RECIPES, FISHANDMEAT RECIPES, LIGHTPUDDINGS

Internal Assessment:

Theory - Average of two exams conducted – Marks 20 **(Concepts of renal diseases 8+ Basics of dialysis technology 8+ Nutrition4)**

Practical's: Record & Lab work* - Marks - 10

**There shall be no University Practical Examination and internal assessment marks secured in Practical's need not be sent to the University.*

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 25+25+20 (Concepts of renal diseases+ Basics of dialysis technology +Nutrition) marks.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS FOR EACH QUESTION	Sub-total
ESSAYTYPE	2	1	
SHORT ESSAY TYPE	8 (6 ×5)	5	
SHORT ANSWER	(10 ×2)	2	
Total			

Practical -1: 70+30=100
Practical-2: 70+30=100

SECOND YEAR Subsidiary subjects

Sl No	Subject	Teaching hours
1	Indian constitution	20
2	Sociology	20
3	Environment science and health	20
4	Clinical psychology	20

I. INDIAN CONSTITUTION

Teaching Hours: 20

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

II. SOCIOLOGY

Teaching Hours: 20

Course Description

This course will introduce student to the basic sociology concepts, principles and social process, social institutions [in relation to the individual, family and community and the various social factors affecting the family in rural and urban communities in India will be studied.

1. **Introduction:**

   Meaning – Definition and scope of sociology. Its relation to Anthropology, Psychology, Social Psychology

   Methods of Sociological investigations – Case study, social survey, questionnaire, interview and opinion poll methods.

   Importance of its study with special reference to health care professionals

2. **Social Factors in Health and Disease:**

   Meaning of social factors, Role of social factors in health and disease

3. **Socialization:**

   Meaning and nature of socialization, Primary, Secondary and Anticipatory socialization, Agencies of socialization

4. **Social Groups:**

   Concepts of social groups influence of formal and informal groups on health and sickness. The role of peoples involved in the primary and secondary health care groups in the hospital and rehabilitation setup.

5. **Family:**

   The family, meaning and definitions, Functions of types of family, Changing family patterns. Influence of family on individual's health, family and nutrition, the effects of sickness in the family and psychosomatic disease and their importance to physiotherapy

6. **Community:**

   Rural community: Meaning and features – Health hazards to rural communities, health hazards to tribal community. Urban community: Meaning and features – Health hazards of urbanities

   Culture and Health: Concept of Health Concept of culture and Health, Culture and Health Disorders

   Social Change: Meaning of social changes, Factors of social changes, Human adaptation and social change, Social change and stress, Social change and deviance, Social change and health programme. The role of social planning in the improvement of health and rehabilitation

   Social Problems of disabled: Consequences of the following social problems in relation to sickness and disability remedies to prevent these problems, Population explosion Poverty and unemployment Beggary, Juvenile delinquency Prostitution Alcoholism, Problems of women in employment

7. **Social Security:**

   Social Security and social legislation in relation to the disabled

8. **Social Work:**

   Meaning of Social Work, The role of a Medical Social Worker

Reference Books:

1. Sachdeva & Vidyabhushan, Introduction to the study of sociology
2. Indrani T.K., Text book of sociology for graduates nurses and Physiotherapy students, JP Brothers, New Delhi 10

III. ENVIRONMENT SCIENCE AND HEALTH

Teaching hours: 20

1. Introduction to Environment and Health
2. Sources, health hazards and control of environmental pollution
3. Water
4. The concept of safe and wholesome water.
5. The requirements of sanitary sources of water.
6. Understanding the methods of purification of water on small scale and large scale. Various biological standards, including WHO guidelines for third world countries. Concept and methods for assessing quality of water.
7. Domestic refuse, sullage, human excreta and sewage their effects on environment and health, methods and issues related to their disposal.
8. Awareness of standards of housing and the effect of poor housing on health.
9. Role of arthropods in the causation of diseases, mode of transmission of arthropods borne diseases, methods of control

Recommended Books:

1. Text Book of Environmental Studies for under gradute courses By Erach Bharucha Reprinted in 2006, Orient Longman Private Limited /Universities Press India Pvt. Ltd.

