Ordinance Governing B.Sc. Critical care Technology Degree Course

(Semester System)

Syllabus/Curriculum 2021-22

Accredited **'A' Grade** by **NAAC** (2nd Cycle) Placed in
'A' Category by Government of India (MHRD)

KLE Academy of Higher Education & Research

(Deemed-to-be-University)

[Declared as Deemed-to-be-University u/s 3 of the UGC Act, 1956 vide Government of India Notification No. F.9 -19/2000-U.3 (A)]

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VISION

To be an outstanding KAHER of excellence ever in pursuit of newer horizons to build self-reliant global citizens through assured quality educational programs.

MISSION

- To promote sustainable development of higher education consistent with statutory and regulatory requirements.
- To plan continuously provide necessary infrastructure, learning resources required for quality education and innovations.
- To stimulate to extend the frontiers of knowledge, through faculty development and continuing education programs.
- To make research a significant activity involving staff, students and society.
- To promote industry / organization, interaction/collaborations with regional/national/international bodies.
- To establish healthy systems for communication among all stakeholders for vision oriented
- growth. To fulfill the national obligation through rural health missions.

OBJECTIVES

The objectives are to realize the following at KAHER and its constituent institutions:

- To implement effectively the programs through creativity and innovation in teaching, learning and evaluation.
- To make existing programs more careers oriented through effective system of review and redesign of curriculum.
- To impart spirit of enquiry and scientific temperament among students through research oriented activities.
- To enhance reading and learning capabilities among faculty and students and inculcate sense of life long learning.
- To promulgate process for effective, continuous, objective oriented student performance evaluation.
- To ordinate periodic performance evaluation of the faculty.
- To incorporate themes to build values, Civic responsibilities & sense of national integrity.
- To ensure that the academic, career and personal counseling are in-built into the system of curriculum delivery.
- To strengthen, develop and implement staff and student welfare programs.
- To adopt and implement principles of participation, transparency and accountability in governance of academic and administrative activities.
- To constantly display sensitivity and respond to changing educational, social, and community demands.
- To promote public-private partnership.

INSIGNIA

The Emblem of the **KAHER** is a Philosophical statement in Symbolic.

The Emblem…

A close look at the emblem unveils a pillar, a symbol of the "KAHER of Excellence" built on strong values & principles.

The Palm and the Seven Stars…

The Palm is the palm of the teacher- the hand that acts, promises & guides the students to reach for the Seven Stars…

The Seven Stars signify the 'Saptarishi Dnyanamandal", the Great Bear-a constellation made of Seven Stars in the sky, each signifying a particular Domain. Our culture says: The true objective of human birth is to master these Knowledge Domains.

The Seven Stars also represent the Saptarishis, the founders of KLE Society whose selfless service and intense desire for "Dnyana Dasoha" laid the foundation for creating the knowledge called KLE Society.

Hence another significance of the raised palm is our tribute to these great Souls for making this KAHER a possibility.

Empowering Professionals…

'Empowering Professionals', inscription at the base of the Emblem conveys that out Organization with its strength, maturity and wisdom forever strive to empower the student community to become globally competent professionals. It has been a guiding force for many student generations in the past, and will continue to inspire many forth coming generations.

Notification

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B.Sc. CRITICAL CARE TECHNOLOGY

PREAMBLE

The B.Sc. Critical Care Technology Course is of 3 years(6 semesters) and 6 months internship duration aimed at training students in the critical care aspects of medical care with a good scientific foundation. The BSc critical care Technology course offered at faculty of Allied Health Sciences, KLE Academy of Higher Education and Research will prepare competent technologist with adequate knowledge and skills necessary for bedside monitoring, setting up equipment, and assist in the clinical decision making process in critical care. They will also be trained in record keeping and data collection in the ICU. Along with the basic knowledge and advanced training in the latest technologies in critical care, these graduates will play an important role in determining the quality of health care provided.

OBJECTIVE

The objective is to impart the basic knowledge & technical skills of critical care and its application in the health care delivery system.

I. ELIGIBILITY FOR ADMISSION

A candidate seeking admission to the Bachelor of Science – **Critical Care Technology** Course shall have passed:

1) The two year Pre-University examination or equivalent as recognized by KAHER with Physics, Chemistry and Biology as principal subjects of study.

   OR

2) Pre Degree Course from a recognized university (two years after ten years of schooling) with Physics, Chemistry and Biology as principal subjects of study.

   OR

3) Any equivalent examination recognized by KAHER for the above purpose with Physics, Chemistry and Biology as principal subjects of study.

   OR

4) Pre university vocational course from an approved Board with laboratory technology as vocational subject.

II. DURATION OF COURSE

The duration of the Course shall be for period of three years and six months compulsory

Rotatory internship

III. MEDIUM OF INSTRUCTION

The medium of instruction and examination shall be English.

IV. SCHEME OF EXAMINATION

There shall be six examinations during the course, each at the end of the first, second, third, fourth, fifth and sixth semester.

V. ATTENDANCE

Every candidate shall attend at least 80% of the total number of classes conducted in a calendar year from date of commencement of the term to the last working day as notified by the 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 one or more subjects either in Theory or Practical in the first appearance will not be eligible to appear the University Examination either in one or more subjects. Failed candidates should have attended at least 80% of the total number of classes conducted in that term in individual subjects separately in Theory and Practical to become eligible to appear for the University Examination in that subject in the supplementary or subsequent Examination. However, this is not applicable in case of carryover subjects.

Job opportunities and prospects

On finishing this course you are easily placed in the hospitals. You work in hospitals in ICUs, emergency rooms, trauma centres and similar healthcare settings requiring emergency and critical care. Hospitals working in both the private and public sector will be in need of your services. Other places to look for employment are govern-ment hospitals, military hospitals, railway hospitals and so on. You can undertake a post graduate program like M.Sc in Intensive care technology. You may also get to do research work in the field by opting for a doctoral program.

Employment:

Those who successfully complete the course will have very good opportunities in all leading hospitals in India and abroad.

COURSE STRUCTURE

First year

Theory classes and practical of following subjects:

Anatomy

Physiology

Biochemistry

Microbiology

Introduction to Computer application

Quality Assurance & Accreditation

English & Soft Skills

Second year

Theory class and posting in the clinical area:

Pharmacology

Applied anatomy and physiology in critical care

Applied microbiology and Pharmacology in critical care

Basics of Intensive Care Technology part 1 and part 2

Third year

Theory class and posting in the clinical area:

Intensive Care Technology– Clinical

Intensive Care Technology– Applied

Intensive Care Technology– Advanced

Fourth Year

Fourth year is internship in the clinical area.

CUMULATIVE GRADE POINT AVEARGE (CGPA)

Letter grades and grade points equivalent to percentage of mark and performance

10 Point Grade Scale

Percentage of Marks obtained	Letter Grade	Grade Point	Performance
91.00-100	O	10	Outstanding
80.00-89.99	A+	9	Excellent
70.00-79.99	A	8	Good
60.00-69.99	B+	7	Fair
50.00-59.99	B	6	Average
Less than 50	F	0	Fail
Absent	AB	0	Fail

1. **Conversion of Grades into GPA**

GPA= Credits X grade points/ Total Credits

2. **Cumulative Grade Point Average (CGPA) of all six semesters will be calculated as: Total No. of GPA /No. of Semester**

FIRST SEMESTER

Sr.No	Subject code	Course	Hours			Credits
			L	P	Total	
1	**CRCT01**	Anatomy	2	2		3
2	**CRCTS02(A)**	Physiology	1	2		2
3	**CRCTS02(B)**	Biochemistry	1	2		2
4	**CRCTS03(A)**	Pathology	1	2		2
5	**CRCTS03(B)**	Microbiology	1	2		2
6	**ELS01**	English (Subsidiary)	1			1
		Clinical Posting	18			08
	Total					20

Scheme of Examination:

Sr. No.	Subject Code	Theory	Subjects	Theory + IA +Viva Voce	Total
1	**CRCT01**	Paper 1	Human Anatomy	60 + 20 + 20	100
2	**CRCT02**	Paper 2 Section A	Human Physiology	30 + 10 + 10	50
		Section B	Basics of Biochemistry	30 + 10 + 10	50
3	**CRCT03**	Paper 3 Section A	Pathology Basic Hematology	30 + 10 + 10	50
		Section B	Microbiology	30 + 10 + 10	50
4	**ELS01**	Paper 4 Subsidiary	English	80 + 20	100
Grand Total					**400**

Sr. No.	Subject Code	Practical	Subjects	Practical + IA	Total
5	**CRCT04**	Practical 1	Human Anatomy	80 + 20	100
6	**CRCT05**	Practical 2A	Human Physiology	40 + 10	50
		2B	Basics of Biochemistry	40 + 10	50
7	**CRCT06**	Practical 3A	Hematology & Clinical Pathology	40 + 10	50
		3B	Microbiology	40 + 10	50
Grand Total					**300**

Semester I

PAPER 1: CRCT01
Human Anatomy
Theory 25 Hours

The human body as a whole:

Definitions, Subdivisions of Anatomy, Terms of location and position, Fundamental Planes, Vertebrate structure of man, Organization of the Body cells and Tissues.

Locomotion and support:

The Skeletal system: Types of bones, structure and growth of bones, Divisions of the skeleton, Appendicular skeleton, Axial skeleton, name of all the bones and their parts, joint- classification, types of movements with examples.

Anatomy of the Nervous System:

Central nervous system: Brain and Spinal cord, functions, meninges.

The Brain- Brief structure of Hind Brain, Midbrain and Forebrain, Location, gross features, parts, functional areas, cerebral blood circulation and coverings, Functions of peripheral nervous system, Organization and Structure of Typical Spinal Nerve Spinal Cord: Gross features, extent, blood supply and coverings, reflex- arc. Applied Anatomy of spinal cord and brain.

Anatomy of circulatory system:

Heart: Size, location, external features, chambers, pericardium and valves, Blood supply and Nerve supply.

Right and Left Atrium: Structural features, venous area, septum and appendages, structural features inflow and outflow characteristics.

The study of blood vessels, General plan of circulation, pulmonary and systemic circulation.

Names of arteries and veins and their positions, general plan of lymphatic system. Coronary Circulation, Lymphatic drainage of heart in brief Applied aspects of heart and pericardium.

Anatomy of the Respiratory system:

Organization of Respiratory System, Gross structure and interior of Nose, Nasal cavity, Para nasal air sinuses,

Gross structure and interior of Pharynx, Larynx, trachea, bronchial tree, Pleura

Gross structure and Histology of Lungs, Pulmonary Circulation, Pulmonary Arteries, Pulmonary Veins and Bronchial Arteries.

Nerve Supply of Respiratory System and Applied aspect of Respiratory System.

Histology

General Slides:

Hyaline cartilage, Fibro cartilage, Elastic cartilage, T.S & L.S of bone, Blood vessels, Tonsils, Spleen, Thymus, Lymph node, Epithelial tissue, Skeletal and cardiac muscle, Peripheral nerve and optic nerve.

Systemic Slides

1. G.I.T

2. Lung-Trachea

3. Kidney, Ureter, Urinary bladder
4. Endocrine- Adrenal, pancreas, pituitary, thyroid and parathyroid
5. Uterus, Ovary, testis

Type of questions and distribution of marks for Theory examination in each subject in First Semester.

