

Ordinance Governing B.Sc. Perfusion Technology Degree Course Syllabus/Curriculum 2017-18



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 our 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.



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Ref. No. KAHER/AC/18-19/D-909 (2)

Dated : 26-11-2017

NOTIFICATION

**Sub : Ordinance governing the syllabus/curriculum for
B.Sc. (Perfusion Technology) Degree Course (Semester System)**

**Ref : Minutes of the meeting of the Academic Council of
the University held on 15-11-2017**

In exercise of the powers conferred under Rule A-04(i) of the Memorandum of Association of the KAHER, the Academic Council of the KAHER is pleased to approve the Ordinance governing the syllabus/curriculum for B.Sc. (Perfusion Technology) Degree Course (Semester System) in its meeting held on 15-11-2017.

The Ordinance shall be effective for the students admitted to B.Sc. (Perfusion Technology) Degree Course under the Faculty of Medicine in the constituent college of the KAHER viz. Jawaharlal Nehru Medical College, Belagavi from the academic session 2017-18 onwards.

By Order

REGISTRAR

To
The Dean
Faculty of Medicine,
J.N. Medical College, Belagavi.

CC to:

1. The Secretary, University Grants Commission, New Delhi,
2. The PA to Hon. Chancellor, KAHER, Belagavi.
3. The Special Officer to Hon. Vice- Chancellor, KAHER, Belagavi.
4. All Officers of the University- Academic Affairs/ Allied Course/ Examination Branch.

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B.Sc. PERFUSION TECHNOLOGY

PREAMBLE

The B.Sc. Perfusion Technology Course is **3 years** degree course aimed at training the students in the technological aspects of medical care with a good scientific foundation. These students will be in a position to competently assist the Anaesthetist & Surgeons in high tech anaesthesia & surgical theatre. They will be in demand both within the country and outside as Allied Healthcare personnel. With advanced training in the latest technologies in their specialty, these graduates will play an important role in determining the quality of health care provided.

I. TITLE OF THE COURSE

The course shall be called Bachelor of Science in Perfusion Technology.

II. ELIGIBILITY FOR ADMISSION

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

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

III. DURATION OF COURSE

The duration of the Course shall be for period of three years including six months compulsory training in sixth semester.

IV. MEDIUM OF INSTRUCTION

The medium of instruction and examination shall be English.

V. 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.

VI. 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.

FIRST SEMESTER
Scheme of Examination:

Sr. No.	Subject Code	Theory	Subjects	Theory + IA +Viva Voce	Total
1	PTBS01	Paper 1	Human Anatomy	60 + 20 + 20	100
2	PTBS02	Paper 2 Section A	Human Physiology	30 + 10 + 10	50
		Section B	Basics of Biochemistry	30 + 10 + 10	50
3	PTBS03	Paper 3 Section A	Pathology-Basic Haematology	30 + 10 + 10	50
		Section B	Microbiology	30 + 10 + 10	50
4	ELS01	Paper 4 Electives	English	80 + 20	100
Grand Total					400

Sr. No.	Subject Code	Practical	Subjects	Practical + IA	Total
5	PTBS04	Practical 1	Human Anatomy	80 + 20	100
6	PTBS05	Practical 2A	Human Physiology	40 + 10	50
		2B	Basics of Biochemistry	40 + 10	50
7	PTBS06	Practical 3A	Hematology & Clinical Pathology	40 + 10	50
		3B	Microbiology	40 + 10	50
Grand Total					300

Semester I

PAPER I : 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.

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

PAPER IV:**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 ASSESSMENT

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

Spotters: 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 Practical Guide	J.P. Gunasegaran	Elsevier Publication, Gurgaon, Haryana
4. Practical manual of Histology for Medical students	Neelkanth Kote	Jaypee Brothers, Medical Publishers, Delhi.

Semester I

PAPER 2 : 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 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 & colour vision, light & dark adaptation, Refractory errors of eye & correction.

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

Taste, Olfaction and Skin: Taste buds, papillae's, taste pathway, Olfactory mucosa, Olfactory Pathway, Adaptation of smell, unique features of olfaction, structure & functions of skin.

Scheme of examination

Theory Total 50 marks

Duration 90 minutes

Sr. 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	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's Name, 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

Practical 1 : Section A - Physiology

Practical 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 Assesment -10 marks

Total -50 marks

Semester I

PAPER 2 : 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. Monosaccharides, 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 denaturing agents
- 8. Chemistry of Nucleic acids:**
 - a) DNA Structure and function
 - b) RNA: Types, Structure (only t RNA) and Functions.

Scheme of examination

Theory Total- 30 Marks

Duration: 90 minutes

Sr. No.	Question	Question asked	Question to attempt	Marks	Maximum Marks	Viva	IA	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:

Sl. No.	Name of the Books & Title	Author	Publisher's Name, Place of Publication
1	Test Book of Bio Chemistry for Medical Students	Vasudevan (DM), & Sree Kumari (S)	Jaypee Brothers, New Delhi.
2	Biochemistry	U. Satyanarayan	Books and Allied (P) Ltd. Kolkata-700009. India)
3	Clinical Chemistry	Varley	William Heinemann Medical Books Ltd & Inter Science Book. Inc. New York.
4	Clinical Chemistry	TEITZ	W.B. Saunders Company Harcourt (India) Private Limited New Delhi-110048.

