

REGULATIONS & CURRICULUM OF GRADUATE PARAMEDICAL COURSE

BACHELOR OF SCIENCE IN

PERFUSION TECHNOLOGY

2020



Sri Siddhartha Academy of Higher Education Deemed-to-be-University

**Established under Section 3 of the UGC Act, 1956
MHRD, GOI No. F.9-31/2006-U.3 (A) Dtd. 30th May 2008**

Agalakote, B.H. Road, Tumkur – 572107, Karnataka, India

SRI SIDDHARTHA ACADEMY OF HIGHER EDUCATION

(DEEMED TO BE UNIVERSITY)

Declared under Section 3 of the UGC Act, 1956, MHRD GOI No. F.9-31/2006-U.3 (A) Dated: 30/05/2008

Accredited 'A' Grade by NAAC

Agalakote, B.H.Road, Tumkur – 572 107. KARNATAKA, INDIA.

Ph. 0816- 2275516, Fax : 0816-2275510 website: sahetumkur.ac.in email: info@sahe.in



No. SSAHE/ACA-S&C(AHSP)/14/2022

Date: 01/09/2022

NOTIFICATION

Sub: Ordinance pertaining to Regulations and Curriculum of Bachelor of Science in Perfusion Technology.

- Ref: 1). Proceedings of BOS Allied Health Sciences Programmes held on 06/04/2021
2). Proceedings of the Academic Council meeting held on 19/08/2021
3). Proceedings of the Board of Management held on 29/08/2022

In exercise of the powers vested under section 6 of 6.4 of MoA / Rules of SSAHE, the Ordinance pertaining to Regulations and Curriculum of Bachelor of Science in Perfusion Technology is notified herewith as per Annexure.

The above Regulations shall be applicable to the students admitted to the said course from the academic year 2020-21 onwards.

By Order,


REGISTRAR

REGISTRAR

Sri Siddhartha Academy of Higher Education
TUMKUR - 572 107, Karnataka.

To,
Dean / Principal, Sri Siddhartha Medical College & Hospital,

Copy to

- 1) Office of the Chancellor, SSAHE, for kind information,
- 2) PA to Vice-Chancellor / PA to Registrar / Controller of Examinations / Finance Officer, SSAHE
- 3) The Director (AHSP), SSAHE
- 4) All Officers of the Academy Examination Branch / Academic Section
- 5) Guard File / Office copy.

**ORDINANCE GOVERNING REGULATIONS & CURRICULUM OF B. Sc.
PERFUSION TECHNOLOGY - 2020**

1. Eligibility for admission:

A candidate seeking admission to the B.Sc. Perfusion Technology shall have studied English as one of the principal subject during the tenure of the course and shall have passed:

1. Two year Pre-University examination or equivalent as recognized by Sri Siddhartha Academy of Higher Education with, Physics, Chemistry and Biology as subjects of study.

OR

2. Pre-Degree course from a recognized University considered as equivalent by SSAHE, (Two years after ten years of schooling) with Physics, Chemistry and Biology as subjects of study.

OR

3. Any equivalent examination recognized by the Sri Siddhartha Academy of Higher Education, Tumkur for the above purpose with Physics, Chemistry and Biology as subjects of study.

OR

4. The vocational higher secondary education course conducted by Vocational Higher Secondary Education, Government of Kerala with five subjects including Physics, Chemistry, Biology and English in addition to vocational subjects conducted is considered equivalent to plus TWO examinations of Government of Karnataka Pre University Course.

OR

5. Candidates with two years diploma from a recognized Government Board in Perfusion technology shall have passed class 12 [10+2] with Physics, Chemistry and Biology, as subjects or candidates with 3 years diploma from a recognized Government Board in Perfusion technology should have studied Physics, Biology and Chemistry as subjects during the tenure of the course.

6. Lateral entry to second year of B.Sc. Perfusion Technology for candidates who have passed diploma program from the Government Boards and recognized by SSAHE, fulfilling the conditions specified above under Sl. No. 5 and these students are eligible to take admission on lateral entry system only in the same subject studied at diploma level for the academic year

Note:

- a. The candidate shall have passed individually in each of the subjects.
- b. Candidates who have completed diploma or vocational course through Correspondence shall not be eligible for any of the courses mentioned above.

2. Duration of the course:

Duration shall be for a period of four years including one year of Internship.

3. Medium of instruction:

The medium of instruction and examination shall be in English.

4. Scheme of examination:

There shall be three examinations one each at the end of 1st, 2nd and 3rd year.

5. Attendance

Every candidate should have attended at least 80% of the total number of classes conducted in an academic year from the date of commencement of the term to the last working day as notified by university in each of the subjects prescribed for that year separately in theory and practical. Only such candidates are eligible to appear for the university examinations in their first attempt. Special classes conducted for any purpose shall not be considered for the calculation of percentage of attendance for eligibility. A candidate lacking in prescribed percentage of attendance in any subjects either in theory or practical in the first appearance will not be eligible to appear for the University Examination in that subject

- The marks of the internal assessment must be displayed on the notice board of the respective colleges within a fortnight from the date test is held.
- If a candidate is absent for any one of the tests due to genuine and satisfactory reasons, such a candidate may be given a re-test within a fortnight.

6. Internal Assessment (IA):

1st Year B.Sc. Perfusion Technology

Theory - 20 marks

Practicals - 10 marks*. [Lab work- 06 marks and Record-04 marks]

2nd & 3rd year B.Sc. Perfusion Technology

Theory – 20 Marks

Practicals – 20 Marks

There shall be a minimum of two periodical tests preferably one in each term in theory and practical of each subject in an academic year. The average marks of the two tests will be calculated and reduced to 20. The marks of IA shall be communicated to the University at least 15 days before the commencement of the University examination. The University shall have access to the records of such periodical tests. The marks of the internal assessment must be displayed on the notice board of the respective colleges within a fortnight from the date test is held. If a candidate is absent for any one of the tests due to genuine and satisfactory reasons, such a candidate may be given a re-test within a fortnight.

* There shall be no University Practical Examination in First year.

7. Subject and hours of teaching for Theory and Practicals

The number of hours of teaching theory and practical, subject wise in first year, second year and third year are shown in Table-I, Table-II and Table-III

Main and Subsidiary subjects are common in first year for all the courses in Allied Health Science.

The number of hours for teaching theory and practical for main subjects in first, Second and Third year are shown in Table-I, II and III.

Table - I Distribution of Teaching Hours in First Year Subjects

Main subjects

Sl. no	Subject Theory No. of	Hours	Practical No. of Hours	Total No. of Hours
1	Human Anatomy	70	20	90
2	Physiology	70	20	90
3	Biochemistry I	70	20	90
4	Pathology I (Clinical Pathology, Haematology & Blood Banking)	70	20	90
5	Microbiology	70	20	90
	Total	350	100	450

The classes in main and subsidiary subjects are to be held from Monday to Thursday. On Fridays and Saturdays students shall work in hospitals in the respective specialty or department chosen by them

Subsidiary Subjects

1. English
2. Health Care

Table - II Distribution of Teaching Hours in Second Year Subjects.

Main Subjects

Sl. no	Subject Theory	No. of Hours	Practical No. of Hours	Clinical Postings	Total No. of Hours
1	Applied Pharmacology	50	--	--	50
2	Applied Pathology	30	30	--	60
3	Applied Microbiology	30	30	--	60
4	Medicine Relevant to Perfusion Technology	50	--	--	50
5	Introduction to Perfusion Technology	80	100	650	830
	Total	240	160	650	1050

Subsidiary Subjects

1. Sociology
2. Indian constitution
3. Environment science and health

Table - III Distribution of Teaching Hours in Third Year Subjects

Main Subjects

Sl. no	Subjects	Theory No.of Hours	Practical No. of Hours	Clinical Posting	Total No. of Hours
1	Paper-I Perfusion Technology Clinical	50	50	250	350
2	Paper-II Perfusion Technology – Applied	50	50	250	350
3	Paper-III Perfusion Technology – Advanced	50	50	250	350
	Total	150	150	750	1050

Subsidiary Subjects

1. Research & Biostatistics
2. Basics Computer application

Schedule of Examination:

The university shall conduct two examinations annually at an interval of not less than 4 to 6 months as notified by the university from time to time. A candidate who satisfies the requirement of attendance, progress and conduct as stipulated by the university shall be eligible to appear for the university examination. Certificate to that effect shall be produced from the Head of the institution along with the application for examination and the prescribed fee.