Sr. No.	Question	Question Asked	Question to Attempt	Marks	Maximum Marks	Internal Assessment	Viva	Total Marks
1.	Long Essay Question	3	2	2 x 10	20	20	20	100
2	Short Essay Question	7	5	5 X 5	25			
3.	Short Answers	5	5	5 x 3	15			

Suggested Readings:

Name of the Books & Title	Author	Publisher's Name, Place of Publication
1. Human Anatomy Regional and Applied. Vol. 1, Vol.2 & Vol.3	B.D.Chaurasia	C.B.S.Publishers, New Delhi
2. Hand Book of General Anatomy	B.D.Chaurasia	C.B.S.Publishers, New Delhi
3. Text Book of Human Histology	Inderbir Singh	Jaypee Brothers, Medical Publishers, Delhi
4. Clinically Oriented Anatomy	Keith L. Moore	Williams and Wilkins, Baltimore
5. Gray's Anatomy	Susan Standring	Elsevier Churchill Livingstone, Edinburg

PRACTICAL 1: CRCTS04 **Practical 20 Hours**

Anatomy

1. General Histology Slides:
   - Epithelial Tissue,
   - Connective Tissue,
   - Hyaline Cartilage,

- Fibro Cartilage,
- Elastic Cartilage,
- T.S. & L.S. of Bone,
- Blood Vessels,
- Tonsil,
- Spleen,
- Thymus,
- Lymph node,
- Skeletal and Cardiac Muscle
- Peripheral Nerve and Optic Nerve

2. Systemic Histology Slides:
   - RS -Lungs and Trachea
   - Cerebrum
3. Demonstration of all bones - Showing parts, joints,
4. X-rays of all normal bones and joints.
5. Demonstration of heart and normal angiograms.
6. Demonstration of Brain
7. Demonstration of different parts of respiratory system and normal X-rays

PRACTICAL ASSESMENT

Scheme of Practical Examination for First Semester.

Sr. No.	Practical	Practical	IA	Grand Total
1	Practical 1	80	20	100

Scheme of Exam for Practicals:

Practical Histology Spotters: 10 X 2 Marks = 20 marks

Gross Anatomy Discussion: 2 X 20 Marks = 40 marks

Potter: 10 X 2 Marks = 20 marks

IA Marks 20 marks

Total: **100 Marks**

Suggested Readings:

Name of the Books & Title	Author	Publisher's Name, Place of Publication
1. Human Anatomy Regional and Applied. Vol. 1, Vol.2 & Vol.3	B.D.Chaurasia	C.B.S.Publishers, New Delhi
2. Hand Book of General Anatomy	B.D.Chaurasia	C.B.S.Publishers, New Delhi
3. Text book of Histology - A	J.P. Gunasegaran	Elsevier Publication, Gurgaon, Hariyana

Practical Guide		
4. Practical manual of Histology for Medical students	Neelkanth Kote	Jaypee Brothers, Medical Publishers, Delhi.

SEMESTER I

PAPER 2: CRCT02

Section A- Human Physiology

Theory: 35 Hours

GENERAL PHYSIOLOGY

Structure of Cell membrane and Cell Organelles, intercellular junctions,

Classification of Body fluid compartments & composition, Homeostasis

Transport across cell membrane –Definition and Classification

NERVE MUSCLE PHYSIOLOGY

Definition of Resting Membrane Potential, Action Potential - Phases & ionic basis

Classification and structure of Nervous Tissue

Structure, Classification and Properties of Skeletal Muscle

Neuromuscular Junction - Definition, Structure and Mechanism of neuromuscular transmission, Myasthenia gravis

Excitation Contraction Coupling

BLOOD

Composition and functions of blood and plasma proteins

Red Blood Cells: Morphology & functions, Erythropoiesis, types & functions of hemoglobin, Definition and Classification of Anemia & Jaundice.

White blood cells: Morphology, functions & variation, Definition of Leucopoiesis, Immunity – definition, and classification

Platelets and Blood Coagulation: Morphology & functions of platelets, Mechanism of Hemostasis,
Anticoagulants, Bleeding disorders.

Blood Groups: Classification of Blood Groups, ABO and Rh blood group systems, uses of blood grouping test and Cross matching, Blood Transfusion and its hazards.

CENTRAL NERVOUS SYSTEM

Organization of CNS

Introduction, Structure of neuron, Properties of nerve fiber, Axonal Transport, Classification of nerve fibers

Synapse, Receptor & Reflex

Definition of synapse, receptor & reflex, Classification of Synapse, Structure & properties of synapse, Classification of receptor, adaptation, properties of receptor, Components of reflex arc, classification of reflex.

The sensory system

Overview of sensory system, Structure of Spinal Cord, Ascending tracts – Anterior Column, Lateral Column and Posterior Column Tract – Course, termination and function

The motor system

Overview of motor system, cortical motor areas, pyramidal and extra pyramidal, tract– Course, termination and function, Upper & Lower Motor Neuron, Lumbar Puncture.

Functions of Various parts of Brain

Cerebellum, Basal ganglia, Hypothalamus, Thalamus, Autonomic Nervous System

Temperature Regulation

Normal temperature of body, Regulation of body temperature & Fever

SPECIAL SENSES

Vision

Structure of Eye, Functions of rods and cones, accommodation, visual pathway, near, distant & color vision, light reflex, Refractory errors of eye & correction.

Hearing

Structure and functions of external, middle and inner ear, Mechanism of hearing & important Tests of Hearing

Taste, Olfaction-

Taste – Receptors, pathway and primary taste sensations, Olfaction- olfactory mucosal receptors and pathway

PRACTICAL 2A - CRCT05

Section: Physiology **30 Hours**

1) Study of Microscope and its use
2) Collection of Blood and study of Haemocytometer
3) Haemoglobinometry
4) White Blood Cell count
5) Red Blood Cell count
6) Determination of Blood Groups
7) Leishman's staining and Differential WBC Count
8) Determination of Bleeding Time
9) Determination of Clotting

Practical Total 50 Marks
Major- 25 Marks
Minor- 15 Marks
Internal-Assessment- 10 Marks
Total - 50 Marks

Scheme of Examination

Theory Total 50 Marks

No	Question	Question Asked	Question to Attempt	Marks	Maximum Marks	Internal Assessment	Viva 10	Total Marks
1.	Long Essay Question	2	1	1 x 10	10	10	10	50
2.	Short Essay Question	3	2	2 x 5	10			
3.	Short Answers	5	5	5 x 2	10			

Suggested Readings:

Recommended Text Books (Latest Edition)

Sl. No.	Name of the Book & Title	Author	Publisher'sName, Place of Publication
1	Textbook of Physiology for MLT	Prof A.K.Jain	Avichal Publishing company
2	Textbook of Medical Physiology	D.Venkatesh & H.H.Sudhakar	Wolters Kluwers
3	Concise Medical Physiology	Sujit K Choudhari	New Central Books Calcutta
4	Textbook of Physiology	Arthur C Guyton	Prism Publishers Bangalore
5	Practical Physiology	Prof. A.K.Jain	Arya Publication

Biochemistry

PAPER 2: CRCT02
Section B: Basics of Biochemistry
Theory 35 Hours

1. Introduction to Medical lab Technology:
(a) Role of Medical lab Technologist (b) Ethics, Responsibility (c) Safety measures (d) First aid. (e) Cleaning and care of general laboratory glass ware and equipment.
2. Introduction to Apparatus- Chemical Balance: Different types, Principles and applications.
3. Units of Measurements: Concepts of Molecular weight, Atomic weight, Normality, Molarity, Standards, Atomic structure, Valence, Acids, Bases, Salts & indicators
4. Concepts of pH: Concepts of Acid Base reaction and hydrogen ion concentration. Definition of pH, buffer & pH meter
5. Chemistry of Carbohydrates:

a. Definition, Classification and biological importance.
b. Monosaccharaides, Oligosaccharides, Disaccharides & Polysaccharides:
6. Chemistry of Lipids:
a. Definition, Classification and biological importance.
b. Simple lipids: Triacylglycerol and waxes-composition and functions.
c. Compound lipids : Phospholipids, Sphingolipids, Glycolipid and Lipoproteins : Composition and functions.
d. Derived lipids: Fatty acids — saturated & unsaturated. Steroids and their properties.
7. Chemistry of Proteins:
a. Amino acids: Classification, properties, side chains of amino acids.
b. Protein: Definitions, Classifications and functions.
c. Peptides: Biologically active peptides
d. Overview of Structural organization of proteins.
e. Denaturation of proteins and denaturating agents

8. Chemistry of Nucleic acids:
a) DNA Structure and function
b) RNA: Types, Structure (only t RNA) and Functions.

PRACTICAL 2B: CRCT05
Section B
Practical 30 Hours
Biochemistry Practicals

1. Introduction to apparatus, Instruments and use of Chemical Balance.
2. Maintenance of Laboratory Glassware and apparatus.
3. Reactions of Carbohydrates (Glucose, fructose, maltose, lactose, sucrose and starch)
4. Reactions Proteins (Albumin and Casein)
5. Colour reactions of Proteins
6. Identification of Unknown Carbohydrates and proteins

SCHEME OF EXAMINATION- Theory

Theory Total- 30 Marks **Duration: 90 minutes**

No	Question	Question Asked	Question to Attempt	Marks	Maximum Marks	Internal Assessment	Viva	Total Marks
1.	Long Essay Question	2	1	1 x 10	10	10	10	50
2.	Short Essay Question	5	3	2 x 5	10			
3.	Short Answers	5	5	5 x 2	10			

Practical Examination-Semester I

Major Practical

Topics	No. Of Questions	Number of Question and Marks	Total
Qualitative Analysis: Identification of Unknown Carbohydrate or protein	1	1 x 20	20 Marks

Minor Practical

Topics	No. Of Questions	Number of Question and Marks	Total
Color reactions of proteins (any one)	1	1 x 20	20 Marks

Practical Marks	40 Marks
IA Marks:	10 Marks
Grand Total	**50 Marks**

Suggested Readings:

Sl. No.	Name of the Books & Title	Author	Publisher's Name, Place of Publication
1	Clinical Chemistry	VARLEY	William Heinemann Medical Books Ltd & Inter Science Book. Inc. New York.
2.	Clinical Chemistry	TEITZ	W.B. Saunders Company Harcourt(India) Private Limited New Delhi-110048.
3.	Clinical Chemistry	KAPLAN	The C.V.Mosby Company, St. Louis Washington, D.C. Toronto.
4.	Text Book of Medical Biochemistry	RAMKRISHAN (S), PRASANNA (KG), RAJAN (R),	Orient Langman, Bombay
5.	Test Book of Bio Chemistry for Medical Students	VASUDEVAN(DM), & SREE KUMARI (S)	Jaypee Brothers, New Delhi.
6.	Biochemistry	U. Satyanarayan	Books and Allied (P) Ltd. Kolkata-700009 (India)
7.	Biochemistry	DAS (Debajyothi)	Academic Publishers Calcutta.

Semester I

PAPER 3 - CRCT03
Section A - Pathology
Theory 25 Hours

Basic Haematology

- Introduction to Haematology: (a) Definition (b) Importance (c) Important equipment used.
- Laboratory organization and safety measures in haemotology Laboratory
- Introduction to blood, its composition, function and normal cellular components.
- Collection and preservation of blood sample for various haematological investigations.
- Normal Values in Hematology
- Preparation of blood Films- Types. Methods of preparation (Thick and thin smear/film)
- Definition, principles & procedure, Normal values, Clinical significance, errors involved, means to minimize errors for the following:
  1. Haemoglobinometry, PCV, Red Cell Indices
  2. Total leucocytes count (TLC)
  3. Differential leucocytes count (DLC), Absolute Eosinophil count, Reticulocyte count and Platelet Count.
  4. Erythrocyte Sedimentation Rate (ESR)
  5. Blood Grouping
- Staining techniques in Haematology (Romanowsky's stains) :Principle, composition, preparation of staining reagents and procedure of the following
  1. Giemsa stain
  2. Leishman stain
  3. Wright's stain
  4. Field's stain

Scheme of Examination

Type of questions and distribution of marks for Theory examination in each subject in First Semester.

Duration 90 minutes

S. No.	Question	Question asked	Question to attempt	Marks	Max. Marks	Internal assessment	Viva	Total Marks
1.	Long Essay Question	2	1	1 x 10	10	10	10	50
2.	Short Essay Question	3	2	2 x 5	10			
3.	Short Answers	5	5	5 x 2	10			

Suggested Readings:

Reference books (Latest Edition)

Sl. No.	Name of Book & title	Author	Publisher, Name, Place of publication
1	Practical Pathology	P. Chakraborty Gargi Chakraborty	New Central Book Agency, Kolkotta
2.	Text Book of Haematology	Dr. Tejinder Singh	Arya Publications, Sirmour (H.P)
3.	Text Book of Medical Laboratory Technology	Praful Godkar	Bhalani Publication House, Mumbai
4.	Practical Haematology	Sir John Dacie	Churchill Livingstone, London
5.	Todd & Sanford, Clinical Diagnosis & Management by Laboratory Methods	John Bernard Henry	All India Travellar Booksellar, Delhi.
6.	Practical Pathology	Dr. Ganga S. Pilli	Prabhu Publications, Dharwad

Practical 3A: CRCT06
Section A – Pathology

Practical 30 Hours Basic Haematology

1. Hb Estimation-Sahli's method & Cyanmethhaemoglobin method
2. RBC Count
3. Retic Count
4. Preparation of blood smears and staining with Leishman stain
5. WBC Total Count
6. WBC -Differential Count
7. Platelet Count
8. Absolute Eosinophil Count
9. ESR- Westergreens & Wintrobe's method,
10. PCV.