PAPER 2 : Section B - Biochemistry Practicals

Practical 30 Hours

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 of Proteins (Albumin and Casein)
5. Colour reactions of Proteins
6. Identification of Unknown Carbohydrates and proteins

Scheme of Examination

Major Practical

Topics	No. Of Questions	Number of Question and Marks	Total
Qualitative Analysis: Identification of Unknown Carbohydrate or protein	1	1 x 25	25 Marks

Minor Practical

Topics	No. Of Questions	Number of Question and Marks	Total
Color reactions of proteins (any one)	1	1 x 15	15 Marks

Practical Marks 40 Marks

IA Marks: 10 Marks

Grand Total 50 Marks

Semester I

PAPER 3 : 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 haematology 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
- Bone Marrow: Techniques of aspiration, Preparation and Staining of films, Bone Marrow Biopsy.

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 3 : 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 Count
6. WBC -Differential Count
7. Platelet Count
8. Absolute Eosinophil Count
9. ESR- Westergreens & Wintrobe's method,
10. PCV.
11. Sickling test-Demonstration
12. Bone Marrow Smear preparation & staining procedure- Demonstration
13. Demonstration of Malarial Parasite.

Exam Pattern

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

- ▶ Hb Estimation-Sahli's method
- ▶ RBC Count
- ▶ Retic 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 Assesment

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: 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 3 : 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. PTBS ENGLISH

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

Scheme of Examination:

Sr. No.	Subject Code	Theory	Subjects	Theory + IA +Viv Voce	Total
1	PTBS07	Paper 1	Human Anatomy	60 + 20 + 20	100
2	PTBS08	Paper 2 Section 2A	Human Physiology	30 + 10 + 10	50
		Section 2B	Basics of Biochemistry	30 + 10 + 10	50
3	PTBS09	Paper 3 Section 3A	Haematology & Clinical Pathology	30 + 10 + 10	50
		Section 3B	Microbiology	30 + 10 + 10	50
4	ELS02	Paper 4 Electives	Enviromental Studies	80 + 20	100
Grand Total					400

Sr. No.	Subject Code	Practical	Subjects	Practical + IA	Total
5	PTBS10	Practical 1	Human Anatomy	80 + 20	100
6	PTBS11	Practical 2 2A	Human Physiology	40 + 10	50
		2B	Basics of Biochemistry	40 + 10	50
7	PTBS12	Practical 3A	Hematology & Clinical Pathology	40 + 10	50
		3B	Microbiology	40 + 10	50
Grand Total					300

Semester II

PAPER 1: 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 First Semester for Subject Codes:

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: 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 Assessment

Scheme of Practical Examination for First Semester for subject code

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
 Spotters 10 x 2 marks : 20 Marks

Histology

Spotters 15 x 2 marks : 30 Marks

IA marks

: 20 Marks

Total : 100 Marks

Respiratory System

Physiological Anatomy of Respiratory System and Functions, Dead Space.

Mechanism of Respiration, Lung volume and capacities, Surfactant, definition of compliance

Transport of Oxygen, ODC Curve and **CO₂ 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, and factors affecting cardiac output,

Blood pressure - Definition, Determinants & Factors affecting blood pressure, regulation of blood pressure,

Defination Hypertension , Hypotention 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.

Micturation: 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 & function of HCL

Composition and functions of pancreatic juice

Functions of Liver and bile Juice

Defination of Jaundice and it types

Movements of GI Tract - Deglutition, Movements of Small Intestines

Endocrines

Major Endocrine glands

- Pituitary Gland: Anterior & Posterior Pituitary Hormones and functions
- Thyroid Gland: Hormones Secreted and Functions, Goitre
- 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, Milk Ejection Reflex, Composition of Milk, Advantages of breast feeding.

Scheme of Examination

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

Sl. No.	Question	Question asked	Question to attempt	Marks	Max. Marks	Internal Assesment	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:

Recommended Text Books (Latest Edition)

Sl. No.	Name of the Book & Title	Author	Publisher's Name, 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.

Practical 2 : Section A-Human Physiology

Practicals 30 Hours

- 1) Recording of Pulse
- 2) Blood Pressure Recording
- 3) Effect of Exercise on BP
- 4) Effect of Posture on BP
- 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 Assesment

Practical	Total 50 marks
Major	-25 marks
Minor	-15 marks
Internal Assesment	-10 marks
Total	-50 marks

PAPER 2 : 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.

Scheme of Examination**Theory total 30 Marks****Duration 90 minutes**

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:

1	Test Book of Bio Chemistry for Medical Students	Vasudevan (DM), & Sree Kumari (S)	Jaypee Brothers, New Delhi.
2	Biochemistry	U. Satyanarayan	Books and Allied (P) Ltd. Kolkata-700009. India)
3	Clinical Chemistry	Varley	William Heinemann Medical Books Ltd & Inter Science Book. Inc. New York.
4	Clinical Chemistry	TEITZ	W.B. Saunders Company Harcourt (India) Pvt. Ltd. New Delhi-110048.

Practical 2 : Basics of Biochemistry**Practical - 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

Practical Examination-Semester II

Major Practical

Topics	No. of Questions	Number of Question and Marks	Total
Qualitative Analysis: of Glucose/ Urea/Creatinine/Estimation of Urine creatinine	1	1 x 25	25 Marks

Minor Practical

Topics	No. of Questions	Number of Question and Marks	Total
Analysis of biochemically important substances	1	1 x 15	15 Marks

Practical Marks 40 Marks

IA Marks: 10 Marks

Grand Total 50 Marks

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 folate assay Normal values, derangements and interpretation of results.
 - b. Schilling test - Method and interpretation
 - c. Serum iron and iron binding capacity and other tests for Iron deficiency anemia-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

BLOOD BANKING

(Blood transfusion and Immunohaematology).