8. Scheme of Examination

There shall be three examinations, one each at the end of I, II and III year. The examination for both main and subsidiary subjects for all courses in Allied Health Sciences shall be common in the first year. Distribution of Subjects and marks for First Year, Second year & Third year University theory and practical Examinations are shown in the Table – IV, V & VI.

First year examination:

The University examination for 1st year shall consist of only theory examination and there shall be no University Practical Examination.

Second & Third year examination:

The University examination for 2nd and 3rd year shall consist of Written Examination & Practical.

Written Examinations consists of

- 05 papers in the 1st year
- 04 papers in the 2nd Year
- 03 papers in the 3rd Year.

Practical examination:

Two practical examinations, at the end 2nd Year and three practical examinations at the end of the 3rd year.

TABLE-IV**Distribution of Subjects and marks for First Year University theory Examination**

A	Main Subjects *	Written Paper		I A Theory	Total
		Duration	Marks	Marks	Marks
1	Basic Anatomy (Including Histology)	3 Hours	80	20	100
2	Physiology	3 Hours	80	20	100
3	Biochemistry	3 Hours	80	20	100
4	Pathology	3 Hours	80	20	100
5	Microbiology	3 Hours	80	20	100
	Subsidiary Subject**				
1	English	3 Hours	80	20	100
2	Kannada	3 Hours	80	20	100
3	Health care	3 Hours	80	20	100

Note: I A = Internal Assessment

*Main Subjects shall have University Examination.

There shall be no University Practical Examination.

**Subsidiary subjects: Examination for subsidiary subjects shall be conducted by respective colleges.

TABLE – V**Distribution of Subjects and marks for Second Year Examination of B.Sc. Perfusion Technology**

Paper	Subject	Theory			Practicals			Grand Total
		Univ. exam	IA	Sub Total	Univ. Prac	IA	Sub Total	
I	Applied Pharmacology	80	20	100	---			100
II	Applied Pathology	40	20	100	40	10	50	150
II	Applied Microbiology	40						
III	Medicine Relevant to Perfusion Technology	80	20	100	---			100
IV	Introduction to Perfusion Technology	80	20	100	40	10	50	150

TABLE – VI**Distribution of Subjects and marks for Third Year Examination of B.Sc. Perfusion Technology**

Paper	Subject	Theory			Practical			
		Univ. exam	IA	Sub Total	Univ . Prac	IA	Sub Total	Grand Total
I	Paper-I Perfusion Technology Clinical	80	20	100	120(40 +40+40)	30 (10+10+ 10)	150	450
II	Paper-II Perfusion Technology - Applied	80	20	100				
III	Paper-III Perfusion Technology - Advanced	80	20	100				

9. Pass criteria**9.1. First year examination**

a. Main Subjects: A candidate is declared to have passed in a subject, if he/she secures,50% of marks in University Theory exam and internal assessment added together.

b. Subsidiary Subjects: The minimum prescribed marks for a pass in subsidiary subject shall be 35% of the maximum marks prescribed for a subject. The marks obtained in the subsidiary subjects shall be communicated to the University before the Commencement of the University examination.

9.2. Second and Third year Examination

a. Main Subjects: A candidate is declared to have passed the examination in a subject if he/she secures 50% of the marks in Theory and 50% in practical separately. For a pass in theory, a candidate has to secure a minimum of 40% marks in the University conducted written examination, and 50% in aggregate in the University conducted written examination and internal assessment added together and for pass in Practical, a candidate has to secure a minimum of 40% marks in the university conducted Practical/Clinical examination and 50% in aggregate i.e. University conducted Practical/Clinical and Internal Assessment.

b. Subsidiary Subjects: The minimum prescribed marks for a pass in subsidiary subject shall be 35% of the maximum marks prescribed for a subject. The marks obtained in the subsidiary subjects shall be communicated to the University before the commencement of the University examination.

10. Carry over benefit

10.1 First year examination:

A candidate who fails in any two of the five main subjects of first year shall be permitted to carry over those subjects to second year. However, he/ she must pass the carry over subjects before appearing for second year examination.

10.2. Second year examination:

A candidate is permitted to carry over any one main subject to the third year but shall pass this subject before appearing for the third year examination.

11. Declaration of Class

a. A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 75% of marks or more of grand total marks prescribed will be declared to have passed the examination with Distinction.

b. A candidate having appeared in all subjects in the same examination and passed that examination in the first attempt and secures 60% of marks or more but less than 75% of grand total marks prescribed will be declared to have passed the examination in First Class.

c. A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 50% of marks or more but less than 60% of grand total marks prescribed will be declared to have passed the examination in Second Class.

d. A candidate passing the university examination in more than one attempt shall be placed in Pass class irrespective of the percentage of marks secured by him/her in the examination.

e. The marks obtained by a candidate in the subsidiary subjects shall not be considered for award of Class or Rank.

[Please note, fraction of marks should not be rounded off clauses (a), (b) and (c)]

12. Eligibility for the award of Degree:

A candidate shall have passed in all the subjects of first, second and third year to be eligible for a compulsory 12 months of rotational internship. On completion of 12 months of the internship with pass criteria in outgoing clinical assessment exams the candidate is then eligible for the award of degree.

13. Distribution of Type of Questions and Marks for Various Subjects

THEORY

9. Distribution of Type of Questions and Marks

SUBJECTS HAVING MAXIMUM MARKS= 100 (for First year)		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	2	10
Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice) $2 \times 10 = 20$ marks
 2. Short essay- 10 Questions (Questions no 5 & 10 choice) $10 \times 5 = 50$ marks
 3. Short answer- 10 Questions (Questions no 15 & 20 choice) $10 \times 3 = 30$ marks
- Total= 100**

SUBJECTS HAVING MAXIMUM MARKS= 100 (for Second and Third Year)		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	2	10
Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice) $2 \times 10 = 20$ marks
 2. Short essay- 10 Questions (Questions no 5 & 10 choice) $10 \times 5 = 50$ marks
 3. Short answer- 10 Questions (No choice) $10 \times 3 = 30$ marks
- Total= 100**

SUBJECTS HAVING MAXIMUM MARKS= 80 (for Subsidiary subjects)		
Type of Questions	NO. of questions	Marks for Each Questions
Essay Type	3 (2 x 10)	10
Short Essay Type	8 (6 x 5)	05
Short Answer Type	12 (10 x 3)	03

1. Long essay- 1 Questions (No choice) $2 \times 10 = 20$ marks
 2. Short essay- 05 Questions (Choice is on Questions no 03) $06 \times 5 = 30$ marks
 3. Short answer- 05 Questions (Choice is on Questions no 03) $10 \times 3 = 30$ marks
- Total= 80**

SUBJECTS HAVING MAXIMUM MARKS= 50		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	1	10
Short Essay	05	05
Short Answer	05	03

4. Long essay- 1 Questions (No choice) $1 \times 10 = 10$ marks
 5. Short essay- 05 Questions (Choice is on Questions no 03) $05 \times 5 = 25$ marks
 6. Short answer- 05 Questions (Choice is on Questions no 03) $05 \times 3 = 15$ marks
- Total= 50**

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STUDENT LEARNING OUTCOMES ALLIED HEALTH SCIENCES PROGRAMMES

- Employ critical thinking and innovation to analyze challenges, concepts, research, and clinical outcomes and apply them to professional practice.
- Analyze, interpret, integrate and evaluate information with the ability to communicate findings in a written or oral format.
- Demonstrate a broad-based and integrative understanding of basic biological, physical, chemical, and/or psychological concepts that prepare them for careers in health science.
- Approach patient care from a cultural humility perspective that respects varied backgrounds including but not limited to: cultural, social, religious, racial, gender, and ethnic diversity of the patient and family regarding disease and their health.
- Integrate concepts from various scientific fields to meet the requirements for entry-level healthcare administrative positions or admission to professional programs in allied health fields (e.g. athletic training, physical therapy, occupational therapy, physician assistant, chiropractic, etc)