Exam Pattern

I. **Major Experiment:** Perform any two exercises: **20 Marks**

- Hb Estimation-Sahli's method
- RBC Count
- Preparation of blood smears and staining with Leishman stain- WBC - Differential count
- WBC Count
- Platelet Count
- Absolute Eosinophil Count

II. **Minor Experiment:** Any one examination **10 Marks**

- Reticulocyte Count
- ESR- Westergreens & Wintrobe's method,
- PCV

III. **Spotters** 10 Marks

IV. **Internal Assessment:** 10 Marks

Total: **50 Marks**

Practical Assessment

Scheme of Practical Examination for First Semester.

(Section A Pathology -50 Marks + Section B Microbiology 50 Marks)

Sr. No.	Practical	Practical	IA	Grand Total
1	Section A	40	10	50
2	Section B	40 (Major 30 + Minor 10)	10	50

Scheme of Exam for Practicals:

Major Experiment: 20 Marks

Minor Experiment: 10 Marks

Spotters : 10 Marks

Internal Assessment: 10 Marks

Total : 50 Marks

Semester I

PAPER 3- CRCT03
Section B – Microbiology
Theory 25 Hours

- **Introduction to Medical Microbiology:** - Definition - History - Host-Microbe relationship.
- **Microscopy:** - Introduction and history - Types of microscopes
  (a) Light microscope
  (b) Dark ground Microscope
  (c) Fluorescent Microscope
  (d) Phase contrast Microscope
  (e) Electron microscope:

-Principles and operational mechanisms of various types of microscopes

- **Sterilization:** - Definition -- Types and principle of sterilization methods
- **Physical methods-** (a) Heat (dry heat, moist heat with special Reference to autoclave - their care and maintenance.) (b) Radiation (c) Filtration, Efficiency testing to various sterilizers.
- **Chemical methods**
- **Antiseptics and disinfectants:** Definition, Types and properties - Mode of action - Uses of various disinfectants, Precautions while using the disinfectants -

Qualities of a good disinfectant, In-house preparation of alcoholic hand/skin disinfectants, Testing efficiency of various disinfectants

- Antibiotics and drug resistance
- Classification of Microbes
- Bacterial Cell Growth and Nutrition
- Overview and mechanisms of Bacterial gene transfer.
- Ubiquity of microbes.

Scheme of Examination for Theory

Type of questions and distribution of marks for Theory examination in each subject in First Semester. Section B - Microbiology - 50 marks

S. No.	Question	Question asked	Question to attempt	Marks	Max. Marks	Internal assessment	Viva	Total Marks
1.	Long Essay Question	2	1	1 x 10	10	10	10	50
2.	Short Essay Question	3	2	2 x 5	10			
3.	Short Answers	5	5	5 x 2	10			

Suggested Readings:

1. Ananthanarayan and Paniker's Textbook of Microbiology. Tenth Edition. Reba Kanungo
2. Textbook of Microbiology for MLT. Second Edition.Dr. C. P. Baveja.

Practical 3B: CRCT06
Section B – Microbiology

Practical 30 Hours

- Focusing, handling and care of Microscopes
- Hanging drop
- Simple stain
- Gram stain
- ZN stain
- Sterilization and Disinfection.

Scheme of Practical Examination for First Semester : Practical Examination for First Semester.

Sr. No.	Practical	Practical	IA	Grand Total
1	Section A	40 (Major 30 + Minor 10)	10	50
2	Section B	40 (Major 30 + Minor 10)	10	50

Major : **30 Marks**

Gram Stain 15 Marks ZN Stain 15 Marks

Minor : **10 Marks**

Spotter 10 Marks

IA : **10 Marks**

Total **50 Marks**

Suggested Readings:

- Practical Microbiology, Fourth Edition. C.P Baveja.

I YEAR B.Sc. Allied ENGLISH

ELS01

COURSE CONTENTS:

Subsidiary subject 60 hours for 1st year marks to be sent to university before IInd year exam. Course description: It is designated to help the students to acquire a good command over English language for common and medical terminology used in medical practice.

Behavioural objectives:

Ability to speak and write proper
English Ability to read and understand
English
Ability to understand and practice medical terminology.
Paragraph
Letter
writing Note
making
Description
The use of paragraphs
Essay writing
Telegrams
Precise-writing and abstracting
Report writing
Medical Terminology
Use of dictionary

Scheme of examination

Theory: 80 Marks Duration: 3 hours

1) Fill in the blanks - 10 marks
2) Articles (Passage/fill in the blanks) - 10 marks
3) Tense (Sentence identification/rewriting a sentence) - 10 marks
4) Voice (Rewrite) - 10 marks
5) Speech (Rewrite) - 10 marks
6) Linkers (Paragraph) - 10 marks
7) Paragraph writing - 10 marks
8) Letter writing - 10 marks

Text Books Recommended (Latest Edition)

Sl. No.	Name of the Book & Title	Author	Publisher's Name Place of Publication
1.	Sharma Strengthen your writing	V. R. Narayana	New Delhi, Orient Longman
2.	Grammar and composition	Wren and Martin	Delhi, Chand & Co.
3.	Spoken English	Shashikumar V. D'Souza P. V.	New Delhi, Tata Mergaw Hill
4.	Medical dictionary	Dorland's pocket IBH Publishing Co.	New Delhi; Oxford &

SECOND SEMESTER

S.No	Subject code	Course	Hours			Credits
			L	P	Total	
1	**CRCT07**	Anatomy	2	2		3
2	**CRCT08(A)**	Physiology	1	2		2
3	**CRCT08(B)**	Biochemistry	1	2		2
4	**CRCT09(A)**	Pathology	1	2		2
5	**CRCT09(B)**	Microbiology	1	2		2
6	**ELS02**	Subsidiary	1			1
		Clinical Posting	18			09
	Total					21

Scheme of Examination:

Sr. No.	Subject Code	Theory	Subjects	Theory + IA +Viva Voce	Total
1	**CRCT07**	Paper 1	Human Anatomy	60 + 20 + 20	100
2	**CRCT08**	Paper 2 Section 2A	Human Physiology	30 + 10 + 10	50
		Section 2B	Basics of Biochemistry	30 + 10 + 10	50
3	**CRCT09**	Paper 3 Section 3A	Haematology & Clinical Pathology	30 + 10 + 10	50
		Section 3B	Microbiology	30 + 10 + 10	50
4	**ELS02**	Paper 4 Subsidiar y	**Computer science**	80 + 20	100
Grand Total					**400**

Sr. No.	Subject Code	Practical	Subjects	Practical + IA	Total
5	**CRCT10**	Practical 1	Human Anatomy	80 + 20	100
6	**CRCT11**	Practical 2 2A	Human Physiology	40 + 10	50
		2B	Basics of Biochemistry	40 + 10	50
7	**CRCT12**	Practical 3A	Hematology & Clinical Pathology	40 + 10	50
		3B	Microbiology	40 + 10	50
Grand Total					**300**

Semester II

PAPER 1 - CRCT07
Human Anatomy
Theory 40 Hours

Anatomy of the Digestive System:

Components of Digestive system, Alimentary tube, Anatomy of organs of digestive tube, mouth, tongue, tooth, salivary glands, liver, Biliary apparatus, pancreas, Names and positions and brief functions - with its applied anatomy.

Anatomy of Renal System.

Organization of renal system

Kidneys: Location, gross features, relations, structure, blood supply, nerve supply, lymphatic drainage and with its applied anatomy.

Ureters and urinary bladder-Location, gross features, structure and with its applied anatomy Urethra in brief along with its applied anatomy.

Anatomy of Reproductive System.

Male Reproductive System: Testis, Duct system - with its applied anatomy.

Female Reproductive System: Uterus, Ovaries, Duct system, Accessory organs- with its applied anatomy.

Anatomy of the Endocrine System.

Name of all endocrine glands their positions, Hormones and their functions- Pituitary, Thyroid and parathyroid glands, Adrenal glands, Gonads and Endocrine part of pancreas- with its applied anatomy.

Type of questions and distribution of marks for Theory examination in each subject in Second Semester.

Sl. No.	Question	Question asked	Question to attempt	Marks	Max Marks	Internal Assessment	Viva	Total Marks
1.	Long Essay Question	3	2	2 x 10	20	20	20	100
2.	Short Essay Question	7	5	5 x 5	25			
3.	Short Answers	5	5	5 x 3	15			

Suggested Readings:

Name of the Books & Title	Author	Publisher's Name, Place of Publication
1. Human Anatomy Regional and Applied. Vol. 1, Vol.2 & Vol.3	B. D. Chaurasia	C.B.S.Publishers, New Delhi.
2. Text Book of Human Histology	Inderbir Singh	Jaypee Brothers, Medical Publishers, Delhi.
3. Clinically Oriented Anatomy	Keith L. Moore	Williams and Wilkins, Baltimore.
4. Gray's Anatomy	Susan Standring	Elsevier Churchill Livingstone, Edinburg
5. Text book of Histology - A Practical Guide	J. P. Gunasegaran	Elsevier Publication, Gurgaon, Hariyana.
6. Practical manual of Histology for Medical students	Neelkanth Kote	Jaypee Brothers, Medical Publishers, Delhi.

Practical 1: CRCT10
Human Anatomy

Practicals- 20 Hours

Systemic Histology slides:

1. G.I.T - oesophagus, stomach, small intestine, large intestine, liver, pancreas and gall bladder.
2. Kidney, ureter and urinary bladder.
3. Endocrine glands - Adrenal, Pancreas, Pituitary, Thyroid and Parathyroid
4. Uterus, Ovary, Testis.

Practical:

1) Demonstration of the digestive system organs
2) Demonstration of excretory systems organs
3) Demonstration of Male & Female reproductive organs
4) Demonstration of Endocrine glands.

Practical Assesment

Scheme of Practical Examination for Second Semester.

Sr. No.	Practical	Practical	IA	Grand Total
1	Practicala 1	80	20	100

Scheme of Exam for Practicals:

Practicals

Gross

Anatomy	Discussion 3 x 10 marks	:	30 Marks
Histology	Spotters 10 x 2 marks	:	20 Marks
	Spotters 15 x 2 marks	:	30 Marks
IA marks		:	20 Marks
	Total	**:**	**100 Marks**

SEMESTER II

PAPER 2 - CRCT08
Section A - Physiology
Theory: 35 Hours

RESPIRATORY SYSTEM

Physiological Anatomy of Respiratory System and Functions, Concept of Dead Space
Mechanism of Respiration, Lung volume and capacities, Surfactant, definition of compliance
Transport of Oxygen, ODC Curve and CO_2 transport
Regulation of Respiration – Types and functions of Respiratory Centres
Cyanosis, Dyspnea, Apnea, Hypoxia – definition and types

CARDIOVASCULAR SYSTEM

Physiological Anatomy of Heart
Cardiac Cycle – Definition and Phases
Cardiac Output - Definition, factors
Blood pressure - Definition, Determinants & Factors affecting blood pressure, regulation of blood pressure, Definition of Hypertension and Hypotension Myocardial Ischemia and Infarction.
Normal Electrocardiogram – Definition, Waves and Uses

EXCRETORY SYSTEM

Functional Anatomy
Functional anatomy of kidneys, structure of a nephron, features of renal circulation, juxtaglomerular apparatus

Mechanism of Urine formation
Glomerular Filtration – Definition, glomerular filtration rate, factors effecting GFR, Tubular reabsorption, functions of Proximal convoluted tubule, loop of Henle, distal convoluted tubule & collecting tubule.