1. Collection & processing of Blood –Donor selection, Registration, Medical history, Physical examination.
2. Collection of Blood
3. Processing of Donor Blood
4. Storage & preservation of Blood.
5. ABO Blood group System
6. R.h typing and weaker variants in R.h system
7. Subgroup and weaker various of A and B and Bombay Phenotype
8. Preparations and standardization of Anti Human globulin reagent
9. Coomb's test.
10. Blood grouping and cross-matching in blood bank.
11. Diseases transmitted by Blood and their screening - Australia Antigen and Hepatitis C. Virus (HCV), HIV, Syphilis, CMV & Malaria in Blood transfusion
12. Investigation of transfusion reaction.
13. HLA Antigens and their significance in blood transfusion.
14. Blood Components- its preparation and their use in clinical practice.
15. Haemapheresis- Apheresis using cell separators Leucapheresis, plateletpheresis, plasmapheresis Adverse effects on donors.
16. Blood Bank Administration.
17. Record keeping

Immuno - cytochemistry:

1. Introduction
2. Basic concepts of immunochemistry
3. Monoclonal antibodies and their preparations
4. Fluorescence reactions
5. PAP Technique - principle, preparation of reagents and Procedure.

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 : Pathology Practicals**Practical 35 Hours****I. HAEMATOLOGY**

- Sickling test-Demonstration
- Bone Marrow Smear preparation & staining procedure- Demonstration
- Demonstration of Malarial Parasite.
- Blood grouping. , Cross matching, Blood Transfusion and immunohaematology.
- Coomb's Test (Demonstration).

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)

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

Pathology Practicals**I. Major****30 marks**

- a. Urine Examination 10 marks
- b. Urine Microscopy 10 marks
- c. Blood Grouping 10 marks

II. Minor**10 marks**

- a. Spotters 05 marks
- b. Coombs(Direct / Indirect) test Interpretation/Proceedure writing 05 marks

IA**10 marks****Total 50 marks**

PAPER 3 : 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's Testbook of Microbiology. Tenth Edition. Reba Kanungo
- 2) Textbook of Microbiology for MLT. Second Edition. Dr.C.P.Baveja.

Practical 3 : 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 :**

- Biomedical waste management -10 marks
- Serological tests/Inoculation techniques -15 marks

-25 marks**Minor :**

- Spotters -15 marks

-15 marks**IA****-10 marks****Total****-50 marks**

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 II Phase 1st term MBBS 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 II Phase 1st term MBBS 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.
- ◆ Biogeographical 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-spots 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	

B.Sc. PERFUSION TECHNOLOGY SYLLABUS

THIRD SEMESTER

Scheme of Examination:

Sr. no	Subject Code	Theory	Subjects	Theory Max. +Viva + IA	Grand Total
1	PTBS013	Paper 1	Applied Pharmacology	60 + 20 + 20	100
2	PTBS014	Paper 2	Basics of Perfusion Technology I	60 + 20 + 20	100
3	PTBS015	Paper 3	Basics of Perfusion Technology II	60 + 20 + 20	100
4	PTBS016	Paper 4	Basics of Perfusion Technology(Practical)	160 + 40	200
5	ELS03	Paper 5 Electives	Communication Skills	80+20	100

Type of questions and distribution of marks for Theory examination in each subject in Third Semester for Subject Codes:

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

PRACTICAL ASSESMENT

Scheme of Practical Examination for third Semesterfor subject code

Sr. no	Practical	Marks	IA	Grand Total
1	Practical paper (Major 80 X 1 + Minor 40 X 2)	160	40	200

SEMESTER III

PAPER I: Applied Pharmacology

Theory: 25 Hours

This course introduces the students to basic pharmacology of common drugs used and their importance in different treatments.

Semester III

Units	Contents	25 Hours
1	General Pharmacology: a. Principles of drug administration and routes of administration, absorption, distribution, metabolism, excretion of drugs and factors influencing drug action. b. Drug allergy and toxicity, mechanism of drug action (various ways in which they act)	07
Enumeration of drugs, uses and adverse effects of the following drugs:		
2	Drugs acting on autonomic nervous system: Cholinergics, anticholinergics, adrenergics and antiadrenergics	05
3	Analgesics NSAIDs and opioid analgesics.	03
4.	Antihistaminics	01
5.	Pharmacotherapy of respiratory disorders: a. Drugs used in bronchial asthma - Bronchodilators, corticosteroids, mast cell stabilizers and leukotriene antagonists. b. Drugs used in cough – Expectorants, mucolytics and cough centre suppressants	02
6.	Endocrine Pharmacology: Thyroid hormones and antithyroid drugs, corticosteroids, anabolic steroids, insulin and oral hypoglycemic agents.	06
7.	Skeletal Muscle Relaxants: Drugs acting at neuromuscular junction and other muscle relaxants.	01

Scheme of Examination:

SI.No.	Questions	Questions asked	Questions to attempt	Marks	Internal Assessment	Total Marks
1	Long Essay Questions	3	2	2x10	20	100
2	Short Essay Questions	7	6	6x5		
3	Short Answer Questions	10	10	10x3		

Duration: 3 Hours

No Practical Examination

Recommended Text Books (Latest Edition)

Sl. no	Author	Name of the text	Publication
1.	K.D. Tripathi	Essentials of Medical Pharmacology	Jaypeebrothers medical publishers pvt. Ltd
2.	R.S. Satoskar, S.D. Bhandarkar, Nirmala N. Rege	Pharmacology and Pharmacotherapeutics	Popular Prakashan
3	Laurence and Bennett	Clinical Pharmacology	Churchill Livingstone
4	Bertram G. Katzung	Basic and Clinical Pharmacology	McGraw hill
5	Goodman & Gilman's	The Pharmacological Basis of Therapeutics	McGraw Hill publications
6	Rang H P & Dale M M	Pharmacology	Churchill Livingstone