INTENDED LEARNING OUTCOMES- COMMON FOR ALL SPECIALITY

COURSE TITLE	OUTCOMES	ASSESSMENT METHODS V-Verbal W-Written P-Practical
Anatomy	<ol style="list-style-type: none"> 1. Define basic technical terminology and language associated with anatomy 2. Identify the structures of human body 3. Describe the anatomy of human body 4. Describe the structure and features of the organ systems of the human body 5. Identify the anatomical structure in the dissected specimen 	W,P,V Internal [20]+ university [80] Total marks=100
Physiology	<ol style="list-style-type: none"> 1. Describe the functional anatomy and histology of various organ systems 2. Describe the basic physiological principles involved in the normal functioning of the human body 3. Apply the physiological principles in comprehending the pathophysiology of disease and its management 	W,P,V Internal [20]+ university [80] Total marks=100
Biochemistry	<ol style="list-style-type: none"> 1. Describe chemistry & metabolism of macromolecules, vitamins and minerals 2. Correlate biochemical mechanisms to diseases 3. Discuss the importance of biochemical parameters in clinical decision making 	W,P,V Internal [20]+ university [80] Total marks=100 Practical
Microbiology	<ol style="list-style-type: none"> 1. Classify microorganisms, discuss the morphological and growth characteristics and its association with causation of disease 2. Demonstrate and interpret basic laboratory techniques used in the detection of micro organisms 3. Explain principles of antimicrobial therapy and Immunization 4. Demonstrate basic infection control practices 	W,P,V Internal [20]+ university [80] Total marks=100
Pathology	<ol style="list-style-type: none"> 1. Identify and Describe the causative agent in various disease 2. Comprehend the major signs and symptoms of the various diseases 3. Describe the pathophysiology of various disease related to anesthetic care Apply pathophysiology 4. knowledge in anesthetic care 5. To Analyze the patient pre-operative fit for undergoing procedure 	W,P,V Internal [20]+ university [80] Total marks=100

LEARNING OUTCOMES - PERFUSION TECHNOLOGY

COURSE TITLE		OUTCOMES	ASSESSMENT METHODS V- Verbal .W-Written P- Practical
Applied Pharmacology		1.To describe Medical Terminology as related to pharmacology. 2.To analyze drug dosages, drug interactions and how drug specificity relates to drug receptors. 3. To explain nomenclature of drugs. 4. To describe routes of administration. 5.To differentiate Pharmaceutical and Pharmacokinetic phase and their components. 6. To categorize the concepts of Bioavailability/Biological Availability.	Internal [20] University [80] Total marks=100
Applied Science	Elective I: Applied Pathology	1.To determine the concepts of disease and outlines of clinical evaluation related to perfusion technology 2.To demonstrate skills in the evaluation of clinical data related to cardiac pathology	Internal [20] University [80] Total marks=100 P=40 IA=10 Total 50 Total W+P=150
	Elective II : Applied Microbiology	1.Classify microorganisms, discuss the morphological and growth characteristics and its association with causation of disease	
Medicine Relevant to Perfusion Technology		1.To describe the systemic effects of the ECC on blood components and the inflammatory response 2.To explain the principles involved in cardiopulmonary bypass	Internal [20] University [80] Total marks=100
Introduction to Perfusion Technology		1.To describe the systemic effects of the ECC on blood components and the inflammatory response 2. To explain the principles involved in cardiopulmonary bypass (CPB) 3.To analyse the concept of hemodilution and its physiological effects during CPB 4. To apply concepts involved in myocardial protection while on	Internal [20] University [80] Total marks=100 P=40 IA=10 Total 50 Total W+P=150
Paper-I Perfusion Technology Clinical		1.To determine and use reason, analysis, calculations, problem solving, critical thinking, and other learning skills to acquire knowledge, and to comprehend and synthesize complex situations. 2. To be prepared for achieving and maintaining a high level of knowledge and clinical competence, as well as having a distinct awareness of the consequence of error in judgment and/or skill.	Internal [20] University [80] Total marks=100 P=40 IA=10 Total 50 Total W+P=150
Paper-II Perfusion Technology – Applied		1.To develop the ability to master complex techniques by thoroughly understanding the principles that govern them and to apply these techniques in designing strategies to investigate problems. 2.To develop judgement and problem solving skills and enhance their ability to critically evaluate data and formulate hypotheses.	Internal [20] University [80] Total marks=100 P=40 IA=10 Total 50 Total W+P=150
Paper-III Perfusion Technology – Advanced		1.To develop the knowledge and skills that allow the pursuit of a career in a wide range of environments. 2.To specialize in distinctive areas of Perfusion Science so that they may share their experiences to mutual benefit	Internal [20] University [80] Total marks=100 Total W+P=150

FIRST YEAR B.SC PERFUSION TECHNOLOGY

ANATOMY

No. of theory classes: 70 hours

No. of practical classes: 20 hours

Theory: 70hrs

Practicals: 20hrs

Chapter 1

Introduction:

Theory:

- Definition of anatomy and its divisions
- Terms of location, positions and planes
- Epithelium-definition, classification, describe with examples, function
- Glands- classification, describe serous, mucous & mixed glands with examples
- Basic tissues – classification with examples

Practical:

- Histology of types of epithelium
- Histology of serous, mucous & mixed salivary gland

Chapter 2

Connective tissue:

Theory:

- Cartilage – types with example & histology theory
- Bone – Classification, names of bone cells, parts of long bone, microscopy of compact
- bone, names of all bones, vertebral column, intervertebral disc, fontanelles of fetal skull
- Joints – Classification of joints with examples, synovial joint (in detail for radiology)
- Muscular system: Classification of muscular tissue & histology
- Names of muscles of the body

Practical:

- Histology of the 3 types of cartilage
- Histology of compact bone (TS & LS)
- Histology of skeletal (TS & LS) & cardiac muscle

- Demo of all bones showing parts, radiographs of normal bones & joints
- Demonstration of important muscles of the body

3. Cardiovascular system:

Theory:

- Heart-size, location, chambers, exterior & interior, pericardium
- Blood supply of heart
- Systemic & pulmonary circulation
- Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery
- Inferior vena cava, portal vein, portosystemic anastomosis, Great saphenous vein, Dural venous sinuses
- Lymphatic system- cisterna chyli & thoracic duct, Histology of lymphatic tissues, Names of regional lymphatics, axillary and inguinal lymph nodes in brief

Practical:

- Demonstration of heart and vessels in the body
- Histology of large artery & vein, medium sized artery & vein
- Histology of lymph node, spleen, tonsil & thymus
- Radiology: Normal chest radiograph showing heart shadows

4. Gastro-intestinal system

Theory:

- Parts of GIT: Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Waldeyer's ring), Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas, spleen, peritoneum & reflections

Practical:

- Demonstration of parts of GIT
- Radiographs of abdomen

5. Respiratory system

- Parts of RS: nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments, diaphragm
- Histology of trachea, lung and pleura
- Names of paranasal air sinuses

Practical:

- Demonstration of parts of respiratory system.
- Normal radiographs of chest, X-ray paranasal sinuses
- Histology of lung and trachea

6. Urinary system

Theory:

- Kidney, ureter, urinary bladder, male and female urethra
- Histology of kidney, ureter and urinary bladder

Practical:

- Demonstration of parts of urinary system
- Histology of kidney, ureter, urinary bladder
- Radiographs of abdomen-IVP, retrograde cystogram

7. Reproductive system

Theory:

- Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology)
- Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology)
- Mammary gland – gross

Practical:

- Demonstration of section of male and female pelvis with organs in situ
- Histology of testis, vas deferens, epididymis, prostate, uterus, fallopian tubes, ovary
- Radiographs of pelvis – hysterosalpingogram

8. Endocrine glands

Theory:

- Names of all endocrine glands in detail on pituitary gland, thyroid gland & suprarenal gland – (gross & histology)

Practical:

- Demonstration of the glands
- Histology of pituitary, thyroid, parathyroid, suprarenal glands