Micturition
Muscles of the bladder, nerves of bladder, micturition reflex, & concept of Artificial Kidney

DIGESTIVE SYSTEM

Functional Anatomy of GIT
Composition & functions of saliva,
Composition of gastric juice, mechanism of Secretion & functions of HCl secretion,

Composition and functions of pancreatic juice
Functions of Liver and bile Juice
Definition Jaundice and it types

Movements of GI Tract - Deglutition, Movements of Small Intestine

ENDOCRINES

Major Endocrine glands

Pituitary Gland: Anterior & Posterior Pituitary Hormones and functions
Thyroid Gland: Hormones secreted and functions, Goiter
Adrenal Gland: Hormones secreted by adrenal cortex and medulla and their functions
Pancreas: Endocrine Hormones of Pancreas and their functions, Diabetes Mellitus
Parathyroid Gland: PTH, calcitonin and its actions

REPRODUCTIVE SYSTEM

Puberty

Puberty, Pubertal changes in male and female

Male Reproductive System

Male reproductive organs, Spermatogenesis, Morphology of a sperm, Semen, Factors influencing spermatogenesis, Functions of testosterone

Female Reproductive System

Female reproductive organs, Oogenesis, Ovulatory cycle with its hormonal basis, Tests for Ovulation Menstrual cycle with its hormonal basis, Functions of Estrogen & Progesterone

Pregnancy & Lactation

Fertilization, Functions of Placenta, Hormones of Placenta, Pregnancy tests, Contraceptive methods, Mammary gland & Lactation, Milk Ejection Reflex, Composition of Milk, advantages of breast Feeding, Parturition

PRACTICAL 2A – CRCT11
Section A – Human Physiology **30 Hours**

1) Clinical Examination of Pulse
2) Blood Pressure Recording
3) Effect of exercise on BP
4) Effect posture
5) Auscultation for Heart Sounds
6) Spirometry – Description of Normal Findings
7) Electrocardiogram of a normal person – Description of ECG waves in Lead II
8) Artificial Respiration

Practical Total 50 Mark
Major- 25 Marks
Minor- 15 Marks
Internal-Assessment- 10 Marks
Total -50 Marks

Scheme of Examination
Theory Total 50 Marks

No	Question	Question Asked	Question to Attempt	Marks	Maximum Marks	Internal Assessment	Viva 10	Total Marks
1.	Long Essay Question	2	1	1 x 10	10	10	10	50
2.	Short Essay Question	3	2	2 x 5	10			
3.	Short Answers	5	5	5 x 2	10			

Suggested Readings:

Recommended Text Books (Latest Edition)

Sl. No.	Name of the Book & Title	Author	Publisher'sName, Place of Publication
1	Textbook of Physiology for MLT	Prof A.K.Jain	Avichal Publishing company
2	Textbook of Medical Physiology	D.Venkatesh & H.H.Sudhakar	Wolters Kluwers
3	Concise Medical Physiology	Sujit K Choudhari	New Central Books Calcutta
4	Textbook of Physiology	Arthur C Guyton	Prism Publishers Bangalore
5	Practical Physiology	Prof. A.K.Jain	Arya Publication

SEMESTER II

PAPER 2: CRCT08
Section B
Basics of Biochemistry
Theory 35 Hours

1. Specimen collection of blood, urine, cerebrospinal fluid and other body fluids, preservation and preparation of protein free filtrate.
2. Enzymes: definition, classification, coenzymes, factors affecting enzyme activity and inhibitors, units of measurements, isoenzymes, Diagnostic enzymology (AST, ALT ALP, LDH, CPK and Troponin).

3. Digestion and Absorption of Carbohydrates, proteins and lipids

4. Nutrition – Calorific value and nutritional importance of Carbohydrates, Lipids, Proteins and Dietary fibers. BMR & Factors affecting BMR

5. Vitamins- Sources, RDA, functions and deficiency manifestations.

6. Minerals-Calcium, Phosphorus, Iron, copper, zinc, selenium and fluoride

7. Non Protein Nitrogenous compounds-Clinical Significance of Urea, Uric acid, creatinine, acetone and HCL

8. Overview of Metabolism

Carbohydrate Metabolism-Glycolysis, Gluconeogenesis and TCA Cycle

Protein Metabolism- General Reactions of amino acids and Urea cycle

PRACTICAL 2B: CRCT11
Basics of Biochemistry II
Practicals **30 Hours**

1. Demonstration of Colorimeter, spectrophotometer, pH meter.
2. Quantitative analysis of Glucose, Urea and creatinine
3. Estimation of urine creatinine
4. Biochemically important substance- Urea, Uric acid, creatinine, acetone and HCL

SCHEME OF EXAMINATION- Theory

Theory - 30 Marks **Duration: 90 minutes**

No	Question	Question Asked	Question to Attempt	Marks	Maximum Marks	Internal Assessment	Total Marks
1.	Long Essay Question	2	1	1 x 10	10	10	50
2.	Short Essay Question	5	3	2 x 5	10		
3.	Short Answers	5	5	5 x 2	10		

Practical Examination-Semester II

Major Practical

Topics	No. Of Questions	Number of Question and Marks	Total
Quantitative analysis of Glucose/Urea/ creatinine /Estimation of urine creatinine	1	1 x 20	20 Marks

Minor Practical

Topics	No. Of Questions	Number of Question and Marks	Total
Analysis of biochemically important substances	1	1 x 20	20 Marks

Practical	40 Marks
IA Marks:	10 Marks
Grand Total	**50 Marks**

Suggested Readings:

Sl. No.	Name of the Books & Title	Author	Publisher's Name, Place of Publication
1	Clinical Chemistry	VARLEY	William Heinemann Medical Books Ltd & Inter Science Book. Inc. New York.
2.	Clinical Chemistry	TEITZ	W.B. Saunders Company Harcourt(India) Private Limited New Delhi-110048.

3.	Clinical Chemistry	KAPLAN	The C.V.Mosby Company, St. Louis Washington, D.C. Toronto.
4.	Text Book of Medical Biochemistry	RAMKRISHAN (S), PRASANNA (KG), RAJAN (R),	Orient Langman, Bombay
5.	Test Book of Bio Chemistry for Medical Students	VASUDEVAN(DM), & SREE KUMARI (S)	Jaypee Brothers, New Delhi.
6.	Biochemistry	U. Satyanarayan	Books and Allied (P) Ltd. Kolkata-700009 (India)
7.	Biochemistry	DAS (Debajyothi)	Academic Publishers Calcutta.

PAPER 3: CRCT09
Section A - Haematology & Clinical Pathology
Theory : 25 Hours

Hematology

1. Bone marrow
   a. Techniques of aspiration, preparation and staining of films
   b. Bone marrow biopsy
2. Preparation of buffy coat smears
3. Laboratory tests used in the investigation of anemia's
   a. B 12 and folic acid: Normal values, derangements and interpretation of results.
   b. Schilling test - Method and interpretation
   c. Serum iron, iron binding capacity, Ferritin, Transferrin saturation: Normal values, derangements and interpretation of results
4. Laboratory test used in investigation of hemolytic anemia's
   a. Osmotic fragility
   b. Investigation of G-6 PD deficiency
   c. Test for sickling
   d. Estimation on of Hb-F, Hb-A2
   e. Plasma haemoglobin and Haptoglobin, demonstration of haemosiderin in urine
   f. Haemoglobin electrophoresis
   g. Coomb's test (Direct & Indirect) - Test for auto immune hemolytic Anaemias.

Clinical Pathology

1. Urine examination
   Physical, Chemical & Microscopic
2. Semen analysis

Scheme of Examination

Type of questions and distribution of marks for Theory examination in each subject in Second Semester.

(Section A - Pathology - 50 marks + Section B - Microbiology - 50 marks)

No.	Question asked	Questions asked	Questions to attempt	Marks	Max. marks	IA	Viva	Total marks
1.	Long Essay Question	2	1	1x10	10	10	10	50
2.	Short Essay Question	3	2	2 x 5	10			
3.	Short Answers	5	5	5 x 2	10			

Suggested Readings:

Reference books (Latest Edition)

Sl. No.	Name of Book & title	Author	Publisher, Name, Place of publication
1	Practical Pathology	P. Chakraborty Gargi Chakraborty	New Central Book Agency, Kolkotta
2.	Text Book of Haematology	Dr. Tejinder Singh	Arya Publications, Sirmour (H.P)
3.	Text Book of Medical Laboratory Technology	Praful Godkar	Bhalani Publication House, Mumbai
4.	Practical Haematology	Sir John Dacie	Churchill Livingstone, London
5.	Todd & Sanford, Clinical Diagnosis & Management by Laboratory Methods	John Bernard Henry	All India Travellar Booksellar, Delhi.
6.	Practical Pathology	Dr. Ganga S. Pilli	Prabhu Publications, Dharwad.
7.	Hematology Blood Banking & Transfusion (PB)	Dutta B. A.	CBS Publishers & Distributors Pvt. Ltd.
8.	Blood Transfusion in Clinical Practice (HB)	Kochhar P. K.	CBS Publishers & Distributors Pvt. Ltd.
9.	Transfusion Medicine, 3e (PB)	Mc Cullough	CBS Publishers & Distributors Pvt. Ltd.
10.	Practical Transfusion Medicine,4e (HB)	Murphy	CBS Publishers & Distributors Pvt. Ltd.

PRACTICAL 3: CRCT12

Section A: Pathology

Practical 35 Hours

I. HAEMATOLOGY

- Sickling test-Demonstration
- Bone Marrow Smear preparation & staining procedure- Demonstration
- Demonstration of Malarial Parasite.
- Blood grouping.

II. CLINICAL PATHOLOGY

- Visit to pathology laboratory – Postings in batches - 15 days for 2 hours
- Urine examination
  - Physical
  - Chemical – Reducing substances ketone bodies, proteins and blood
  - Microscopy
  - Dipstick method – Demonstration
  - Semen Analysis Demonstration

Practical Assessment

Scheme of Practical Examination for Second Semester.

(Section A Pathology 50 Marks + Section B Microbiology -50 Marks)

Pathology Practicals **I. Major** a. Urine Examination	10 marks	**30 marks**
b. Urine Microscopy c. Blood Grouping	10 marks 10 marks	
II. Minor a. Spotters	10 marks IA	**10 marks** **10 marks**
	Total	**50 marks**

Sr. No.	Practical	Practical	IA	Grand Total
1	Practical A	40 (Major 30 + Minor10)	10	50
2	Section B	40 (Major 30 + Minor10)	10	50

PAPER 3: CRCT09

Section B – Microbiology

Theory 25 Hours

- Culture media and different methods of cultivation.
- **Immunology**– Introduction, Specific and non-specific immunity, Antigens, Antibodies – Structure and function, Complement and antigen-antibody reaction.

Scheme of Examination

Theory 40 Marks **Duration 90 minutes**

No.	Question asked	Questions to attempt	Questions	Marks	Max. marks	Internal assessment	Viva	Total marks
1.	Long Essay Question	2	1	1x10	10	10	10	50
2.	Short Essay Question	3	2	2 x 5	10			
3.	Short Answers	5	5	5 x 2	10			

Suggested Readings:

1) Ananthanarayan and Paniker'sTestbook of Microbiology. Tenth Edition. Reba Kanungo
2) Textbook of Microbiology for MLT. Second Edition.Dr.C.P.Baveja.

PRACTICAL 3: CRCT12

Section B - Microbiology **Practicals 25 Hours**

- Biomedical waste management
- Collection of various clinical specimens.
- Serological tests
- Un-inoculated culture media and culture techniques.

Practical Exam Pattern

Major :		**-25 marks**
• Biomedical waste management	-	10 marks
• Serological tests/Inoculation techniques		-15 marks
Minor :		**-15 marks**
Spotters		15 marks
IA		**-10 marks**
	Total	**-50 marks**

COMPUTER SKILLS
ELS02

Fundamentals of Computers-I

1. **Introduction to computer:** introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.

a. **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)

b. **Processor and memory:** The Central Processing Unit (CPU) and main memory.

c. **Storage Devices:** sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.