PAPER II

Theory 45 Hours

Basics of Perfusion Technology I

1. Chest X-ray: Normal chest X-ray, postero-anterior-view, views in different positions, identification of borders of heart.
- cardiomegaly, pneumothorax, hydrothorax, pleural effusion, etc.
2. ECG- Normal electro cardio graph different waves, its significance, atrial arrhythmias, ventricular arrhythmias, heart blocks etc.
3. Angiography-coronary angiography, peripheral angiography,
 - Coronary- normal coronary and its branches in different views, indications and limitations.
 - Peripheral- cerebral, renal, limbs (upper and lower).
 - Nuclear cardiology-thallium scan, indications, advantages and disadvantages.
4. Echo-trans thoracic echo, Transesophageal echo, indications, applications, different views and information.
5. Laboratory investigations in relation to perfusion technology Hemoglobin, blood grouping, urine analysis, renal function tests (RFT), Liver Function Tests (LFTS, PT, INR, APTT, Spirometry for lung function, Activated Clotting Time (ACT), TEG (ThromboElastography)
6. History of cardiac surgery and perfusion
Specific reference of Gibbon Lillehei, Carrel Pre cardio pulmonary bypass surgery Axygous flow principle Hypothermic/nonhypothermic non-cardio pulmonary surgery including gross's well technique and controlled cross circulation.
7. Monitoring and instrumentation
Concepts of monitoring-instrumentation technology of ECG machine, pressure transducers, syringe and peristaltic pumps, monitors, ventilators, pulse oximeters, temperature probes and thermo regulatory monitoring, defibrillators and fibrillators. Piped and piped gad delivery systems and connections. Basic physics related to medically used gases.
8. Haemodynamic monitoring.
9. Haemostatic monitoring. 10. Haemotologic monitoring.

PAPER III

Theory 45 Hours

Basics of Perfusion Technology II

1. Maintenance of oxygen, carbon dioxide and acid base status and their monitoring.
2. Neurological monitoring (SSPE, EEG and cerebral function monitor).
3. Aseptic technique.
4. Physiology of extra-corporeal circulation.
Heart – Lung machine.
Principles of extra-corporeal circulation.
Materials used in extracorporeal circuit.
Principles of extracorporeal gas exchange.
5. Various types of oxygenators Bubble oxygenators Rotating spiral/cylinder/disc oxygenator Membrane oxygenators.
6. Theory of blood pump, ideal blood pump, pulsatile versus non-pulsatile flow, occlusive and non-occlusive pumps, types of pumps – roller, bellow, diaphragm, ventricular and centrifugal pumps.
7. Element of extracorporeal circulation/hazards of:
 - a. Blood failure
 - b. Bubble trap
 - c. Flow meters
 - d. Temperatures
 - e. Heart exchanger
 - f. TemperatureRegulating devices
8. Connection of the vascular system with extracorporeal circulation: Arterial and venous cannulae, connecting tubes and connectors, vents, suckers, cardioplegia delivery system, venous drainage.
9. Haemodynamics of arterial return, venous drainage, cardioplegia delivery and venting.
10. Blood grouping, handling of blood products and their management blood components and their use.

PAPER IV

Practicals: 50 Hours

Basics of Perfusion Technology Practical

1. Spotters
2. Heart Lung Machine
3. Cardio Pulmonary Bypass Circuits (CPB)
4. Anaesthesia Drug and equipments

The following Spotters can be Considered for Practical Exams:

Chest X-ray

- ❖ ECG
- ❖ Echo
- ❖ Coronary Angiography Nuclear Cardiology, ACT Machine
- ❖ Laboratory investigations- arterial blood gas, Venous blood gas, Renal function test, liver function test, coagulation profile.
- ❖ Haemoglobin, haematocrit, platelet, RBC, WBC, Electrolytes, Heart lung machine
- ❖ Oxygenator
- ❖ Heater cooler unit
- ❖ Blood cardioplegia device
- ❖ ACT Machine
- ❖ Setting up of ECG machine
- ❖ Pressure transducer
- ❖ Syringe and peristaltic pumps
- ❖ Anaesthesia Monitors
- ❖ Pulse oximeters
- ❖ Temperature probes and Thermoregulatory monitoring
- ❖ Defibrillators
- ❖ Fibrillators
- ❖ ACT Activated Clotting Time

PAPER V

Theory 30 Hours

Communication Skills

Unit-I :

- o Communication, its types and significance: Communication, Process of communication its kinds, channels and role in the society.
- o Methods of Communication (Oral, Written, One way, two way communication skills).
- o Reading skills: - Process of reading, reading purpose, models, strategies methodologies, reading activities, structure of meaning techniques.

Unit-II

- Précis and Communication.
- Writing skills :- Elements of effective writing, writing styles, scientific and technical writing.
- Grammar: - Transformation of sentences, words used as different parts of speech, one word substitution, abbreviations, technical terms etc.

Unit-III

- Listening skills: - Process of listening, barriers to listening, effective listening skills, feedback skills.
- 8. Speaking skills :- Speech mechanism, organs of speech, production and classification of speech sounds, phonetic transcription, skills of effective speaking components of an effective talk, oral presentation and the role of audio visual aids in it.
- 9. Reading of text book.