9. Nervous system

Theory:

- Neuron & Classification of NS
- Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve
(gross & histology) Meninges, Ventricles & cerebrospinal fluid, Names of basal nuclei
- Blood supply of brain
- Cranial nerves
- Sympathetic trunk & names of parasympathetic ganglia

Practical:

- Histology of peripheral nerve & optic nerve
- Demonstration of all plexuses and nerves in the body
- Demonstration of all part of brain
- Histology of cerebrum, cerebellum, spinal cord

10. Sensory organs**Theory:**

- Skin: Skin-histology & Appendages of skin
- Eye: Parts of eye & lacrimal apparatus, Extra-ocular muscles & nerve supply
- Ear: parts of ear- external, middle and inner ear and contents

Practical:

- Histology of thin and thick skin
- Demonstration and histology of eyeball
- Histology of cornea & retina

11. Embryology:**Theory:**

- Spermatogenesis & oogenesis
- Ovulation, fertilization
- Fetal circulation
- Placenta

INTERNAL ASSESSMENT

Theory-average of 2 exams conducted 20

Practicals: record and lab work* 10

*There shall be no university practical examination and internal assessment marks secured in Practicals need not be sent to the university.

Distribution of Marks for University Theory and Practical Exam

Practicals				Grand total		
Theory	IA	Sub	Practicals	IA	Sub Total	
		Total				
80	20	100	*			100

REFERENCE BOOKS:

1. William Davis (P) understanding Human Anatomy and Physiology – McGraw Hill
2. Chaurasia- A Text Book of Anatomy
3. T. S. Ranganathan- A Text Book of Human Anatomy
4. Fattana, Human Anatomy (Description and applied)- Saunder's & C P Prism Publishers, Bangalore
5. ESTER. M. Grishcimer- Physiology & Anatomy with Practical Considerations, J. P. Lippin Cott. Philadelphia
6. Bhatnagar- Essentials of Human Embryology- Revised Edition. Orient Blackswan Pvt. Ltd.

PHYSIOLOGY

Theory 70 hours

Practical 20hours

1. General Physiology

Introduction to cell physiology, transport across cell membrane

Homeostasis, Body Fluid compartment & measurement

2. Blood

Introduction - composition and function of blood

Plasma. proteins, types and functions

Red blood cells - erythropoiesis, stages of differentiation, factors affecting it, function, normal count, physiological variation.

Hemoglobin- function, concentration, types & methods of Hb estimation, fate of hemoglobin

Jaundice-types Anaemia,-types

ESR, PCV, osmotic fragility & blood indices

WBC- morphology, production, functions, normal count, differential count, variation, variation Immunity (in brief)

Platelets- origin, morphology, normal count, function-Platelet plug ,bleeding disorder

Haemostasis - definition, normal haemostasis, clotting factors, mechanism of clotting, anticoagulants disorders of clotting factors.

Blood group-ABO & Rh system, Rh incompatibility blood typing ,cross matching, hazards of mismatched blood transfusion

RES, spleen and lymph

3. Nerve-Muscle

Neuron structure, types, neuroglia-types, nerve fibre classification, properties of nerve fibres,

RMP,action potential, wallerian degeneration

NMJ, blockers, Myasthenia gravis

Classification of muscle, structure of skeletal muscle, sarcomere, contractile proteins

Excitation contraction coupling, mechanism of muscle contraction, types of contraction

Motor unit, fatigue, rigor mortis Smooth muscle

4. Respiratory system

Physiological anatomy of respiratory system, muscles of respiration, respiratory & non respiratory functions of lungs, dead space

Mechanics of breathing, intrapulmonary & pleural pressures

Compliance, Surfactant, Hyaline membrane disease

Lung volumes and capacities

Respiratory membrane , transport of O₂ & CO₂

Chemical regulation of respiration

Neural regulation of respiration

Hypoxia, Acclimatization,

Dysbarism. Artificial respiration

Definition-Periodic breathing ,dyspnoea, apnoea, asphyxia,, cyanosis

5. Cardiovascular system

Introduction to CVS & general principles of circulation

Properties of Cardiac muscle

Cardiac cycle, heart sounds, Pulse

Cardiac output, factors and measurement

Heart rate

BP-factors, measurement, Short term regulation

Intermediate and long term regulation of BP

ECG uses and significance, .normal waveform, heart block

Coronary circulation, Cutaneous circulation-Triple response

Shock

Effects of exercise on CVS and Respiratory system

6. Renal system, Skin and body temperature

Kidneys- functions, structure of nephron, type, juxtaglomerular apparatus-structure and function, non-excretory functions of kidney

Glomerular filtration rate (GFR)- Definition ,normal value, factors affecting GFR

Tubular reabsorption - sites, substance reabsorbed, mechanisms of reabsorption

Tubular secretion- sites, substance secreted, mechanisms of reabsorption

Counter current mechanism of concentration of urine

Obligatory and Facultative reabsorption of water

Micturition reflex, Diuretics

Artificial kidney, renal function tests-clearance tests

Skin -structure and function, body temperature measurement, physiological variation,

Regulation of body Temperature by physical chemical and nervous mechanisms-Role of Hypothalamus

Hypothermia and fever

7. Digestive system

Physiological anatomy, Enteric nervous system & functions of GIT

Saliva- composition, regulation, disorder.

Deglutition- stages & disorders

Stomach-functions, composition and regulation of gastric juice

Gastric motility, MMC, vomiting reflex.

Pancreas- function, composition and regulation of pancreatic juice

Liver & gall bladder-functions, bile- composition, secretion and regulation

Small intestine- Succus entericus-composition, functions & movements

Large intestine- functions, movements and defecation reflex

Digestion & absorption of Carbohydrates, fats and proteins

8. Endocrine system

Classification of Endocrine glands & their hormones & properties-chemistry and receptor, feedback mechanisms of hormone regulation.

Anterior pituitary hormones- secretion, functions , disorders

Posterior pituitary hormones- secretion , functions , disorders

Thyroid hormones- secretion, functions, disorders

Parathyroid hormones- secretion, functions, disorders

Calcium homeostasis & disorders

Pancreatic hormones, -Insulin and Glucagon- . secretion, functions, disorders

Adrenal cortex- Glucocorticoids & Mineralocorticoids, Androgen - secretion, functions, disorders

Adrenal medulla- secretion, functions, disorders Thymus & Pineal gland

9. Reproductive system

Introduction to reproductive system, sex differentiation & Puberty

Male reproductive system, functions of testosterone & Spermatogenesis

Female reproductive system, functions of Estrogen, Progesterone,

Oogenesis Ovulation & Menstrual cycle

Physiological changes during pregnancy, pregnancy tests, parturition & lactation

Male & Female contraceptive methods

10. Central nervous system

Introduction to CNS, Sensory receptors classification, properties

Synapse– classification, properties

Sensory pathways: Anterior spino thalamic tract and Posterior column pathway

Lateral spino thalamic tract, Types of pain, Referred pain, Thalamus; nuclei and function

Classification of reflexes, Monosynaptic reflex- Stretch reflex , muscle spindle ,inverse stretch reflex.