2. **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, spellchecking, printing the document file, creating and editing of table and mail merge.
3. **Introduction to Excel:** introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
4. **Introduction to power-point:** introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
5. **Introduction of Operating System:** introduction, operating system concepts, types of operating system

a. **Introduction to MS-DOS:** History of DOS, features of MS-DOS, MS-DOS Commands (internal and external).

b. **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. **Computer networks:** introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
7. **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.
8. **Application of Computer in various fields:** Medical, Education, Railway, Defense, Industry, Management, Sports, Commerce, Internet.
9. ***Introduction to installation of different software and introduction about different software related to MLS.***

Practicals:

Learning to use MS Office: MS WORD, MS EXCEL & MS PowerPoint and Internet

THIRD SEMESTER

Semester III

S.No	Subject code	Course	Hours			Credits
			L	P	Total	
1	**CRCT13**	Applied Anatomy and Physiology related to Critical Care	2	2		3
2	**CRCT14**	**Applied Pharmacology in Critical Care**	2	2		3
3	**CRCT15**	Applied Microbiology And Infection Control	2	2		3
4	**ELS03**	Environmental Studies	1			1
		Clinical Posting	18			09
	Total					19

Sr. No.	Subject Code	Theory	Subjects	Theory + IA +Viva Voce	Total
1	**CRCT13**	Paper 1	Applied Anatomy and Physiology related to Critical Care	60 + 20 + 20	100
2	**CRCT14**	Paper 2	Applied Pharmacology in Critical Care	60 + 20 + 20	100
3	**CRCT15**	Paper 3	Applied Microbiology And Infection Control	60 + 20 + 20	100
4	**ELS02**	Paper 4 Subsidiary	**Environmental Studies**	80 + 20	100
Grand Total					**400**

Sr. No.	Practical	Subjects	Practical + IA	Total
5	Practical 1	Applied Anatomy and Physiology related to Critical Care	80 + 20	100
6	Practical 2	Applied Pharmacology in Critical Care	80 + 20	100
7	Practical 3	Applied Microbiology And Infection Control	80 + 20	100
Grand Total				**300**

SEMESTER III

PAPER 1: CRCT13
Theory 30 Hours

Applied Anatomy and Physiology related to Critical Care

Applied Anatomy related to critical care paper1

I RESPIRATORY SYSTEM

• Introduction

• Medical Terminology

• Anatomical terms, planes, relations

o Anatomy of the upper respiratory tract

• Nose, oral cavity

• Pharynx, Larynx

o Anatomy of thoracic cage bones, muscles, innervation

o Anatomy of the lungs - overview

o Pleura, lobes of lung, bronchi, trachea, hilum, bronchial tree

o Alveolus, Broncnioles,

o Blood supply,

o Lymphatics

o Innervation

II CARDIOVASCULAR SYSTEM

• Overview of CVS

• Anatomy of heart - Pericardium, myocardium, endocardium, valves,

• Anatomy of Vascular system - Major Vessf;!ls, Arteries, Veins, Capillaries

• Regional Circulation - coronary, cerebral, splanchnic

III CENTRAL NERVOUS SYSTEM

• Basic organisation of the nervous system - Central, Peripheral, Autonomic

• Cerebral blood flow

• Pain pathway

Applied physiology related to critical care

I. RESPIRATORY SYSTEM

• Physiology of breathing

• Homeostasis

• Mechanics of Breathing, Muscle action

• Regulation of breathing

• Lung Volumes & Capacity

• Gas exchange & transport- oxygen, carbon dioxide

- Diffusion
- O_2 Transport and abnormalities
- CO_2 Transport and abnormalities

• Pressure,Volume
• Resistance, Compliance
• Ventilation and Perfusion, V/Q ratio
• Gas exchange, mechanism of diffusion
• Work of breathing
• Transport of O_2 and CO_2; factors affecting oxygen transport
• Acid - base balance
• Pulmonary Function Tests
• Arterial Blood Gas
• Types of respiratory failure - causes and treatment

II CARDIOVASCULAR SYSTEM
• Cardiac cycle
• Cardiac output - factors affecting cardiac output
• Cardiac conducting system
• Regulation of rate, basic arrhythmias
• Principles of ECG, Normal ECG
• Blood pressure
• Maintenance of normal blood pressure and factors affecting it
• systolic, diastolic, pulse pressure, mean
• Oxygen delivery, uptake to tissues
• Central venous pressure
• Cardiac output, Stroke volume contractility
• Preload, after load
• Interpretation of common haemodynamic parameters.
• Assessment of hemodynamic parameters
• Recognise the following regarding arterial cannulation
• Indications
• Cannulation sites
• Possible complications
• Normal pressures and their significance
• Pressure wave forms
• Significance of respiratory variation in the pressure wave forms

CVP Monitoring

• Indications

• Factors affecting measurement

• Insertion sites

• Types of catheters

• Correct technique of pressure measurement.

III CENTRAL NERVOUS SYSTEM

• Metabolic requirements of the brain

• Consciousness, Coma, Brain injury

• Sedation

• Brain Death

SCHEME OF EXAMINATION –
Semester III

Theory Total- 100 Marks **Duration: 3 Hour**

Sl. No	Question	Question Asked	Question to Attempt	Marks	Maximum Marks	Theory Total	Viva	Internal Assessment	Total Marks
1.	Long Essay Question	3	2	2 x 10	20	60	20	20	100
2	Short Essay Question	6	5	6X5	25				
3.	Short Answers	5	5	5 x 3	15				

Practical Examination-Semester III

Major Practical

Topics	No. Of Questions	Number of Question and Marks	Total
X ray, graphs ,ECG	4	4 x 20	80 Marks

Minor Practical

Topics	No. Of Questions	Number of Question and Marks	Total
Spotters		4X10	40 Marks

Practical 80 Marks

	I A Marks	20Marks
	Grand Total	**150 Marks**

Recommended Books:

1. Critical Care Physiology Robert H Bartlett
2. Applied Physiology in Critical Care Physiology Michael R.Pinsky

Reference books:

1. Textbook of Medical Physiology , AC Guyton, JE Hall
2. Ganong's review of Medical Physiology

Online Reference

1. WWW.derangedphysiology.com
2. WWW.emcrit.org

PAPER 2:CRCT14
Theory 30 Hours

Applied Pharmacology in critical care:

- Drugs - Nomenclature
- Modes of action of drugs
- Routes of administration
- Drug dose calculation - Dilution, infusion rate

Medical gases: O2 ; N20

- Bronchodilators
- Mucokinetic agents
- Antihistamines
- Steroids

- Drugs affecting autonomic nervous system
- Inotropic agents, Chronotropic agents,
- Vasopressors & Vasodilators
- Anti-hypertensives
- Analgesics; sedatives
- neuromuscular blocking agents
- Antimicrobial drugs, antiviral and anti-fungal agents - basic concepts Antimicrobial Resistance - Basic concepts
- Antiseptic and disinfectants agents

Theory Total- 100 Marks **Duration: 3 Hour**

Sl. No	Question	Question Asked	Question to Attempt	Marks	Maximum Marks	Theory Total	Viva	Internal Assessment	Total Marks
1.	Long Essay Question	3	2	2 x 10	20	60	20	20	100
2	Short Essay Question	6	5	5X5	25				
3.	Short Answers	5	5	5 x 3	15				

Practical Examination-Semester III

Major Practical

Topics	No. Of Questions	Number of Question and Marks	Total
Drug preparation	2	2 x 20	40 Marks

Minor Practical

Topics	No. Of Questions	Number of Question and Marks	Total
Spotters		4x 10	40 Marks

Practical	80Marks
I A Marks	20Marks
Grand Total	**100 Marks**

Recommended Books:

1. Textbook of Microbiology Anatanarayanan and Paniker
2. Essentials of Medical Pharmacology KD.Tripathi

Reference books:

1. Infectious Diseases in Critical Care Medicine, Burke A Cunha
2. Textbook of Critical Care, Jean Louis Vincent, Edward Abraham

Online Reference

1. WWW.derangedphysiology.com
2. WWW.intensivecarenetwork.com

PAPER 3:CRCT15
Theory 30 Hours
APPLIED MICROBIOLOGY AND INFECTION CONTROL

INTRODUCTION - Importance of infection in an ICU

Agents causing Infection

SPREAD OF INFECTION Source; host; transmission

Biohazardous materials

INFECTION CONTROL & UNIVERSAL PRECAUTIONS

- Sterilisation & Disinfection - concepts
- Methods of sterilization
- Spread of infection
- Elimination of source - Cleaning and sterilizing equipment
- Interrupting transmission of infection - role of health care workers
- Disposal of infection wastes
- Surveillance; quality control

SPECIFIC INFECTIONS

Community acquired infections

Nosocomial Infections: Types - Prevention.

HIV-AIDS .

Hepatitis A. B, C

Tropical Infections -Tetanus, Malaria, Leptospirosis, Dengue, Rickettsial, Amoebiasis

SCHEME OF EXAMINATION –
Semester III

Theory Total- 100 Marks **Duration: 3 Hour**

Sl. No	Question	Question Asked	Question to Attempt	Marks	Maximum Marks	Theory Total	Viva	Internal Assessment	Total Marks
1.	Long Essay Question	3	2	2 x 10	20	60	20	20	100
2	Short Essay Question	6	5	5X5	25				
3.	Short Answers	5	5	5 x 3	15				

Practical Examination-Semester III

Major Practical

Topics	No. Of Questions	Number of Question and Marks	Total
microbiology reposts	2	2 x 20	40 Marks

Minor Practical

Topics	No. Of Questions	Number of Question and Marks	Total
Spotters & Interpretation of lab reports		4 x 10	40 Marks

Practical	80 Marks
I A Marks	20Marks
Grand Total	**100 Marks**

Recommended Books:

1. Textbook of Microbiology Anatanarayanan and Paniker
2. Essentials of Medical Pharmacology KD.Tripathi

Reference books:

1. Infectious Diseases in Critical Care Medicine ,Burke A Cunha
2. Textbook of Critical Care ,Jean Louis Vincent , Edward Abraham

Online Reference

1.WWW.derangedphysiology.com
2.WWW.intensivecarenetwork.com

ELS03
ENVIRONMENTAL STUDIES

GOAL:

The students should gain knowledge to understand the multidisciplinary nature of the environment and the awareness of the eco system, which maintains the natural environment.

OBJECTIVES:

a) **KNOWLEDGE**

At the end of the 3rd semester course the student is expected to know:

1. The natural resources like forest, water, mineral, food, energy and land.
2. Functions of the eco system.
3. Bio-diversity and its conservation.
4. Environmental pollution & its prevention.
5. Social issues.

b) **SKILLS**

At the end of the 3rd semester course the student is expected to:

1. Visit local areas to understand and document environmental assets like river, forest, grassland, hill and mountain.
2. Visit an industrial area or agricultural area to know about local pollutants.
3. Identify common plants, insects and birds in their local areas.
4. Identify rivers, hills and mountains in their local areas.
5. To make use of the knowledge to protect natural resources.

COURSE CONTENTS

Theory and Field work: 50 Hours

- **Theory - 45 hours**
- **Field work - 5 hours**

1: Multi-disciplinary nature of environmental studies

Definition, scope and importance, need for public awareness. **2 hours**

2: Natural Resources:

Renewable and non-renewable resources:

Natural resources and associated problems.

a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

g) Role of an individual in conservation of natural resources.

h) Equitable use of resources for sustainable lifestyles **8 hours**

3: Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystems:-

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **6 hours**

4: Biodiversity and its conservation **8 hours**

- Introduction - Definition: genetic, species and ecosystem diversity.
- Bio geographical classification of India.
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation.
- Hot-sports of biodiversity.
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

5: Environmental Pollution **8 hours**

Definition

- Cause, effects and control measures of:-

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster management: floods, earthquake, cyclone and landslides.

6: Social Issues and the Environment **7 hours**

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case Studies
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and control of Pollution) Act.
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.

7: Human Population and the Environment **6 hours**

- Population growth, variation among nations.
- Population explosion - Family Welfare Programme.
- Environment and human health.
- Human Rights.
- Value Education.
- HIV/AIDS
- Women and Child Welfare.
- Role of Information Technology in Environment and human health.
- Case Studies.