Unit-IV

- Barriers of communication and technique to overcome those.
- Meaning of effective communication.
- Technical Report writing.
- Practice of writing personal resume and writing application for employment.

Theory: 80 Marks

IA: 20 Marks

FOURTH SEMESTER

Scheme of Examination

Sr. no	Subject Code	Theory	Subjects	Theory Max. + IA	Grand Total
1	PTBS17	Paper 1	Applied Pharmacology	60 + 20 + 20	100
2	PTBS18	Paper 2	Applied Perfusion Technology I	60 + 20 + 20	100
3	PTBS20	Paper 3	Applied Perfusion Technology II	60 + 20 + 20	100
4	PTBS21	Paper 4	Medicine Relevant To Perfusion Technology	60 + 20 + 20	100
5	PTBS22	Paper 5	Applied Perfusion Technology Practical	160 + 40	200
6	ELS04	Paper 6 Electives	Law- Indian Constitution	80 + 20	100

Type of questions and distribution of marks for Theory examination in each subject in Fourth Semester for Subject Codes: PTBS020, PTBS021 PTBS022 and PTBS023

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

PRACTICAL ASSESMENT

Scheme of Practical Examination for Fourth Semester for subject code PTBS024

Sr. no	Practical	Marks	IA	Grand Total
1	Practical paper (Major 80 X 1 + Minor 40 X 2)	160	40	200

SEMESTER IV

PAPER I: Applied Pharmacology

Theory: 25 Hours

This course introduces the students to basic pharmacology of common drugs used and their importance in different treatments.

Semester IV

Units	Contents	25 Hours
Enumeration of drugs, uses and adverse effects of the following drugs:		
1	Drugs acting on the Cardiovascular System a. Antihypertensives b. Antiarrhythmic drugs c. Antianginal drugs d. Drugs used in heart failure	04
2	Drugs acting on renal system: Diuretics	01
3	Drugs acting on blood: a. Drugs used in haemostasis – coagulants, anticoagulants, antiplatelet drugs, fibrinolytics (thrombolytics) and antifibrinolytic drugs. b. Drugs used in the treatment of shock	03
4	Drugs acting on CNS: Alcohol, sedatives, hypnotics, antiepileptic drugs and antianxiety drugs.	04
5	Anaesthetic agents a. Inhalational anaesthetics and intravenous anaesthetics– Advantages and disadvantages of individual agents. b. Adjuvants to general anaesthesia and preanaesthetic medication c. Local anaesthetics.	02
5.	Chemotherapy of infections: a. Introduction to antimicrobials b. Sulfonamides, penicillins, cephalosporins, fluoroquinolones, aminoglycosides, antitubercular drugs and anti HIV drugs.	08
6.	Antiemetics	01
7.	Miscellaneous a. IV fluids- various preparations and their usage b. Immunomodulatory agents	02

Scheme of Examination:

Sl.No.	Questions	Questions asked	Questions to attempt	Marks	Internal Assessment	Total Marks
1	Long Essay Questions	3	2	2x10	20	100
2	Short Essay Questions	7	6	6x5		
3	Short Answer Questions	10	10	10x3		

Duration: 3 Hours

No Practical Examination

Recommended Text Books (Latest Edition)

Sl. no	Author	Name of the text	Publication
1.	K.D. Tripathi	Essentials of Medical Pharmacology	Jaypeebrothers medical publishers pvt. Ltd
2.	R.S. Satoskar, S.D. Bhandarkar, Nirmala N. Rege	Pharmacology and Pharmacotherapeutics	Popular Prakashan
3	Laurence and Bennett	Clinical Pharmacology	Churchill Livingstone
4	Bertram G. Katzung	Basic and Clinical Pharmacology	McGraw hill
5	Goodman & Gilman's	The Pharmacological Basis of Therapeutics	McGraw Hill publications
6	Rang H P & Dale M M	Pharmacology	Churchill Livingstone

Semester IV

PAPER II

Theory 45 Hours

APPLIED PERFUSION TECHNOLOGY I

1. Pharmacokinetics :Haemodilution, hypothehrima, perfusion, acidbasestauts. Sequestration and pharmacodymamics : Binding (to issue protein), age tissue penetration, temp, acid base status, anesthetic agents, specific drugs with CPB influence, properties, ioids, neuromuscular blocking drugs, antibiotics, anesthetic of : antithrombic agents, antiplatelet drugs, calcium channel blockers, vasodilators, nirates, beta – blockers, calcium entry blocking drugs in pulmonary bypass surgery.
2. Drugs used in cardiopulmonary bypass : Pre medication drugs used by anesthesiologist example beta adrenergic blocking drugs, antihypertensive drugs, anticholinergic drugs, sedative / hypnotics dugs etc.
3. Conduct and monitoring of cardiopulmonary bypass. : ECG, Arterial blood pressure CVP, Arterial pressure pulwelge, pressure measurement, arterial pump flow rate, suction pump flow, temp, biochemistry, central function, computer linked monitor,
4. Adequacy of perfusion : General considerations, specific aspects of perfusion, monitoring other concomitants which may affect its adequacy.
5. Oxygenation – general considerations, bubble & memberance (including assessment and comparison of oxygenator function).
6. Heat exchangers - Principles, function of heat exchange & their Management.
7. Priming of fluids and hemodilution : Crystalloids, 5% Dextrose, Balanced salt 50m, Mannitol, Colloidal osmoter, pressure, plasma expander, plasma preparation, dexatramos, gelatins hetastarch Hemodilution : Historical perspective , advantages, - physiological effects, complications during bypass, safety during cardiopulmonary bypass, bypass safety, organizational aspects, accidents & its management (perfusion relative), cogulopathies, mechanical and electrical failure, perfusion management, perfusion systems, safety and performoist surgical teams.
8. Blood conservation hemofiltration& dialysis during cardiopulmonary Bypass including modified ultra filtration reverse autologous priming and other methods.
9. Micro emboli gaseous and particulate, filters used in cardiopulmonary bypass circuit.
10. Micro pore filtration during cardiopulmonary bypass.