IV. CLINICAL PSYCHOLOGY

Total teaching hours: 20

1. Introduction to psychology
2. Intelligence, Learning, Memory, Personality, Motivation
3. Body integrity- one's body image
4. Patient in his Milan
5. Self-concept of the therapist, Therapist patient relationship-some guidelines
6. Illness and its impact on the patients
7. Maladies of the age and their impact on the patient's own and others concept of his body image
8. Adapting changes in vision
9. Why Medical Psychology needs / demands commitment?

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THIRD YEAR
BACHALORE OF SCIENCE
IN
RENAL
DIALYSIS TECHNOLOGY
(3RD B. Sc. RDT)

THIRD YEAR

PAPER I: APPLIED DIALYSIS TECHNOLOGY

1. INDICATIONS OF DIALYSIS
2. HISTORY &TYPES OF DIALYSIS
3. THEORY OF HAEMODIALYSIS – DIFFUSION, OSMOSIS, ULTRAFILTERATION & SOLVENTDRAG
4. HAEMODIALYSIS APPRATUS –TYPES OF DIALYSER &MEMBRANE, DIALYSATE
5. PHYSIOLOGY OF PERITONEAL DIALYSIS
6. VASCULAR ACCESS FOR HAEMODIALYSIS &ASSOCIATED COMPLICATIONS
7. PERITONEAL ACCESSDEVICES – TYPES OF CATHETER, INSERTION TECHNIQUES& ASSOCIATED COMPLICATIONS
8. DIALYSIS MACHINES - MECHANISMOF FUNCTIONING &MANAGEMENT HAEMODIALYSIS MACHINE PERITONEAL DIALYSISMACHINE
9. COMPLICATIONS OF DIALYSIS
   - HAEMODIALYSIS – ACUTE &LONG TERM COMPLICATIONS
   - PERITONEAL DIALYSIS– MECHANICAL &METABOLIC COMPLICATIONS
10. BIOCHEMICALINVESTIGATIONS REQUIRED FOR RENAL DIALYSS
11. ADEQUACY OF DIALYSIS
    - HAEMODIALYSIS
    - PERITONEAL DIALYSIS
    - PERITONEAL EQUILIBRIATION TEST (PET)
13. ANTICOAGULATION
14. PERITONITIS &EXITSITE INFECTION
15. WITHDRAWAL OF DIALYSIS CRITERIA
    - ACUTE DIALYSIS
    - CHRONIC DIALYSIS

Internal Assessment:
Total IA marks: 30
Theory - Average of two exams conducted – Marks 20
Practical's: Record & Lab work* - Marks - 10

*There shall be no University Practical Examination and internal assessment marks secured in Practical's need not be sent to the University.

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 70 marks. Distribution of type of questions and marks for APPLIED DIALYSIS TECHNOLOGY shall be as given under.

Type of	No. of Questions	Mark	Sub-total
Long Essay(LE)	2	2x10	20
Short Essay(SE)	8 (To attempt 6)	6 x5	30
Short Answer(SA)	All are compulsory	10 x2	20
Total Marks			70

PAPER-2: APPLIED DIALYSIS TECHNOLOGY

1. DIALYSISIN SPECIAL SITUATIONS
    - PATIENTS WITH CONGESTIVE CARDIAC FAILURE
    - ADVANCED LIVER DISEASE
    - PATIENTS POSITIVE FOR HIV, HBsAg & HCV
    - FAILED TRANSPLANT
    - POISIONING CASES
    - PREGNENCY
2. DIALYSISININFANTS & CHILDREN
3. DIALYSER REUSE
4. SPECIAL DIALYSIS PROCEDURES
    - CONTINUOUS THERAPIES IN HAEMODIALYSIS
    - DIFFERENTMODALITIES OF PERITONEAL DIALYSIS
    - HAEMODIAFILTRATION
    - HAEMOPERFUSION
    - SLED
    - MARS

5. PLASMAPHERESIS
6. SPECIAL PROBLEMSIN DIALYSIS PATIENTS
    - PSYCHOLOGY& REHABILITATION
    - DIABETES
    - HYPERTENSION
    - INFECTIONS
    - BONE DISEASES
    - ALUMINIUMTOXICITY
7. RECENTADVANCES INHAEMODIALYSIS
    - NOCTURNAL DIALYSIS
    - ONLINE DIALYSIS
    - DAILY DIAYSIS
8. TELEMEDICINEIN DIALYSIS PRACTICE
9. WATERTREATMENTSYSTEM
10. RENAL ANAEMIA MANAGEMENT
    - CHRONIC DIALYSIS

Distribution of type of questions and marks for APPLIED DIALYSIS TECHNOLOGY PAPER II shall be as given under.