8: Field work

- Visit to a local area to document environmental assets river/forest/grassland/hill/mountain
- Visit to a local polluted site - Urban / Rural/ Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours)

SCHEME OF EXAMINATION

A. Theory : 80 Marks

- **Long Essay** **2 X 10 = 20**
- **Short Essay** **8 X 5 = 40**
- **Short Answers** **5 X 4 = 20**

B. Field Work: 20 Marks

Recommended Books:

Sl. No.	Title	Author	Edition & Year	Publisher
1	Environmental Biology	Agarwal, K.C.	2001	Nidi Publication Ltd. Bikaner
2	The Biodiversity of India	Bharucha Erach		Mapin Publishing Pvt. Ltd., Ahmedabad - 380 013
3	Environmental Encyclopedia	Cunningham W.P., Copper T.H., Gorhani E. & Hepworth M.T.	2001	Jaico Publication House, Mumbai.
4	Global Biodiversity Assessment	Heywood V. H. & Waston R.T.	1995	Cambridge University Press 1140p
5	Environmental Protection and Laws	Jadhav H. & Bhosale V. M.	1995	Himalaya Publishing House, Delhi 284p
6	Environmental Science Systems & Solutions	Mckinney M. L. & School R.M.	1996	

FOURTH SEMESTER

Sr. No.	Subject Code	Theory	Subjects	Theory + IA +Viva Voce	Total
1	**CRCT16**	Paper 1	Basics Of Intensive Care Technology Part 1	60 + 20 + 20	100
2	**CRCT17**	Paper 2	Basics Of Intensive Care Technology Part 2	60 + 20 + 20	100
3	**CRCT18**	Paper 3	Basics Of Intensive Care Technology Part 3	60 + 20 + 20	100
4	**ELS02**	Paper 4 Subsidiary	**Law- Indian Constitution**	80 + 20	100
Grand Total					**400**

Sr. No.	Practical	Subjects	Practical + IA	Total
5	Practical 1	Basics Of Intensive Care Technology Part 1	80 + 20	100
6	Practical 2	Basics Of Intensive Care Technology Part 2	80 + 20	100
7	Practical 3	Basics Of Intensive Care Technology Part 3	80 + 20	100
Grand Total				**300**

PAPER 1:CRCT16
Theory 30 Hours
BASICS OF INTENSIVE CARE TECHNOLOGY PART 1

Airway Care
INDICA TIONS FOR ARTIFICIAL AIRWA YS
- Relieving airway obstruction
- Secretion removal
- Protecting the airway
- Positive Pressure Ventilation

SELECTING AND ESTABLISHING AN ARTIFICIAL AIRWA Y
- Nasal airways
- Pharyngeal airways
- Tracheal airways

AIRWAY CLEARANCE TECHNIQUES
- Airway suctioning
- Bronchoscopy

AIRWA Y MAINTENANCE
- Securing the airway and confirming placement
- Providing adequate humidification
- Minimizing nosocomial infections
- Providing cuff care
- Facilitating clearance of secretions
- Troubleshooting airway emergencies

EXTUBATION
- Indications
- Procedure
- Post extubation care & complications

Oxygen Therapy
- Sources of oxygen for therapy
- Storage of oxygen
- Oxygen delivery systems
- Hazards of oxygen
- Modes of O2 therapy B.Sc. Intensive Care Technology Page 43 of 55
- Monitoring O2 delivery systems (in vitro)

Blood gases in patient (in vitro.)
- Pulse oximetry
- Economic issues

CHEST XRAY and BASIC CONCEPTS IN CT
NORMAL CHEST X-RA Y
- Normal anatomy
- Basic physics of X-ray and assessment of film quality

- Cardiac configuration .
- Lung fields and airway
- Optimum position of - ET, NG, Central Lines

ABNORMAL CXR /CT:

- Trauma:
- Pneumothorax
- Hemothorax
- Lung contusion
- Pulmonary oedema
-CCF
-ARDS
- Pneumonia: - Bronchopneumonia
- Lobar pneumonia
- Aspiration pneumonia

Fundamentals of Electricity and Electronics:

Resistance: Symbol, units, colour coding equivalent resistance with 'connection in series and parallel.

Capacitance: Symbol, units, series and parallel connection

Inductance and transformers

Parameters of electricity power - voltage, current frequency, power.

Differences between AC and DC - .

AC and DC power supplies, Phase, neutral and earth - conventional colour coding

Ohms law and Kirchoff's law Electrical Circuits.

Earth and grounding - Symbol, importance in patient care.

AC and DC power supplies- Phase, neutral and earth - conventional colour coding

Classification of medical equipment

1. According to type of protection: B C F etc
2. According to mode of protection: Class I -III.

Semester IV

Theory Total- 100 Marks **Duration: 3 Hour**

Sl. No	Question	Question Asked	Question to Attempt	Marks	Maximum Marks	Theory Total	Viva	Internal Assessment	Total Marks
1.	Long Essay Question	3	2	2 x 10	20	60	20	20	100
2	Short Essay Question	6	5	5X5	25				
3.	Short Answers	5	5	5 x 3	15				

Practical Examination-Semester IV

Major Practical

Topics	No. Of Questions	Number of Question and Marks	Total
SPOTTERS	2	2 x 20	40 Marks

Minor Practical

Topics	No. Of Questions	Number of Question and Marks	Total
SPOTTERS		4 x 10	40 Marks

Practical	80 Marks
I A Marks	20Marks
Grand Total	**100 Marks**

Recommended Books:

1. The ICU book ,Paul Marino
2. ICU Protocols A Stepwise approach ,Rajesh Chawla and Subash Todi
3. Washington manual of critical care

Reference books:

1. Irwin and Rippe's intensive care medicine
2. Textbook of Critical Care ,Jean Louis Vincent , Edward Abraham

Online Reference

1. lifeinthefastlane.com
2. criticalcarereviews.com

PAPER 2: CRCT17
Theory 30 Hours
BASICS OF INTENSIVE CARE TECHNOLOGY PART 2

Clinical Scenarios

RESPIRATORY SYSTEM

- Respiratory Failure
- Acute Respiratory Distress Syndrome
- Pneumonia, Tuberculosis
- Opportunistic infections
- Bronchial asthma
- Chronic obstructive airways disease
- Chronic bronchitis
- Emphysema
- Chronic Suppurative Lung Disease Bronchiectasis
- Lung Abscess

• Atelectasis I Collapse
• Pleural diseases: pneumothorax, pleural effusions
CARDIOVASCULAR SYSTEM
• Shock - hypovolemic, cardiogeniq, obstructive, septic
• Congestive cardiac failure; Acute-left ventricle failure
• Pulmonary oedema
• Pulmonary hypertension
• Pulmonary embolism
• Ischemic heart disease; Myocardial infarction

SCHEME OF EXAMINATION – SemesterIV

Theory Total- 100 Marks **Duration: 3 Hour**

Sl. No	Question	Question Asked	Question to Attempt	Marks	Maximum Marks	Theory Total	Viva	Internal Assessment	Total Marks
1.	Long Essay Question	3	2	2 x 10	20	60	20	20	100
2	Short Essay Question	6	5	5X5	25				
3.	Short Answers	5	5	5 x 3	15				

Practical Examination-Semester IV

Major Practical

Topics	No. Of Questions	Number of Question and Marks	Total
CASE SCENARIO	2	2 x 20	40 Marks

Minor Practical

Topics	No. Of Questions	Number of Question and Marks	Total
SHORT CASE SCENARIO		4x 10	40 Marks

Practical	80 Marks
I A Marks	20Marks
Grand Total	**100 Marks**

Recommended Books:

1. The ICU book ,Paul Marino
2.ICU Protocols A Stepwise approach ,Rajesh Chawla and Subash Todi

3. Washington manual of critical care

Reference books:

1. Irwin and Rippe's intensive care medicine
2. Textbook of Critical Care ,Jean Louis Vincent , Edward Abraham

Online Reference

1. lifeinthefastlane.com
2. criticalcarereviews.com

PAPER 3:CRCT18

Theory 30 Hours

BASICS OF INTENSIVE CARE TECHNOLOGY PART 3

NERVOUS SYSTEM:

• Cerbrovascular Disease
• Neurological Failure:
• Coma
• Delirium
• Neuromuscular disease
• Myasthenia gravis
• Guillain Barre Syndrome
• Cerebrovasular disease, stroke
• Brain Death
• Persistent Vegetative State
• Trauma
• Head injury
• Unstable spine & protection

GASTROINTESTINAL, HEPATIC, PANCREAS:

• Upper GI Bleed
• Hepatic Coma
• Pancreatitis

RENAL:

Renal Failure in ICU

ENDOCRINE & METABOLIC:

• Hypoglycemia
• Hyperglycemia

HAEMATOlOGY:

• Haemaological Malignancies
• Neutrapenia
• Coagulopathy
•

MISCEllANEOUS:

• Envenomation - snake bite, scorpion sting
• Poisoning - general supportive care, common poisons

SCHEME OF EXAMINATION –
SemesterIV

Theory Total- 100 Marks **Duration: 3 Hour**

Sl. No	Question	Question Asked	Question to Attempt	Marks	Maximum Marks	Theory Total	Viva	Internal Assessment	Total Marks
1.	Long Essay Question	3	2	2 x 10	20	60	20	20	100
2	Short Essay Question	6	5	5X5	25				
3.	Short Answers	5	5	5 x 3	15				

Practical Examination-Semester IV

Major Practical

Topics	No. Of Questions	Number of Question and Marks	Total
CASE SCENARIO	2	2 x 20	40 Marks

Minor Practical

Topics	No. Of Questions	Number of Question and Marks	Total
SHORT CASE SCENARIO		4 x 10	40 Marks

Practical	80 Marks
I A Marks	20Marks
Grand Total	**100 Marks**

Recommended Books:

1. The ICU book ,Paul Marino
2. ICU Protocols A Stepwise approach ,Rajesh Chawla and Subash Todi
3. Washington manual of critical care

Reference books:

1. Irwin and Rippe's intensive care medicine
2. Textbook of Critical Care ,Jean Louis Vincent , Edward Abraham

Online Reference

1. lifeinthefastlane.com
2. criticalcarereviews.com

ELS04
LAW - INDIAN CONSTITUTION

I. GOAL :

The students should gain the knowledge and insight into the Indian Constitution so that they are aware of the fundamental rights and freedom bestowed through the democratic governance of our country.

II. OBJECTIVES :

A) KNOWLEDGE :

At the end of the B.Sc. 4th Semester the student is expected to know:

1) Basic knowledge of the Indian Constitution.
2) Democratic institutions created by the Constitution.
3) Special rights created by the Constitution for regional and linguistic minorities.
4) Election Commission.
5) Legislative, Executive and Judicial powers and their functions in India.

B) SKILLS:

At the end of the B.Sc. 4th Semester the student is expected to make use of knowledge:

1) To perform his / her duties towards the society judiciously and with conscious effort for self-development.
2) To utilize State policies in their future practice.