Polysynaptic reflex-Withdrawal reflex

Motor pathways : Pyramidal pathway and functions, UMNL, LMNL

Cerebral cortex (Sensory and motor)-functions, Medulla and Pons-functions

Cerebellum –functions, disorders

Basal ganglia-functions, disorders

Hypothalamus and Limbic system-functions

CSF, lumbar puncture

Sleep, EEG,

Autonomic Nervous System - Sympathetic and parasympathetic distribution and functions

11. Special senses

Vision –Functional anatomy of eye, visual pathway, lesion

Refractive errors, color vision

Audition – Physiological anatomy of ear, Mechanism of hearing, auditory pathway, deafness

Olfaction –modalities, receptor, function, abnormalities

Gustation-modalities, receptor, function, taste pathway, abnormalities

Practicals

Blood pressure Recording

Auscultation for Heart Sounds

Artificial Respiration

Determination of vital capacity

INTERNAL ASSESSMENT

Theory-average of 2 exams **20**
conducted

Practicals: record and lab work* **10**

***There shall be no university practical examination and internal assessment marks secured in
Practicals need not be sent to the university.**

NO PRACTICAL EXAMINATION

REFERENCE BOOKS:

- 1. Guyton (Arthur) Text Book of Physiology. Latest Ed. Prism Publishers**
- 2. Chatterjee (CC) Human Physiology Latest Ed. Vol. 1, Medical Allied Agency**
- 3. Choudhari (Sujith K) Concise Medical Physiology Latest Ed. New Central Book**
- 4. Ganong (William F) Review of Medical Physiology. Latest Ed. Appleton**

BIOCHEMISTRY

No. Theory classes: 70hours

No. of practical classes: 20 hours

1. Carbohydrate Chemistry [3 hours]

- Classification (Definition/ examples for each class)
- Monosaccharides (classification depending upon number of carbon atoms and functional group with examples)
- Disaccharides (Sucrose/ lactose/ maltose and their composition)
- Polysaccharides :
 - a) Homopolysaccharides (Structure of starch and glycogen)
 - b) Heteropolysaccharides (Functions)

2. Lipid Chemistry [3 hours]

- Definition of lipids
- Functions of lipids in the body
- Classification of lipids (subclasses with examples)
- Definition and Classification of fatty acids
- Essential fatty acids
- Phospholipids and their importance

3. Amino- acid and Protein Chemistry [3 hours]

- General structure of D and L amino acids
- Amino acids; Definition and Classification of amino acids with examples.
- Peptides; definition & Biologically important peptides
- Classification of Proteins based on composition, functions and shape (with examples)
- Functions of amino acids and Proteins

4. Nucleotide and Nucleic acid Chemistry [3 hours]

- Nucleosides & Nucleotides
- Nucleic acid Definition & types
- Composition & functions of DNA & RNA

- Structure of DNA (Watson and Crick model)
- Structure of tRNA, & functions of tRNA, rRNA, mRNA
- Difference between DNA and RNA

5. Enzymes [5 hours]

- Definition & Classification of Enzymes with example
- Definitions of Active site, Cofactor (Coenzyme, Activator),
- Proenzyme; Definition and examples (Pepsin & trypsin)

6. Digestion and Absorption [3 Hours]

- General characteristics of digestion and absorption,
- Digestion and absorption of carbohydrates, proteins and lipids.

7. Carbohydrate Metabolism [5 Hours]

- Glycolysis ; Aerobic, Anaerobic, Definition , Site and subcellular site , Steps with all the enzymes and coenzymes at each step , mention the regulatory enzymes , Energetics,
- Citric acid cycle; Pyruvate dehydrogenase complex (reaction and coenzymes) , Site and subcellular site , Reactions with all the enzymes and coenzymes ,Regulatory enzymes , Energetics
- Significance of HMP Shunt pathway.
- Hyperglycemic and hypoglycemic hormones
- Blood Glucose Regulation.
- Diabetes mellitus (definition, classification, signs and symptoms)
- **Glycogen metabolism and gluconeogenesis**

8. Lipid Metabolism [4 Hours]

- Introduction to lipid metabolism, Lipolysis
- Beta oxidation of fatty acids ; Definition ,Site and subcellular site , Activation of palmitic acid , Transport of activated palmitic acid into mitochondria , Reactions , Energetics.
- Name the different ketone bodies . Note on ketosis

9. Amino acid and Protein Metabolism [3 Hours]

- Introduction, transamination, deamination, Fate of ammonia, transport of ammonia,
- Urea cycle.

10. Vitamins [5 Hours]

- Definition and classification .
- RDA, sources, coenzyme forms, biochemical functions and disorders for the following water soluble vitamins: Thiamine, Niacin, Pyridoxine, Cobalamine, Folic acid, Ascorbic acid
- RDA, sources, coenzyme forms, biochemical functions and deficiency disorders for the following fat soluble vitamins; A and vitamin D

11. Mineral Metabolism [3 Hours]

- Name the macro/ microminerals
- Iron: Sources ,RDA, Functions and Disorders of deficiency and excess
- Calcium and phosphorus: Sources ,RDA, functions, normal serum levels and hormones reulating their levels

12. Nutrition [6 hours]

- Balanced diet (Definition)
- Caloric value ; Definition , Caloric values of carbohydrates, proteins and fats
- Total daily caloric requirements of an adult male and female,
- RDA (Definition, standard values for nutrients)
- Basal metabolic rate(BMR) ; Definition , Magnitude of BMR in men and women, Factors affecting BMR
- Thermic effect/ SDA of food (Definition, values for major macronutrients)
- **Carbohydrates ;. Daily dietary requirement. 2. Dietary fibers (Definition, functions, importance and their daily requirements)**
- **Proteins ;. Daily requirement , Biological value. a. Definition b. Protein used as a standard for this, Protein sources with high and low biological value , Mutual supplementation of proteins (Definition, examples).**
- **Fats ; Daily requirement , Essential fatty acids (Definition, functions, daily requirement and deficiency manifestations) , Saturated and unsaturated fatty acids (Definition, sources, examples).**
- **Malnutrition**

13. Renal Function Tests [2 hours]

- Name the different tests to access the kidney functions

- Explain Creatinine clearance & Inulin clearance

- Urinary acidification test

14. Radioactive Isotopes [1 hour]

- Definition, clinical applications
- Biological effects of radiations

15. Clinical Biochemistry [5 hours]

A. Definitions of acid, base, pH and pKa [1 hour]

B. Buffers • Definition [2 hours]

- Henderson Hasselbalch equation,
- Principal buffer systems in the ECF ICF and urine
- Bicarbonate and phosphate buffer systems (pKa value, normal ratio of base/acid in the plasma)
- Acidosis & Alkalosis (Definition, classification, causes and biochemical findings)

C. Normal serum levels and condition where they are altered [2 hour]

- Glucose, Protein, urea, uric acid, and creatinine
- Bilirubin, cholesterol
- Serum Electrolytes

16. Fundamental Chemistry (1 hour)

- Valency, Molecular weight & Equivalent weight of elements and compounds. Normality, Molarity, Molality.

17. Solutions: Definition, use, classification where appropriate, preparation and storage (5 hours)

- Stock and working solutions.
- Molar and Normal solutions of compounds and acids. (NaCl, NaOH, HCl, H₂SO₄, H₃PO₄, CH₃COOH etc.,)
- Preparation of percent solutions – w/w, v/v w/v (solids, liquids and acids), Conversion of a percent solution into a molar solution
- Saturated and supersaturated solutions
- Standard solutions. Technique for preparation of standard solutions and Storage. E.g: glucose, albumin etc.
- Dilutions- Diluting Normal , Molar and percent solutions. Preparing working standard from stock standard.
- Part dilutions: Specimen dilutions. Serial dilutions. Reagent dilution. Dilution factors

ASSIGNMENT TOPICS

- 1. Units of measurement**
2. Hazards - Physical, Chemical, Biological
3. Arterial blood gas analysis
4. Responsibilities of Health care personnel
5. Biomedical waste management

Total theory hours = 70

PRACTICAL DEMONSTRATION [20 hours]

- Color Reactions of Carbohydrates & amino acids.
- Precipitation Reactions of proteins
- Colorimetry
- Estimation of Blood glucose Folin Wu and enzymatic method
- Estimation of Urea by DAM method

INTERNAL ASSESSMENT

Theory-average of 2 exams conducted 20

Practicals: record and lab work* 10

*There shall be no university practical examination and internal assessment marks secured in Practicals need not be sent to the university.