TYPEOFQUESTION	NUMBER OFQUESTIONS	MARKSFOR EACH QUESTION	Sub-total
ESSAYTYPE	2	10	20
SHORT ESSAYTYPE	8 (6 ×5)	5	30
SHORT ANSWER TYPE	(10 ×2)	2	20
Total			70

Practical including paper 1 & 2: IA = 30 marks
University Practical Examination= 70 marks

PRACTICAL

1. SETTING UP DIALYSIS MACHINE FOR DIALYSIS
2. A VCANNULATION
4. A VFISTULA/A VGRAFTCANNULATION
5. INITIATION OF DIALYSIS THROUGH CENTRAL VENOUS CATHETERS LIKE INTERNAL JUGULAR, FEMORAL &SUBCLAVIAN VEIN
6. PACKING&STERILISATION OF DIALYSIS TRAYS
7. CLOSING OF DIALYSIS
8. PREPARATION OF CONCENTRATES DEPENDING ON THE SITUATIONS
9. REUSE OF DIALYSIS APPARATUS
10. ISOLATED ULTRAFILTRATION
11. PERFORMANCE OF PERITONEAL DIALYSIS EXCHANGE MANUALLY
12. SETTING UP OF AUTOMATED PERITONEAL DIALYSIS EQUIPMENT
13. FIRSTASSISTANTIN MINOR PROCEDURES
14. SKIN SUTURING
15. CPR DEMONSTRATIONS

Subsidiary Subjects

THIRD YEAR

Sl No	Subject	Teaching hours
1	Research methodology	20
2	Biostatistics	20

THIRD YEAR

I. RESEARCH METHODOLOGY Teaching hours : 20

1. Introduction: Research Methodology
   - Research process
   - Steps involved in research process
   - Research methods and methodology
2. Variables and scales of measurements
   - Definitions and examples of qualitative, quantitative, continuous discrete, dependent and independent variable
   - Definitions, properties and examples of nominal, ordinal, interval and ratio scales of measurements.
3. Sampling
   - Population, sample, sampling, reasons for sampling, probability and non-probability sampling.
   - Methods of probability sampling – simple random, stratified, systematic-procedure
   - Merits and demerits.
   - Use of random number table.
4. Organization of data
   - Frequency table, histogram, frequency polygon, frequency curve, bar diagram, pie chart
5. Measures of location
   - Arithmetic mean, median, mode, quartiles and percentiles – definition
   - Computation (for raw data), merits, demerits and applications
6. Measures of variation
   - Range, inter-quartile range, variance, standard deviation, coefficient of variation- definition
   - Computation (for raw data), merits, demerits and applications

II. BIO-STATISTICS Teaching hours : 20

1. Introduction I: Biostatistics
    - Definition
    - Role of statistics in health science and health care delivery system
2. Normal distribution
    - Concept, graphical form, properties, examples
    - Concept of Skewnes and Kurtosis
3. Correlation
    - Scatter diagram
    - Concept and properties of correlation coefficient, examples [No computation]
4. Health Information System
    - Definition, requirement, component and uses of health information system.
    - Sources of health information system- Census, Registration of vital events, Sample registration system (SRS), Notification of diseases, Hospital records, Disease registries, Record linkage, Epidemiological surveillance, Population survey
5. Vital statistics and hospital statistics
    - Rate, ratio, proportion, Incidence, Prevalence. Common morbidity, mortality and
6. Fertility statistics – Definition and computation.
7. Hypothesis
    - What is hypothesis
    - Formulation of hypothesis
    - Characteristics of good hypothesis.
8. Epidemiology
    - Concept of health and disease
    - Definition and aims of Epidemiology,
    - Descriptive Epidemiology- methods and uses.
9. Concept of reliability & validity