COURSE CONTENTS

Theory: **25 Hours**

Unit I a) Meaning of term Constitution.

b) Making of the Indian Constitution - 1946 - 1949 and role played by Dr. B. R. Ambedkar.

c) Salient Features of the Constitution.

d) Preamble of the Constitution. **2 Hours**

Unit II The democratic institutions created by the Constitution.
Bicameral System of Legislature at the Centre and in the States.
Devolution of Powers to Panchayat Raj Institutions. **5 Hours**

Unit III Fundamental Rights and Duties - Their content and significance **5 Hours**

Unit IV Directive Principles of State policies - The need to balance Fundamental Rights with Directive Principles. **1 Hour**

Unit V Special rights created in the constitution for Dalits, Backward class, Women and Children, and the Religious and

	Linguistic Minorities	**1 Hour**
Unit VI	Doctrine of Separation of Powers - Legislative, Executive and Judicial, and their functions in India.	**4 Hours**
Unit VII	The Election Commission and State Public Service Commissions.	**2 Hours**
Unit VIII	Method of amending the Constitution.	**1 Hours**
Unit IX	Enforcing rights through Writs Certiorari, Mandamus, Quo warranto and Hebeas Corpus.	**2 Hours**
Unit X	Constitution and Sustainable Development in India.	**2 Hours**

Reference: 1. Durga Das Basu, Introduction to the Constitution of India, Gurgaon; LexisNexis, 2018 (23rd edn.)
2. M.V.Pylee, India's Constitution, New Delhi; S. Chand Pub., 2017 (16th edn.)
3. J.N. Pandey, The Constitutional Law of India, Allahabad; Central Law Agency, 2018 (55th edn.)
4. Constitution of India (Full Text), India.gov.in., National Portal of India, https://www.india.gov.in/sites/upload_files/npi/files/coi_part_full.pdf
5. Durga Das Basu, Bharatada Samvidhana Parichaya, Gurgaon; LexisNexis Butterworths Wadhwa, 2015 6. Kb Merunandan, Bharatada Samvidhana Ondu Parichaya, Bangalore, Meragu Publications, 2015

Scheme of Examination

University Theory Examination at the end of fourth Semster:100 Marks

Reference Books Latest Edition :

Sl. No.	Title	Author	Publisher
1	The Constution of – A Politico – Legal Study	J C. Jbhari	Sterling Publication Pvt. Ltd.
2	Constitution Law	J N. Pandey	Central Law Agency
3	The Indian Constitution	Granville Austin	Corner Stone of Nation

FIFTH SEMESTER

SEMISTER V

Sr. No.	Subject Code	Theory	Subjects	Theory + IA +Viva Voce	Total
1	**CRCT19**	Paper 1	Intensive Care Technology-Clinical	60 + 20 + 20	100
2	**CRCT20**	Paper 2	Intensive Care Technology-Applied(1)	60 + 20 + 20	100
3	**CRCT21**	Paper 3	Intensive Care Technology-Applied (2)	60 + 20 + 20	100
4	**ELS02**	Paper 4 Subsidiary	**Biomedical waste Management**	80 + 20	100
Grand Total					**400**

Sr. No.	Practical	Subjects	Practical + IA	Total
5	Practical 1	Intensive Care Technology- Clinical	80 + 20	100
6	Practical 2	Intensive Care Technology- Applied(1)	80 + 20	100
7	Practical 3	Intensive Care Technology- Applied (2)	80 + 20	100
Grand Total				**300**

PAPER 1:CRCT19
Theory 30 Hours
INTENSIVE CARE TECHNOLOGY- CLINICAL

1. ARTERIAL BLOOD GASES
- Procedure, puncture sites
- Sampling techniques
- Using an ABG machine,
- Different types of ABG machines - advantages and disadvantages, cost considerations
- Transportation of sample
- Interpretation of values
- Appropriate Interventions

2. MECHANICAL VENTILATION - NON INVASIVE AND INVASIVE
- Basic concepts: - Mechanics of ventilation
- Work of breathing
- Indications
- Humidification of gas
- Ventilator settings
- Timings -Inspiratory, Expiratory, Inspiratory hold
- Flow
- Tidal volume
- Pressure - Peak
- Plateau
- PEEP
- "POP-OFF"
- Pressure support
- Proximal airway vs. distal
- Fi02
- Modes of ventilation

Non Invasive, CPAP, BiPAP
Invasive modes - Controlled, Assisted, SIMV, APRV, Pressure Support
- Alarm settings
- Care of ventilator & tubings- -Sterility
- Weaning – concepts
- Humidifier - types
- Advantages and disadvantages
- Inhaled drug therapy
- Nebulisation - different types, advantages & disadvantages
- MDI with Spacer

3. CARE OF PATIENTS ON VENTILATOR
- Ensuring proper placement of tube

- Cuff pressure,
- Tracheobronchial hygiene, suctioning
- Humidification, Chest physic
- Ventilator settings
- Monitoring vetilatory parameters

4. CARE OF CHEST TUBE

Drainage systems of pleural air, fluid

Theory Total- 100 Marks **Duration: 3 Hour**

Sl. No	Question	Question Asked	Question to Attempt	Marks	Maximum Marks	Theory Total	Viva	Internal Assessment	Total Marks
1.	Long Essay Question	3	2	2 x 10	20	60	20	20	100
2	Short Essay Question	6	5	6X5	25				
3.	Short Answers	5	5	5 x 3	15				

Practical Examination-Semester vI

Major Practical

Topics	No. Of Questions	Number of Question and Marks	Total
TROUBLESHOOTING	2	2 x 20	40 Marks

Minor Practical

Topics	No. Of Questions	Number of Question and Marks	Total
SPOTTERS		4 x 10	40 Marks

Practical	80 Marks
I A Marks	20Marks
Grand Total	**100 Marks**

Recommended Books:

1. The ICU book ,Paul Marino
2. ICU Protocols A Stepwise approach ,Rajesh Chawla and Subash Todi
3. Washington manual of critical care

Reference books:

1. Irwin and Rippe's intensive care medicine
2.Textbook of Critical Care ,Jean Louis Vincent , Edward Abraham
3. mechanical ventilation by David Chang

Online Reference

1.lifeinthefastlane.com
2.criticalcarereviews.com

PAPER 2 : CRCT20

Theory 30 Hours

INTENSIVE CARE TECHNOLOGY- APPLIED (I) CARDIOVASCULAR SUPPORT:

A. Assisting in .
1. Arterial and central venous cannulation
2. Peripheral venous cannulation
3. PiCCO I Pulmonary artery catheter insertion - measuring cardiac output by thermodulation
4. Pericardiocentesis
5. Transvenous pacemaker
6. Basic ultrasonography

B. Placement of ECG leads taking 12-lead dynamic ECG.
C. Use of infusion devices for vasoactive medications.
D. Assisting in electrical cardioversion and defibrillation. Placement of transcutaneous pacemaker.
E. Setting up invasive pressure monitoring - levelling, calibration, zeroing; measuring pressures
• MONITORING CARDIOVASCULAR SUPPORT:
Zeroing, calibration and trouble- shooting of pressure transducers.
Troubleshooting invasive blood pressure monitoring and central venous pres-sure monitoring' Setting up and troubleshooting invasive cardiacoutput monitoring - PiCCO, PA catheter ,
BASIC ULTRASONOGRAPHY
• INVASIVE PRESSURE MONITORING
- Arterial & venous
- Care & maintenance
- Transducers, dome, zeroing, calibration
• BASICS OF FLUID RESUSCITATION & INOTROPIC SUPPORT

Theory Total- 100 Marks **Duration: 3 Hour**

Sl. No	Question	Question Asked	Question to Attempt	Marks	Maximum Marks	Theory Total	Viva	Internal Assessment	Total Marks
1.	Long Essay Question	3	2	2 x 10	20	60	20	20	100
2	Short Essay Question	6	5	5X5	25				
3.	Short Answers	5	5	5 x 3	15				

Practical Examination-Semester V

Major Practical

Topics	No. Of Questions	Number of Question and Marks	Total
MONITORING, TROUBLESHOOTING	2	2 x 20	40 Marks

Minor Practical

Topics	No. Of Questions	Number of Question and Marks	Total
SPOTTERS	8	4 x 10	40 Marks

Practical	80 Marks
I A Marks	20Marks
Grand Total	**100 Marks**

Recommended Books:

1. The ICU book ,Paul Marino
2. ICU Protocols A Stepwise approach ,Rajesh Chawla and Subash Todi
3. Washington manual of critical care

Reference books:

1. Irwin and Rippe's intensive care medicine
2. Textbook of Critical Care ,Jean Louis Vincent , Edward Abraham
3. mechanical ventilation by David Chang

Online Reference

1. lifeinthefastlane.com
2. criticalcarereviews.com

PAPER 3: CRCT21

Theory 30 Hours

INTENSIVE CARE TECHNOLOGY- APPLIED (2)

RESPIRATORY SUPPORT:

1. Maintaining an open airway.
2. Assisting in

i. Tracheal intubation (oral, nasal)

ii. Cricothyrotomy, tracheostomy, trans tracheal catheters

iii. Mechanical ventilatory support

Monitoring airway pressures

iv. Topical use of respiratory medication (inhalers and nebulisers)

v. Suctioning: Chest physiotherapy and incentive spirometry.

vi. Weaning techniques.

vii. Assisting in fibroptic bronchoscopy.

viii. Oxygen therapy devices and their limitations

ix. Assisting in chest tube insertion and chest drainage systems

x. Bed side pulmonary function tests

xi. Arterial blood gas sampling; Using the ABG machine

xii. CPAP & BI PAP circuit

RESPIRATORY THERAPY:

Setting up & troubleshooting:

Oxygen administration

Non-invasive Ventilation - NIV on standard ventilator, BiPAP, CPAP

Invasive Ventilation

Setting up the ventilator

Oxygenation

Ventilation

Alarms

Trigger

Evaluate and trouble shoot the patient- ventilator system

Interpret ventilator graphic waveform

Detect and measure auto-peep

Monitoring of patients who are assisted by mechanical ventilation and are in sudden distress

MONITORING RESPIRATORY SUPPORT

Monitoring of patients who are assisted by mechanical ventilation and are in sudden distress

Recognise the methods and significance of measuring the following lung vol-umes and flows in the ICU.

a. Tidal volume

b. Vital capacity

c. Peak Flow Rate

d. Negative Inspiratory Pressure

e. Respiratory Graphics Analysis

7. RECOGNITION OF CARDIORESPIRATORY ARREST

8. BASIC LIFE SUPPORT (Hands on Training)

- Ventilation, Use of Ambu bag
- Cardiac massage

Theory Total- 100 Marks **Duration: 3 Hour**

Sl. No	Question	Question Asked	Question to Attempt	Marks	Maximum Marks	Theory Total	Viva	Internal Assessment	Total Marks
1.	Long Essay Question	3	2	2 x 10	20	60	20	20	100
2	Short Essay Question	6	5	5X5	25				
3.	Short Answers	5	5	5 x 3	15				

Practical Examination-Semester vI

Major Practical

Topics	No. Of Questions	Number of Question and Marks	Total
PROCEDURES	2	2 x 20	40 Marks

Minor Practical

Topics	No. Of Questions	Number of Question and Marks	Total
SPOTTERS		4 x 10	40 Marks

Practical	80 Marks
I A Marks	20Marks
Grand Total	**100 Marks**

Recommended Books:

1. The ICU book ,Paul Marino
2.ICU Protocols A Stepwise approach ,Rajesh Chawla and Subash Todi
3. Washington manual of critical care

Reference books:

1. Irwin and Rippe's intensive care medicine
2.Textbook of Critical Care ,Jean Louis Vincent , Edward Abraham
3. mechanical ventilation by David Chang

Online Reference

1.lifeinthefastlane.com
2.criticalcarereviews.com

Biomedical waste management
ELS05

15 hours

Programme

Creating awareness about the various aspects of biomedical waste and disposal practices among the health care providers

Skill

Segregation and safe disposal of biomedical waste

OBJECTIVES

1) List the various types of wastes generated in a hospital laboratory.

2) Define and classify biomedical waste

3) Explain the Biomedical waste management Rule

4) Definition of certain terms in health care waste

5) Mention the guidelines as per Karnataka pollution control board for biomedical waste management

6) List the steps involved in Bio-medical Waste Management.

7) Describe the various steps involved in biomedical waste collection.

8) List the guidelines for segregation of biomedical waste.

9) List the standards for treatment and disposal as per BMWM rule, 2016

10) Explain the segregation, treatment and disposal of waste depending on colour coding

11) State the methods for waste disposal depending on the type of waste.

12) Mention the responsibilities of healthcare workers(Who handle it and one who manage).

Unit I

a) Various types of biomedical wastes generated in a hospital laboratory.

b) Biomedical waste management Rule.

c) Terminologies in health care waste.

d) Bio-medical wastes-Definition and classification

Unit II

Guidelines as per Karnataka pollution control board for segregation of bio medical wastes.

Unit III

a) Steps involved in Bio-medical Waste Management.

b) Methods of waste disposal depending on the type of waste.

c) Guidelines for segregation of biomedical waste.

d) Steps involved in biomedical waste collection.

e) Treatment Option for Bio-medical Waste.