IV Semester

PAPER III

Theory 45 Hours

APPLIED PERFUSION TECHNOLOGY II

1. Pulsatile perfusion : Introduction, theory & Physiology of pulsatile flow, haemodynamic, metabolic effects, clinical use, hematological effects.
2. Cannulation technique during cardiopulmonary bypass: Venous cannulation, Principles of venous drainage, types and size of cannula, connection to the patient, the venous drainage. Arterial cannulation, cannulas, connection to a patient. Cardioplegiacannule, serts.
3. Termination of cardiopulmonary bypass - Preparation of separation, Separation technique, Separation problems – situation, vasodilation, hypotension, principles and methodology.
4. Myocardial protection and cardioplegia- pretreatment of the myocardium, cardioplegia, hypothermia controlled reperfusion, myocardial protection for specific clinical problems, Complications of cardioplegia. Non cardioplegic methods during cardiac surgery on cardiopulmonary bypass.
5. Blood cell trauma – analysis of forces of fluid motion, effects of physical forces on blood cells, clinical effect. Complications of blood transfusion.
6. Anticoagulation on bypass, its monitoring, its reversal and complications. Heparinless bypass. Platelet aggregation and platelet dysfunction. Coagulopathies due to cardiopulmonary bypass and its management.
7. Perfusion problems during radio pulmonary bypass, high arterial line Press, air and arterial line poor venous return, air lock in a venous line Inflammatory responses to cardiopulmonary bypass & its clinical effects. Methods to minimize the same. Immune response, neuroendocrine renal metabolic splanchnic response, pulmonary response and electrolyte response to cardiopulmonary bypass.
8. Counter pulsation techniques and assist devices.
9. Perfusion techniques for pediatric cardiac surgery:
Perfusate composition, Cannulation techniques, aspects of perfusion practice in pediatric cardiac surgery, myocardial protection, removal of sugi, pressure monitoring, heparin dosage reversal.
10. ECMO – Special perfusion techniques for special cardiac surgery, invasive cardiology and outside the operation suite.
11. Perfusion as a method of cardiopulmonary bypass.

12. Minimally invasive surgery and the perfusionist.
13. Recent advances in perfusion techniques.
14. Experimental Perfusion.

IV Semester

PAPER IV

Theory 50 Hours

MEDICINE RELEVANT TO PERFUSION TECHNOLOGY

- ❖ Cardiovascular System
 - o Ischaemic heart diseases
 - o Rheumatic heart disease
 - o Congenital heart disease
 - o Hypertension
 - o Aortic Aneurysms
 - o Cardiomyopathy
 - o Peripheral vascular disease
 - o Pulmonary edema and LV failure
- ❖ Hematology
 - o Anaemia
 - o Bleeding disorders
 - o Laboratory tests used to diagnose bleeding disorders (in brief)
- ❖ Respiratory System
 - o Chronic obstructive airway diseases (COPD)
 - o Concept of obstructive versus restrictive pulmonary disease
 - o PFT and its interpretation
- ❖ Renal System
 - o ARF & CRF
 - o End stage renal disease
 - o Role of dialysis and renal transplantation in its management

- ❖ CNS
 - o Automatic nervous system
 - o (Sympathetic & Parasympathetic system)
 - o Brief mention of CNS disorders & their etiology
- ❖ Others
 - o DM
 - o Obesity
 - o Pregnancy
 - o Paediatric Patient (neonate/Infant)
 - o Elderly patient

IV Semester (Practical)

PAPER V

Practicals 50 Hours

APPLIED PERFUSION TECHNOLOGY

1. Calculation of PCV on CPB and amount of blood to be added to bring the PCV on CPB to particular level.
2. Interpretation and correction of a given arterial blood gas.
3. Interpretation and correction of a given electrolyte abnormally.
4. Calculation of body surface area.
5. Performing an ACT estimation and interpretation of results.
6. Setting of a dummy CPB circuit.

IV Semester

PAPER VI

Theory 45 Hours

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. 1stYear course 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. 1st Year course 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 Hour
Unit IX	Enforcing rights through Writs Certiorari, Mandamus, Quo warranto and Habeas Corpus.	2 Hours
Unit X	Constitution and Sustainable Development in India.	2 Hours

Scheme of Examination

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

Reference Books Latest Edition :

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

V SEMESTER

Scheme of Examination

Sr. no	Subject Code	Theory	Subjects	Theory Max. + IA	Grand Total
1	PTBS22	Paper 1	Advanced Perfusion Technology Paper I	60 + 20 + 20	100
2	PTBS23	Paper 2	Advanced Perfusion Technology Paper II	60 + 20 + 20	100
3	PTBS24	Paper 3	CPR and Life Support	60 + 20 + 20	100
4	PTBS25	Paper 4	Advanced Perfusion Technology Practicals	160 + 40	200
5	ELS05	Paper 5 Electives	Fundamentals of Computers	80 + 20	100

Type of questions and distribution of marks for Theory examination in each subject in Fifth Semester for Subject Codes:

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

PRACTICAL ASSESMENT

Scheme of Practical Examination for Fifth Semester for subject code

Sr. no	Practical	Marks	IA	Grand Total
1	Practical paper (Major 80 X 1 + Minor 40 X 2)	160	40	200

Semester V

PAPER I

Theory 45 Hours

Advanced Perfusion Technology I

Contents

1. Pulsatile perfusion : Introduction, theory & Physiology of pulsatile flow, haemodynamic, metabolic effects, clinical use, hematological effects.
2. Cannulation technique during cardiopulmonary bypass: Venous cannulation, Principles of venous drainage, types and size of cannula, connection to the patient, the venous drainage. Arterial cannulation, cannulas, connection to a patient. Cardioplegiacannule, sets.
3. Termination of cardiopulmonary bypass - Preparation of separation, Separation technique, Separation problems – situation, vasodilation, hypotension, principles and methodology.
4. Myocardial protection and cardioplegia- pretreatment of the myocardium, cardioplegia, hypothermia controlled reperfusion, myocardial protection for specific clinical problems, Complications of cardioplegia. Non cardioplegic methods during cardiac surgery on cardiopulmonary bypass.
5. Blood cell trauma – analysis of forces of fluid motion, effects of physical forces on blood cells, clinical effect. Complications of blood transfusion.
6. Anticoagulation on bypass, its monitoring, its reversal and complications. Heparinless bypass. Platelet aggregation and platelet dysfunction. Coagulopathies due to cardiopulmonary bypass and its management.
7. Perfusion problems during radio pulmonary bypass, high arterial line Press, air and arterial line poor venous return, air lock in a venous line Inflammatory responses to cardiopulmonary bypass & its clinical effects. Methods to minimize the same. Immune response, neuroendocrine renal metabolic splanchnic response, pulmonary response and electrolyte response to cardiopulmonary bypass.

V Semester

PAPER II

Theory 45 Hours

Advanced Perfusion Technology II

1. Counter pulsation techniques and assist devices.
2. Perfusion techniques for pediatric cardiac surgery:
Perfusate composition, Cannulation techniques, aspects of perfusion practice in pediatric cardiac surgery, myocardial protection, removal of sugi, pressure monitoring, heparin dosage reversal.
3. ECMO – Special perfusion techniques for special cardiac surgery, invasive cardiology and outside the operation suite.
4. Perfusion as a method of cardiopulmonary bypass.
5. Minimally invasive surgery and the perfusionist.
6. Recent advances in perfusion techniques.
7. Experimental Perfusion.

V Semester (Theory)

PAPER III

Theory 50 Hours

CPR and Life Support

A. Intensive Care

1. Monitoring and diagnostic procedures in ICU.
 - ❖ Central venous access
 - ❖ ECG monitoring
 - ❖ Invasive hemodynamic monitoring
 - ❖ Cardiac arrhythmia recognition.
2. General care of patient in ICU
 - ❖ Eye, GI tract and bladder system

- ❖ Care of mechanically ventilated patient.
 - ❖ Tracheostomy, Humidification
 - ❖ Vascular line, arterial line, venous line.
 - ❖ Radiography
 - ❖ Chest physiotherapy
3. Intensive care management of myocardial infarction & unstable angina.
 4. Fluid management and parenteral nutrition.
 5. Infectious disease in ICU, antibiotics in ICU.
 6. Respiratory failure
 - ❖ Oxygen therapy
 - ❖ Mechanical ventilation.
 7. Acid base disorders electrolyte imbalance.
 8. Cardio vascular failure
 - ❖ Plan of management
 - ❖ Inotropic support
 - ❖ Vasodilator drugs.
 9. Renal failure and liver failure.
 10. Head injury.
 11. Principles of transfusion therapy.

B. Cardio Pulmonary Resuscitation and First Aid Techniques :

1. Basic Life Support
 - ❖ An Open Airway.
 - ❖ Adequate Breathing.
 - ❖ Sufficient Circulation.
2. Adult One-Rescuer CPR
 - ❖ Assess the victim's need for CPR.
 - ❖ Call for help.

- ❖ Open Airway & checking breathing.
 - ❖ Mouth to mouth breathing.
 - ❖ Manual resuscitation bag and mask.
 - ❖ Determine pulselessness.
 - ❖ External chest compression.
3. Adult - Two Rescuer CPR
4. CPR Equipment
- ❖ Manual resuscitator (Bag – value).
 - ❖ Mouth to valve mask resuscitator.
 - ❖ Patient assessment.
- a) Resuscitation For Children
- Artificial ventilation for children & babies under two External chest compression for children& babies.
- b) The Recovery Position - ACLS: (Advanced Cardiac Life Support).
- c) Skill Steps
- d) Station One : Basic Life Support
- ❖ One rescuer CPR.
 - ❖ Two rescuer CPR.
 - ❖ Obstructed airway.
- e) Station Two : Airway Management
- ❖ Mouth to mask ventilation.
 - ❖ EDA
 - ❖ Endo tracheal intubation.
 - ❖ Endotracheal intubation with DOA in place.
- f) Station Three: ECG And Treatment.
- ❖ Modalities Statue ECG slip.
 - ❖ Case histories and ACLS.
 - ❖ Treatment modalities.