RECOMMENDED BOOKS

1. Methods in Biostatistics for medical students & Research workers, Mahajan B.K.- 6th edition
2. Research methodology – Methods & techniques, Kothari. C.R
3. Introduction to Biostatistics: A manual for students in health sciences, Sundar Rao PSS, Richard. J
4. Text book of Preventive and social medicine, Park. E. Park

INTERNSHIP

Twelve-month compulsory rotational postings during the internship which students have to work under the supervision of experienced staff in the following areas:

- ICU Dialysis
- Paediatric Dialysis
- Peritoneal Dialysis
- CRRT
- Plasmapheresis
- Haemodialysis
- Nephrology Procedure room
- Two Weeks Posting with Kidney transplant coordinator
- Two Week Posting in Emergency Department

FOURTH YEAR B. Sc. RENAL DIALYSIS TECHNOLOGY BSc RDT IV YEAR - INTERNSHIP:

1. Project Submission:

Project work is a compulsory requirement for the B Sc RDT –course. Each student can choose a topic for the project in any one of the subjects - Haemodialysis/Peritoneal dialysis/Dialysis unit Management, which would be approved by his/her supervising Teacher. Supervising Teacher should have a minimum of 3 years of teaching experience in the concerned subject.

The student should be under the guidance of the supervising staff, carry out the work on the topic selected and prepare a project report including results and references— the project report duly certified by the supervising staff and Head of the department of RDT.

One month before the ‘‘Fourth Year university practical examination’’ the project should be submitted to the HOD.

The project report evaluation will be conducted by the concerned subjects, internal and external examiners together during the Fourth Year B Sc RDT University practical examination.

2. Twelve-month compulsory rotational postings during the internship, which students have to work under the supervision of experienced staff in the following areas:

- ICU Dialysis
- Paediatric dialysis
- Peritoneal dialysis
- CRRT
- Plasmapheresis
- Haemodialysis
- Nephrology Procedure room
- Two Weeks Posting with Kidney transplant coordinator
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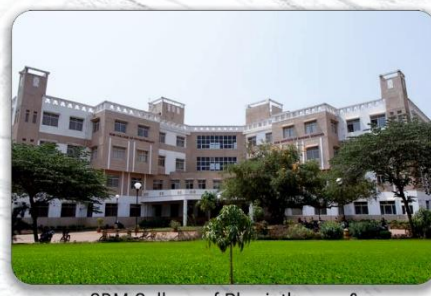
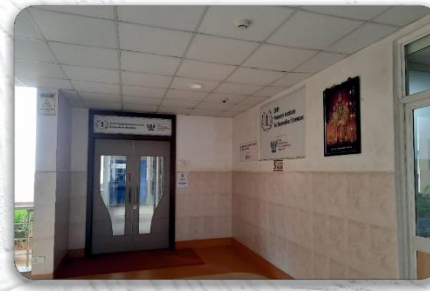
SDM College of Medical Sciences & Hospital

SDM College of Dental Sciences & Hospital

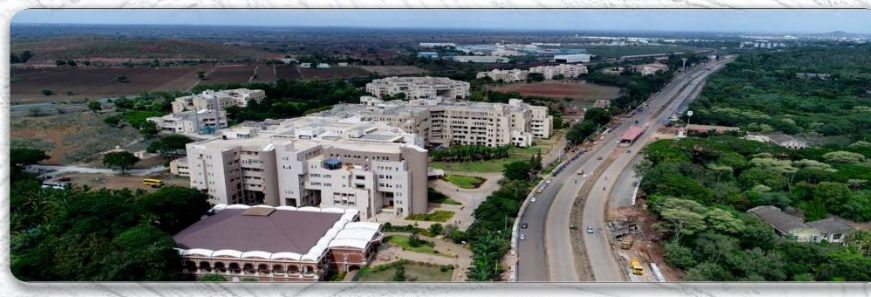


SDM College of Physiotherapy &
SDM Institute of Nursing Sciences

Shri Dharmasthala Manjunatheshwara University



SDM Research Institute for Biomedical Sciences



Panoramic View of Campus