NO PRACTICAL EXAMINATION

Text Book References

- Biochemistry – 3rd revised edition by U Sathyanarayana & U Chakrapani
- Textbook of Medical Biochemistry-6th Edition by MN Chatterjea & Rana Shinde
- Textbook of Medical Laboratory technology 2nd edition by Godkar and Godkar.
- Biochemistry- 3rd edition by Pankaja Naik
- Medical Laboratory technology 6th edition by Ramnik Sood.
- Manipal Manual of Clinical Biochemistry for medical laboratory and M.Sc., students- 3rd edition by Shivananda Nayak B
- Varley's Practical Clinical Biochemistry, 4th, 5th and 6th editions

PATHOLOGY

Clinical Pathology, Hematology and Blood

Banking Theory-70 hours

Practicals-20 hours

I. Clinical Pathology- Theory

- Introduction to clinical pathology
- Collection , transport, preservation and processing of various clinical specimens
- Urine examination- collection and preservation, Physical, chemical and microscopic examination for abnormal constituents
- Examination of Body fluids
- Examination of Cerebrospinal fluid (CSF)
- Sputum examination
- Examination of feces

II. Hematology – Theory

- Introduction to hematology
- Normal constituents of Blood, their structure and functions
- Collection of Blood samples
- Various anticoagulants used in Hematology
- Hemoglobin estimation, different methods and normal values
- Packed cell volume
- Erythrocyte sedimentation rate
- Normal Haemostasis
- Bleeding time. Clotting time, prothrombin time, Activated partial Thromboplastin time

III. Blood Bank- Theory

- Introduction blood banking
- Blood group system
- Collection and processing of blood for transfusion
- Compatibility testing
- Blood transfusion reactions

- **General Pathology:**

- **Cell injury:**

a. Definition, causes.

b. Cellular adaptations – Hypertrophy, hyperplasia, atrophy and metaplasia.

- c. Types of cell injury – Reversible and irreversible; morphology of reversible injury.
- d. Necrosis – Definition and patterns of tissue necrosis.
- e. Intracellular accumulations – Lipids, cholesterol, proteins, glycogen and pigments; examples.
- f. Pathologic calcification – Types and examples.

- **3) Inflammation:**

- a. Definition and signs of inflammation.
- b. Types – Acute and chronic inflammation.
- c. Acute inflammation – Causes, morphological patterns and outcome.
- d. Chronic inflammation – Causes, morphology and examples.
- e. Regeneration and repair – Mechanism of cutaneous wound healing.
- f. Factors affecting wound healing.

- **4) Hemodynamic disorders:**

- a. Edema – Definition, pathogenesis and types: Renal, cardiac, pulmonary and cerebral.
- b. Difference between transudate and exudate.
- c. Shock – Definition, types of shock with examples: Hypovolemic, cardiogenic and septic shock, stages of shock: Non progressive, progressive and irreversible.
- d. Thrombosis – Definition, mechanism of thrombus formation (Virchow's triad) and fate of thrombus.
- e. Embolism – Definition and types: Thromboembolism, fat, air and amniotic fluid embolism.
- f. Infarction – Definition and examples.

- **5) Immune system:**

- a. Autoimmune diseases – General features, enumerate systemic and organ specific autoimmune diseases.
- b. Systemic lupus erythematosus – Manifestations and diagnosis.

- **6) Neoplasia:**
 - a. Definition and nomenclature of tumors.
 - b. Differences between benign and malignant neoplasms.
 - c. Enumerate modes of carcinogenesis: Genes, physical, chemical and microbial agents of carcinogenesis.
 - d. Modes of spread of tumors.
 - e. Clinical aspects of neoplasia.
 - f. Grading and staging of cancers.
 - g. Laboratory diagnosis of cancer.

Practicals

1. Urine analysis- Physical, Chemical, Microscopic
2. Blood grouping and Rh typing
3. Hb estimation , packed cell volume (PCV), Erythrocyte Sedimentation rate (ESR)
4. Bleeding time and Clotting time
5. Histopathology- section cutting and H & E Staining (for BSc MLT only

INTERNAL ASSESSMENT

Theory-average of 2 exams conducted 20

Practicals: record and lab work* 10

*There shall be no university practical examination and internal assessment marks secured in Practical need not be sent to the university.

NO PRACTICAL EXAMINATION

REFERENCE BOOKS:

1. Culling Histopathology techniques
2. Bancroft Histopathology techniques
3. Koss- Cytology
4. Winifred Diagnostic cytopathology
5. Oral Cytopathology
6. Todd and Sanford- clinical diagnosis by Laboratory Medicine
7. Dacie and Lewis- Practical Hematology
8. Ramnik SOOD. Lab technology, Methods and interpretation, 4 th edition JP Bros New Delhi, 1996
9. Sathish Guptha , Short text book of Medical laboratory techniques for technicians
10. Sachdev K N. Clinical Pathology and Bacteriology, 8 th edi JP Bros, New Delhi, 1996

MICROBIOLOGY

Theory: 70 Hours

Practicals: 20 Hours

1. Introduction (6 hrs)

History of Microbiology - Louis Pasteur, Antony Van Leeuwenhoek, Robert Koch, Edward Jenner, Alexander Fleming.

Use of microscope in the study of bacteria - Types of microscopes - compound microscope, phase contrast microscope, electron microscope, fluorescent microscope, dark ground microscope.

Morphology of bacterial cell

2. Growth and Nutrition (6 hrs.)

Nutrition, growth and multiplication of bacteria, bacterial growth curve, culture media, culture methods, anaerobic culture methods.

3. Sterilization and disinfection (8 hrs.)

Principles and use of equipments of sterilization, chemicals used in disinfection, testing of disinfectants.

4. Biomedical waste management principle and practice

5. Immunology (5hrs.)

Immunity - mechanism of immunity, classification, types

Vaccines

Immunization schedule

Definition of antigen, antibody, list of antigen antibody reaction (no need of detailed account of antigen antibody reactions)

Definition of hypersensitivity and classification (no need of detailed account of types of hypersensitivity)

6. Infection (5 hrs.)

Definition, types and mode of transmission

Hospital acquired infection - causative agents, mode of transmission and prophylaxis.

Antimicrobial sensitivity testing

7. Systematic bacteriology (15 hrs.)

Disease caused and laboratory diagnosis of medically important bacteria (Staphylococcus, coagulase negative Staphylococcus, MRSA, Streptococcus pyogenes, Pneumococcus, gonococcus, E.coli, diarrhoeagenic E.coli, Salmonella, Vibrio cholerae, ElTor vibrios, Halophilic vibrios, Shigella, Mycobacterium tuberculosis, Mycobacterium leprae, Atypical Mycobacteria, Treponema pallidum, leptospira)

(no need of classification, antigenic structure, virulence mechanism)

8. Parasitology (10 hrs.)

Introduction to Parasitology

List of medically important parasites and diseases (E.histolytica, Plasmodium, W.bancrofti, Ascaris, Ancylostoma, B.coli, G.lambliia, T.solium, T.saginata)

Laboratory diagnosis of parasitic infection (No need of including life cycles)

9. Virology (10 hrs.)

Introduction to virology

List of medically important viruses and diseases (AIDS, Hepatitis, Rabies, Polio, Arbo viruses)

Cultivation of viruses and laboratory diagnosis of viral infections

10. Mycology (5 hrs.)

Introduction to Mycology

Classification of medically important fungi - (based on morphology, spore production, disease production, taxonomy)

List of medically important fungi and diseases (Candidiasis, Cryptococcosis, Dermatophytes, Aspergillosis, Mucor Mycosis)

Laboratory diagnosis of fungal infections.

Practicals (20 hrs.)

Compound microscope (Demonstration)

Demonstration of sterilization equipments

Demonstration of culture media and culture methods

Demonstration of antibiotic sensitivity testing

Demonstration of serological tests - Widal, VDRL, ASO, CRP, RA

Demonstration of gram stain and ZN staining

Demonstration of Helminthic ova

Grams stain, Acid fast staining

Stool exam for Helminthic ova

There shall be no university practical examination and Internal Assessment marks secured in practicals need not be sent to the university.

INTERNAL ASSESSMENT

Theory-average of 2 exams 20
conducted

Practicals: record and lab work* 10

*There shall be no university practical examination and internal assessment marks secured in Practical need not be sent to the university.