Unit IV

Segregation, treatment and disposal of

- Yellow
- Red
- White
- Blue

Unit V

a) BMWM rule, 2016- Standards for treatment and disposal

b) Mention the responsibility of healthcare facility worker

Unit VI

Hazards of Biomedical Waste to the stake holder

Patient: Nosocomial infections

Health care provider: Occupational hazard

Environment: Pollution and contamination

Field visit

1.To categories various types of biomedical waste based on colour coding.(3 hours)

2.Field Visit for segregation, treatment and disposal of waste.(3 hours)

3.Field visit for waste disposal depending upon the type of waste. (3 hours)

References

https://www.who.int/docstore/water_sanitation_health/wastemanag/ch19.htm

Hegde V, Kulkarni RD, Ajantha GS. Biomedical waste management. Journal of Oral and Maxillofacial Pathology. 2007 Jan 1;11(1):5.

Thareja P, Singh B, Singh S, Agrawal D, Kaur P. Biomedical waste management: need for human civilization. Indian Journal of Clinical Anatomy and Physiology. 2015 Apr;2(2):66-73.

SIXTH SEMESTER

Sr. No.	Subject Code	Theory	Subjects	Theory + IA +Viva Voce	Total
1	**CRCT22**	Paper 1	Intensive Care Technology-Advanced	60 + 20 + 20	100
2	**CRCT23**	Paper 2	CSSD Procedures	60 + 20 + 20	100
3	**CRCT24**	Paper 3	Procedures And Biomedical Waste Management In Intensive Care Unit	60 + 20 + 20	100
4	**ELS02**	Paper 4 Subsidiary	**Fundamentals of Electricity and Electronics:**	80 + 20	100
Grand Total					**400**

Sr. No.	Practical	Subjects	Practical + IA	Total
5	Practical 1	Intensive Care Technology- Advanced	80 + 20	100
6	Practical 2	CSSD Procedures	80 + 20	100
7	Practical 3	Procedures And Biomedical Waste Management In Intensive Care Unit	80 + 20	100
Grand Total				**300**

PAPER 1: CRCT22
Theory 30 Hours
INTENSIVE CARE TECHNOLOGY- ADVANCED

9. CONCEPTS IN ADVANCED LIFE SUPPORT

- Drugs

- Defibrillator

PROLONGED LIFE SUPPORT

- Concept of the "ICU" and team work

10. CARE OF THE UNCONSCIOUS PATIENT

• Comfort, orientation, pain control

• Skin integrity assessment and care

• Physiotherapy - Chest & Limbs

• Nutritional needs and supply

• Basic care of surgical wounds and fractures

• Psychological assessment and support in an ICU.

11. BASIC ADMINISTRATION:

Economic Issues .

Raising purchase orders for equipment

Maintaining consumables stock

Maintaining equipment - repair and troubleshooting

12. TRAUMA, BURNS, ENVIRONMENTAL INJURIES, PERIOPERATIVE CARE

SCHEME OF EXAMINATION – SemesterVI

Theory Total- 100 Marks **Duration: 3 Hour**

Sl. No	Question	Question Asked	Question to Attempt	Marks	Maximum Marks	Theory Total	Viva	Internal Assessment	Total Marks
1.	Long Essay Question	3	2	2 x 10	20	60	20	20	100
2	Short Essay Question	6	5	5X5	25				
3.	Short Answers	5	5	5 x 3	15				

Practical Examination-Semester VI

Major Practical

Topics	No. Of Questions	Number of Question and Marks	Total
CASE SCENARIO	2	2 x 20	40 Marks

Minor Practical

Topics	No. Of Questions	Number of Question and Marks	Total
SHORT CASE SCENARIO		4x 10	40 Marks
		Practical	80 Marks
		I A Marks	20Marks
		Grand Total	**100 Marks**

Recommended Books:

1. The ICU book ,Paul Marino
2.ICU Protocols A Stepwise approach ,Rajesh Chawla and Subash Todi
3. Washington manual of critical care

Reference books:

1. Irwin and Rippe's intensive care medicine
2.Textbook of Critical Care ,Jean Louis Vincent , Edward Abraham

Online Reference

1.lifeinthefastlane.com
2.criticalcarereviews.com

PAPER 2: CRCT23
Theory: 30 Hours
11.CSSD PROCEDURES

1. Waste disposal collection of used items from user area, reception protective clothing and disinfections sage gaurds,
2. use of disinfectionts sorting and classification of equipment for clean-ing purposes, sharps, blunt lighted etc. contaminated high risk baby care - delicate instruments or hot care instruments,
3. cleaning process - use of detergents. Mechanical cleaning apparatus, cleaning instruments, cleaning jars, receivers bowls etc. trays, basins and similar hand ware utensils. Cleaning of catheters and tubings, cleaning glass ware, cleaning syringes and needles.
4. Materials used for wrapping and packing assembling pack contents. Types of packs prepared. Inclusion of trays ahd galliparts in packs. Method of wrapping and making use of indications to show that a pack of container has been through a sterilization process date stamping.

5. General observations principles of sterilization. Moist heat sterilization. Dry heat sterilization. EO0gas sterilization. H202 gas plasma vapo sterilization.

12. BIOMEDICAL WASTE MANAGEMENT

13. MEDICAL ETHICS

1. Medical ethics - Definition - Goal - Scope
2. Code of conduct - Introduction –
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
8. Organ transplantation
9. Medico legal aspects of medical records - Medicolegal case and type- Rec-ords and document related to MLC - ownership of medical records - Confiden-tiality Privilege communication - Release of medical information - Unauthor-ized disclosure - rentention of medical records - other various aspects

SCHEME OF EXAMINATION –
SemesterVI

Theory Total- 100 Marks **Duration: 3 Hour**

Sl. No	Question	Question Asked	Question to Attempt	Marks	Maximum Marks	Theory Total	Viva	Internal Assessment	Total Marks
1.	Long Essay Question	3	2	2 x 10	20	60	20	20	100
2	Short Essay Question	6	5	5X5	25				
3.	Short Answers	5	5	5 x 3	15				

Practical Examination-Semester VI

Major Practical

Topics	No. Of Questions	Number of Question and Marks	Total
SPOTTERS	2	2 x 20	40 Marks

Minor Practical

Topics	No. Of Questions	Number of Question and Marks	Total
SPOTTERS		4 x 10	40 Marks

:	Practical	80 Marks
	I A Marks	20Marks
	Grand Total	**100 Marks**

Recommended Books

1. The ICU book, Paul Marino
2. ICU Protocols A Stepwise approach, Rajesh Chawla and Subash Todi
3. Washington manual of critical care

Reference books:

1. Irwin and Rippe's intensive care medicine
2. Textbook of Critical Care ,Jean Louis Vincent , Edward Abraham

Online Reference

1. lifeinthefastlane.com
2. criticalcarereviews.com

PAPER 3: CRCT24
Theory: 30 hours

PROCEDURES AND BIOMEDICAL WASTE MANAGEMENT IN INTENSIVE CARE UNIT

14, PROCEDURAL SKILLS

EMERGENCY LIFE SUPPORT:

Basic Life Support - Keeping Airway open, Use of Ambu bag and mask ventilation, Cardiac massage

Advanced Life Support

Use of Defibrillator

Emergency Management of Trauma

GASTROINTESTINAL; GENITOURINARY AND OBSTETRIC AND GYNAECOLOGICAL PROBLEMS:

1. Assisting in

a. Placement of Trans oesophageal devices.

NG tubes, enteral feeding tubes, Sengstaken-Blackemore tube

b. Maintenance of urinary catheters

c. Placement of hemodialysis catheters

d. Management peritoneal dialysis

e. Management CVVHD

f. bed side screening ultrasonography

NERVOUS SYSTEM:

Assisting in:

Lumbar puncture

Application of intracranial pressure monitoring device

Application of in-line immobilisation (C spine protection)

Cervical neck collor.
TOXICOLOGY:
Gastric lavage
ANALGESIA and SEDATION
Care of Epidural
Patient Controlled Analgesia
HAEMATOLOGICAL DISORDERS:
Assisting in:
Exchange Transfusion
Plasmapharesis

15.BASICS OF ULTRASOUND AND RADIOLOGY IN CRITICAL CARE

1. USG physics
2. Basic cardiac ultrasound and ECHO views
3. Basic lung ultrasound
4. Basic abdominal ultrasound
5. Echocardiographic assessment of a patient in shock
6. Ultrasound for vascular access
7. Reading xrays and CT with clinical correlation

16.EQUIPMENT MAINTEN0NCE & BASIC TROUBLESHOOTING:

Ventilators, CPAP, BiPAP machines
Pumps - Infusion, Syringe
Monitors - Standalone & multipara meter
ECG Machine
ABG Machine
Defibrillator
USG Machine

SCHEME OF EXAM FOR THEORY

Semester VI

Theory Total- 100 Marks **Duration: 3 Hour**

Sl. No	Question	Question Asked	Question to Attempt	Marks	Maximum Marks	Theory Total	Viva	Internal Assessment	Total Marks
1.	Long Essay Question	3	2	2 x 10	20	60	20	20	100
2	Short Essay Question	6	5	5X5	25				
3.	Short Answers	5	5	5 x 3	15				

Practical Examination-Semester VI

Major Practical

Topics	No. Of Questions	Number of Question and Marks	Total
PRESSURE TRANSDUCTION TROUBLESHOOTING	2	2 x 20	40 Marks

Minor Practical

Topics	No. Of Questions	Number of Question and Marks	Total
SPOTTERS		4 x 10	40 Marks

Practical	80 Marks
I A Marks	20Marks
Grand Total	**100 Marks**

Recommended Books:

1. The ICU book, Paul Marino
2. ICU Protocols A Stepwise approach, Rajesh Chawla and Subash Todi
3. Washington manual of critical care

Reference books:

1. Irwin and Rippe's intensive care medicine
2. Textbook of Critical Care, Jean Louis Vincent, Edward Abraham
3. Mechanical ventilation by David Chang

Online Reference

1.lifeinthefastlane.com

2.criticalcarereviews.com

ELS06
Fundamentals of Electricity and Electronics:

Resistance: Symbol, units, colour coding equivalent resistance with 'connection in series and parallel.

Capacitance: Symbol, units, series and parallel connection

Inductance and transformers

Parameters of electricity power - voltage, current frequency, power.

Differences between AC and DC - .

AC and DC power supplies, Phase, neutral and earth - conventional colour coding

Ohms law and Kirchoff's law Electrical Circuits.

Earth and grounding - Symbol, importance in patient care.

AC and DC power supplies- Phase, neutral and earth - conventional colour coding

Classification of medical equipment

1. According to type of protection: B C F etc
2. According to mode of protection: Class I -III.

Internal Assessment

1. Internal Assessment will be undertaken for theory and practical periodically as per the semester system and the average marks of the tests will be calculated and reduced to 20 or 10 as applicable and the marks are to be communicated to the university.

2. In order to be eligible to appear for University Examination a candidate, should secure at least 35% of total marks assigned for internal assessment in a particular subject for theory and practical's separately.

Declaration of result

1. Criteria for pass

   a. Main subject: A Candidate is declared to have passed the examination in a subject, if he/she secures 40% of the total marks in Theory and Practical separately.

   b. Elective Subjects: The minimum marks for a pass in a elective subject shall be 35% of the maximum marks prescribed for a subject and the marks shall be communicated to the University before the commencement of the Practical examination.

   c. In case a candidate fails in either theory or practical, he/she has to appear for both theory and Practical in the subject in any subsequent examination and he/she must obtain the minimum for a pass in the subject (theory and practical separately)

   d. A candidate shall be declared to have passed the examination if he/she passes in all the main subjects.

   Carry over System:

   At any given point of time a candidate shall have subjects pending to clear of only previous semester in addition to the subjects of the current semester that he/she is appearing for. Example:-

   - If the candidate has not cleared semester I, he/she can appear for semester II and pending subjects of semester I simultaneously.
   - For appearing for semester III he/she should have cleared semester I and can appear for papers pending from semester II along with semester III subjects.
   - For appearing for semester IV he/she should have cleared semester II and can appear for papers pending from semester III along with semester IV subjects.
   - For appearing for semester V he /she should have cleared semester III and can appear for papers pending from semester IV along with semester V subjects.
   - For appearing for semester VI he/she should have cleared semester IV and can appear for papers pending from semester V along with semester VI

subjects.

Examiners:

There should be minimum two examiners, one internal from the same university and one external Examiner for the first year subjects and for Pharmacology in the second year shall have Postgraduate degree in the respective subject with 3 years teaching experience of M.Sc. (Medical) with 5 years teaching experience