- g) Station Four : Mega Code
 - ❖ Serving as code leader.
 - ❖ Defibrillation.
- h) Lecture Topics : ACLS In Perspective
 - ❖ Myocardial infarction.
 - ❖ Adjunct for airway control.
 - ❖ Dysrhythmia therapy.
 - ❖ Electrical therapy.
 - ❖ Cardio vascular pharmacology.
 - ❖ Putting it all together.
- i) First Aid Techniques

Suggested Readings

- ❖ Text book : Text Book of Anaesthesia Kaplan
- ❖ Cardiac Surgery Authors: Kirklin / Barratt-Boyes

V Semester

PAPER IV

Practical 45 Hours

Advanced Perfusion Technology

Contents

1. Managing a simulated perfusion accident on a dummy CPB circuit including changing oxygenators when on CPB, managing falling/leaking reservoir levels, venous airlocks, air in the arterial line, cardioplegia delivery failure, increased arterial line pressure, recognition of a possible dissection, run a way pump head, recognition of heat exchanger water leak into the CPB circuit, reaction time assessment etc.
2. Identification of various CPB circuit components and their uses, method of sterilization and complications related to them.
3. Identification of drugs and their pharmacology
4. Calculating vascular resistance on CPB and management of increased perfusion pressure on bypass.

V Semester

PAPER V

Theory 45 Hours

Fundamentals of Computers

- ❖ **Introduction to computer:** introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages. **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).
- ❖ **Processor and memory:** The Central Processing Unit (CPU), main memory. **Storage Devices:** sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices. **Introduction to MS-Word:** introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge. **Introduction to Excel:** introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs. **Introduction to power-point:** introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.

- ❖ **Introduction of Operating System:** introduction, operating system concepts, types of operating system. **Introduction to MS-DOS:** History of DOS, features of MS-DOS, MS-DOS Commands (internal and external). **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.).
- ❖ **Computer networks:** introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network. **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. **Application of Computers in various fields:** Medical, Education, Railway, Defense, Industry, Management, Sports, Commerce, Internet. **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

Practical Examination: 80 Marks

IA : 20 Marks

VI SEMESTER

Scheme of Examination

Sr. no	Subject Code	Theory	Subjects	Theory Max. + IA	Grand Total
1	PTBS26	Paper 1	Professional Training	160 + 40	200
2	PTBS27	Paper II Practicals	Internal assessment + Project/Practical file + Practical (Performance) and viva	100 + 150 + 100 +50	400
3	ELS06	Paper III Electives	Human Values and Professional Ethics	80 + 20	100

VI SEMESTER

PAPER I

Professional Training

Guest Lecture/ Tutorial/ Seminar/visit to any medical research institution or reputed clinical laboratory (Compulsory)

For evaluation of Professional Training, out of 200 marks, 100 will be awarded by the Department where the candidate has taken training. The Candidate has to submit his/her project report (Log Book and Small Project on Instrument) before end of sixth semester. Then at the end of the semester he/she will appear for the Practical examinations in the presence of Internal & external Examiners. Out of rest 400 marks 150 will be for Project/ Practical file and 100 for Practical and 50 for *Viva voce* (by external examiner)

The Practicals learned in all five semester will be part of final practical exam at the end of sixth semester

VI SEMESTER

PAPER II

Practical

INTERNAL ASSESMENT + PROJECT + PRACTICAL PERFORMANCE AND VIVA ON DAY TO DAY BASIS

VI SEMESTER

PAPER III

Theory 45 Hours

Human Values and Professional Ethics

- 1. Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**
 - ❖ Understanding the need, basic guidelines, content and process for Value Education.
 - ❖ Self Exploration—what is it?- its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration.
 - ❖ Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
 - ❖ Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

- ❖ Method to fulfill the above human aspirations: understanding and living in harmony at various levels

2. Understanding Harmony in the Human Being - Harmony in Myself!

- ❖ Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- ❖ Understanding the needs of Self ('I') and 'Body' - *Sukhand Suvidha*
- ❖ Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- ❖ Understanding the characteristics and activities of 'I' and harmony in 'I'
- ❖ Understanding the harmony of I with the Body: *Sanyamand Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail
- ❖ Programs to ensure *Sanyamand Swasthya*

3. Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

- ❖ Understanding harmony in the Family- the basic unit of human interaction
- ❖ Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship
- ❖ Understanding the meaning of *Vishwas*; Difference between intention and competence
- ❖ Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship
- ❖ Understanding the harmony in the society (society being an extension of family):

Samadhan, Samridhi, Abhay, Sah-astitvaas comprehensive Human Goals

- Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*)- from family to world family!

4. Understanding Harmony in the Nature and Existence - Whole existence as Co- existence

- ❖ Understanding the harmony in the Nature
- ❖ Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
- ❖ Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space

- ❖ Holistic perception of harmony at all levels of existence (4 Hrs)

5. Implications of the above Holistic Understanding of Harmony on Professional Ethics

- ❖ Natural acceptance of human values
- ❖ Definitiveness of Ethical Human Conduct
- ❖ Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- ❖ Competence in professional ethics:
 - Ability to utilize the professional competence for augmenting universal human order
 - Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems
 - Ability to identify and develop appropriate technologies and management patterns for above production systems.
- ❖ Case studies of typical holistic technologies, management models and production systems
- ❖ Strategy for transition from the present state to Universal Human Order:
 - At the level of individual: as socially and ecologically responsible engineers, technologists and managers
 - At the level of society: as mutually enriching institutions and organizations

Text Book:

1. R R Gaur, R Sangal, G P Bagaria, 2009, *A Foundation Course in Value Education*.

Other Suggested Readings / Books:

1. Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA
2. E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
3. A Nagraj, 1998, *JeevanVidyaekParichay*, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991
5. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.

6. A.N. Tripathy, 2003, Human Values, New Age International Publishers
7. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi TantraShodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome’s report, Universe Books.
9. E G Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press
10. M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
12. B L Bajpai, 2004, Indian Ethos and Modern Management, New

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.

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

Examiners 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.