NO PRACTICAL EXAMINATION

Reference Books-

1. Ananthanarayana & Panikar Medical Microbiology- University Press
2. Robert Cruickshank- Medical Microbiology- The Practice of Medical Microbiology
3. Chatterjee- Parasitology- Interpretation to Clinical Medicine
4. Rippon- Medical Mycology
5. Emmons- Medical Mycology
6. Basic Laboratory methods in Parasitology, J P Bros, New Delhi
7. Basic Laboratory procedures in clinical bacteriology, J P Bros, New Delhi
8. Medical Parasitology- Ajit Damle
9. Introduction to medical microbiology- Ananthanarayana- Orient Longman Pvt. Ltd

SUBSIDIARY SUBJECTS

ENGLISH

COURSE OUTLINE

COURSE DESCRIPTION: This course is designed to help the student acquire a good command and comprehension of the English language through individual papers and conferences.

BEHAVIOURAL OBJECTIVES:

The student at the end of training is able to

1. Read and comprehend English language
2. Speak and write grammatically correct English
3. Appreciates the value of English literature in personal and professional life.

UNIT - I: INTRODUCTION:

Study Techniques

Organisation of effective note taking and logical processes of analysis and synthesis

Use of the dictionary

Enlargement of vocabulary

Effective diction

UNIT - II: APPLIED GRAMMAR:

Correct usage

The structure of sentences

The structure of paragraphs

Enlargements of Vocabulary

UNIT - III: WRITTEN COMPOSITION:

Precise writing and summarizing

Writing of bibliography

Enlargement of Vocabulary

UNIT - IV: READING AND COMPREHENSION:

Review of selected materials and express oneself in one's words.

Enlargement of Vocabulary.

UNIT - V: THE STUDY OF THE VARIOUS FORMS OF COMPOSITION:

Paragraph, Essay, Letter, Summary, Practice in writing

UNIT - VI: VERBAL COMMUNICATION:

Discussions and summarization, Debates, Oral reports, use in teaching

REFERENCE

1. English Grammar Collins, Birmingham University, International Language Data Base, Rupa & Co. 1993
2. Wren and Martin - Grammar and Composition, 1989, Chanda & Co, Delhi
3. Letters for all Occasions. A S Myers. Pub - Harper Perennial
4. Spoken English V. Shasikumar and P V Dhanija. Pub. By: Tata Mcgraw Hill, New Delhi
5. Journalism Made Simple D Wainwright
6. Writers Basic Bookself Series, Writers Digest series
7. Interviewing by Joan Clayton Platkon
8. Penguin Book of Interviews.

HEALTH CARE

Teaching Hours : 40

Introduction to Health

Definition of Health, Determinants of Health, Health Indicators of India, Health Team Concept.

National Health Policy

National Health Programmes (Briefly Objectives and scope)

Population of India and Family welfare programme in India

Introduction to Nursing

What is Nursing ? Nursing principles. Inter-Personnel relationships. Bandaging : Basic turns; Bandaging extremities; Triangular Bandages and their application.

Nursing Position, Bed making, prone, lateral, dorsal, dorsal re-cumbent, Fowler's positions, comfort measures, Aids and rest and sleep.

Lifting And Transporting Patients: Lifting patients up in the bed. Transferring from bed to wheel chair. Transferring from bed to stretcher.

Bed Side Management: Giving and taking Bed pan, Urinal : Observation of stools, urine.

Observation of sputum, Understand use and care of catheters, enema giving.

Methods of Giving Nourishment: Feeding, Tube feeding, drips, transfusion

Care of Rubber Goods

Recording of body temperature, respiration and pulse,

Simple aseptic technique, sterilization and disinfection.

Surgical Dressing: Observation of dressing procedures

First Aid :

Syllabus as for Certificate Course of Red Cross Society of St. John's Ambulance Brigade.

Reference Books:

Preventive and Social Medicine by J.Park

Text Book of P & SM by Park and Park

Counseling & Communicate skills for medical and health, Bayne- Orient Longman Pvt. Ltd.

No Practical or Viva voce examination

This is a subsidiary subject, examination to be conducted by respective colleges. Marks required for a pass is 35%

SECOND YEAR B.SC PERFUSION TECHNOLOGY

APPLIED PHARMACOLOGY

- General concepts about pharmacodynamic and Pharmacokinetic Principles involved in drug activity.

I. Autonomic nerves system.

- Anatomy & functional organisation.
- List of drugs acting on ANS including dose, route of administration, indications, contra indications and adverse effects.

II. Cardiovascular drugs- Enumerate the mode of action, side effects And therapeutic uses of the following drugs.

a. Antihypertensives

- Beta Adrenergic antagonists
- Alpha Adrenergic antagonists
- Peripheral Vasodilators
- Calcium channel blockers

b. Antiarrhythmic drugs

c. Cardiac glycosides

d. Sympathetic and non sympathetic inotropic agents.

e. Coronary vasodilators.

f. Antianginal and anti failure agents

g. Lipid lowering & anti atherosclerotic drugs.

h. Drugs used in Haemostasis – anticoagulants Thrombolytics and antithrombolytics.

i. Cardioplegic drugs- History, Principles and types of cardioplegia.

j. Primary solutions – History, principles & types.

k. Drugs used in the treatment of shock.

III. Anaesthetic agents.

- Definition of general and local anaesthetics.
- Classification of general anaesthetics.
- Pharmacokinetics and Pharmacodynamics of inhaled anaesthetic agents.
- Intravenous general anaesthetic agents.
- Local anaesthetics – classification mechanism of action, duration of action and methods to prolong the duration of action. Preparation, dose and routes of administration.

IV Analgesics

- Definition and classification
- Routes of administration, dose, frequency of administration, Side effects and management of non opioid and opioid analgesics

V. Antihistamines and antiemetics-

- Classification, Mechanism of action, adverse effects, Preparations, dose and routes and administration.

VI. CNS stimulants and depressants

- Alcohol
- Sedatives, hypnotics and narcotics
- CNS stimulants
- Neuromuscular blocking agents and muscle relaxants.

VII. Pharmacological protection of organs during CPB

VIII. Inhalational gases and emergency drugs.

IX. Pharmacotherapy of respiratory disorders

- Introduction – Modulators of bronchial smooth muscle tone and pulmonary vascular smooth muscle tone
- Pharmacotherapy of bronchial asthma
- Pharmacotherapy of cough
- Mucokinetic and mucolytic agents
- Use of bland aerosols in respiratory care.
-

X. Corticosteroids – Classification, mechanism of action, adverse effects and complications. Preparation, dose and routes of administration.

XI Diuretics

- Renal physiology
- Side of action of diuretics
- Adverse effects
- Preparations, dose and routes of administration.

XII. Chemotherapy of infections

- Definition
- Classification and mechanism of action of antimicrobial agents
- Combination of antimicrobial agents
- Chemoprophylaxis.
- Classification, spectrum of activity, dose, routes of administration and adverse effects of penicillin, cephalosporins, aminoglycosides, tetracyclines, chloramphenicol, antitubercular drugs.

XIII. Miscellaneous.

- IV fluids- various preparations and their usage.
- Electrolyte supplements
- Immunosuppressive agents
- New drugs included in perfusion technology.
- Drugs used in metabolic and electrolyte imbalance.

NO PRACTICAL EXAMINATION

APPLIED PATHOLOGY

I. CARDIOVASCULAR SYSTEM

- Atherosclerosis- Definition, risk factors, briefly Pathogenesis & morphology, clinical significance and prevention.
- Hypertension- Definition, types and briefly Pathogenesis and effects of Hypertension.
- Aneurysms – Definition, classification, Pathology and complications.
- Pathophysiology of Heart failure.
- Cardiac hypertrophy – causes, Pathophysiology & Progression to Heart Failure.
- Ischemic heart diseases- Definition, Types. Briefly Pathophysiology, Pathology & Complications of various types of IHD.
- Valvular Heart diseases- causes, Pathology & complication. Complications of artificial valves.
- Cardiomyopathy – Definition, Types, causes and significance.
- Pericardial effusion- causes, effects and diagnosis.
- Congenital heart diseases – Basic defect and effects of important types of congenital heart diseases.

II. HAEMATOLOGY

- Anaemia – Definition, morphological types and diagnosis of anaemia. Brief concept about Haemolytic anaemia and polycythaemia.
 - Leukocyte disorders- Briefly leukaemia, leukocytosis, agranulocytosis etc.,
 - Bleeding disorders- Definition, classification, causes & effects of important types of bleeding disorders. Briefly various laboratory tests used to diagnose bleeding disorders.

III. RESPIRATORY SYSTEM

- Chronic obstructive airway diseases – Definition and types. Briefly causes, Pathology and complications of each type of COPD.
- Briefly concept about obstructive versus restrictive pulmonary disease.
- Pneumoconiosis- Definition, types, Pathology and effects in brief.
- Pulmonary congestion and edema.
- Pleural effusion – causes, effects and diagnosis.

IV. RENAL SYSTEM

- Clinical manifestations of renal diseases. Briefly causes, mechanism, effects and laboratory diagnosis of ARF & CRS. Briefly Glomerulonephritis and Pyelonephritis.
- End stage renal disease – Definition, causes, effects and role of dialysis and renal transplantation in its management.
- Brief concept about obstructive uropathy.

NO PRACTICAL EXAMINATION

APPLIED MICROBIOLOGY

THEORY- 40 HOURS

1. Health care associated infections and Antimicrobial resistance: Infections that patients acquire during the course of receiving treatment for other conditions within a healthcare setting like Methicillin Resistant Staphylococcus aureus infections, Infections caused by Clostridium difficile, Vancomycin resistant enterococci etc. Catheter related blood stream infections, Ventilator associated pneumonia, Catheter Related urinary tract infections, Surveillance of emerging resistance and changing flora. The impact and cost attributed to Hospital Associated infection.

6 Hours

2. Disease communicable to Healthcare workers in hospital set up and its preventive measure: Occupationally acquired infections in healthcare professionals by respiratory route (tuberculosis, varicella-zoster, respiratory syncytial virus etc), blood borne transmission (HIV, Hepatitis B, Hepatitis C, Cytomegalovirus, Ebola virus etc), oro faecal route (Salmonella, Hepatitis A etc), direct contact (Herpes Simplex Virus etc). Preventive measures to combat the spread of these infections by monitoring and Control

3. Microbiological surveillance and sampling: Required to determine the frequency of potential bacterial pathogens including Streptococcus pneumoniae, Haemophilus influenzae, and Moraxella catarrhalis and also to assess the antimicrobial resistance. Sampling: rinse technique, direct surface agar plating technique.

4. Importance of sterilization:

a. Disinfection of instruments used in patient care: Classification, different methods, advantages and disadvantages of the various methods.

b. Disinfection of the patient care unit

c. Infection control measures for ICU's

5. Sterilization:

a. Rooms: Gaseous sterilization, one atmosphere uniform glow discharge plasma (OAUGDP).

b. Equipments: classification of the instruments and appropriate methods of sterilization.

c. Central supply department: the four areas and the floor plan for instrument cleaning, high-level disinfecting and sterilizing areas.

6. Preparation of materials for autoclaving: Packing of different types of materials, loading, holding time and unloading.

PRACTICALS- 30 HOURS

1. Principles of autoclaving & quality control of Sterilization.

2. Collection of specimen from outpatient units, inpatient units, minor operation theater and major operation theater for sterility testing.

3. The various methods employed for sterility testing.

4. Interpretation of results of sterility testing.

5. Disinfection of wards, OT and Laboratory.

MEDICINE RELEVANT TO PERFUSION TECHNOLOGY

Cardiovascular System

Ischaemic heart diseases

Rheumatic heart disease

Congenital heart disease

Hypertension

Aortic Aneurysms

Cardiomyopathy Peripheral
vascular disease

Pulmonary edema and LV failure

Hematology

Anaemia

Bleeding disorders

Laboratory tests used to diagnose bleeding disorders (in brief)

Respiratory System

Chronic obstructive airway diseases (COPD)

Concept of obstructive versus restrictive pulmonary disease PFT and
its interpretation

Renal System

ARF & CRF

End stage renal disease

Role of dialysis and renal transplantation in its management CNS

Automatic nervous system

(Sympathetic & Parasympathetic system)

Brief mention of CNS disorders & their etiology Others

DM

Obesity

Pregnancy
Paediatric Patient (neonate/Infant)
Elderly patient

Scheme of examination theory

There shall be one theory paper of three hours duration carrying 100 marks. Distribution of type of questions and marks for MEDICINE RELEVANT TO PERFUSION TECHNOLOGY

SUBJECTS HAVING MAXIMUM MARKS= 100		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	2	10
Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice) 2x10= 20 marks
 2. Short essay- 10 Questions (Questions no 5 & 10 choice) 10x5= 50 marks
 3. Short answer- 10 Questions (No choice) 10x3= 30 marks
- Total= 100**

INTRODUCTION TO PERFUSION TECHNOLOGY

Basics of diagnostic techniques:

Chest of X-ray

ECG

Echo

Angiography

Nuclear Cardiology

Laboratory investigations in relation to perfusion technology

Cardiopulmonary bypass and perfusion technology

History of Cardiac surgery and perfusion

- Specific reference of Gibbon Lillehei, Carrel
- Pre CPB surgery
- Azygous Flow principle.
- Hypothermic/nonhypothermic non-CPB surgery including Gross's Well technique and controlled cross circulation.

Monitoring and instrumentation

- Concepts of monitoring – instrumentation technology of ECG machine,
- pressure transducer, syringe and peristaltic pumps, monitors, ventilators, pulse oximeters, temperature probes and

thermo regulatory monitoring, defibrillators and fibrillators. Piped and non-piped gas delivery systems and connections. Basic physics related to medically used gases.

- Haemodynamic monitoring
- Haemostatic monitoring
- Haematologic monitoring

- Maintenance of oxygen, carbon dioxide and acid-base status and their monitoring
- Neurological monitoring (SSPE, EEG and cerebral function monitor)
- Aseptic technique.
- Cardiac surgery team, profession and terminology, scope of perfusion technology

Physiology of Extracorporeal circulation Heart

– Lung machine

- Principles of extracorporeal circulation
- Materials used in EC circuit
- Principles of extracorporeal gas exchange

Various types of oxygenators

- Bubble oxygenators
- Rotating spiral/cylinder/disc oxygenators
- Membrane oxygenators

• Mechanism of action components defoaming, rated flow. Theory of blood pumps

• Ideal blood pump, pulsatile versus non-pulsatile flow, occlusive and non-occlusive pumps, various types of pumps roller, bellow, sigmoid motor, diaphragm, ventricular and centrifugal pumps.

Element of extracorporeal circulation/hazards of:

- a. blood failure
- b. Bubble trap
- c. Flow meters
- d. Temperatures
- e. Heat exchanger
- f. Regulating devices

Connection of the vascular system with extracorporeal circulation:

- Arterial and venous cannulae.
- Connecting tubes and connectors
- Vents
- Suckers
- Cardioplegia delivery system
- Venous drainage.

Haemodynamic of arterial return, venous drainage, cardioplegia Delivery and venting.

Blood banking, handling of blood products and their management. Blood components and their use.

SUBSIDIARY SUBJECTS

SOCIOLOGY

Teaching Hours : 20

Course Description

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

Introduction :

Meaning – Definition and scope of sociology

Its relation to Anthropology, Psychology, Social Psychology

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

Importance of its study with special reference to health care professionals

Social Factors in Health and Disease:

Meaning of social factors

Role of social factors in health and disease

Socialization:

Meaning and nature of socialization

Primary, Secondary and Anticipatory socialization

Agencies of socialization

Social Groups:

1. Concepts of social groups, influence of formal and informal groups on health and sickness.
2. The role of primary groups and secondary groups in the hospital and rehabilitation setup.

Family :

The family, meaning and definitions

Functions of types of family

Changing family patterns

Influence of family on individual's health, family and nutrition, the effects of sickness in the family and psychosomatic disease and their importance to physiotherapy

Community :

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

Urban community – Meaning and features – Health hazards of urbanities

Culture and Health :

Concept of Health

Concept of culture

Culture and Health

Culture and Health Disorders

Social Change :

Meaning of social changes

Factors of social changes

Human adaptation and social change

Social change and stress

Social change and deviance

Social change and health programme

The role of social planning in the improvement of health and rehabilitation

Social Problems of disabled :

Consequences of the following social problems in relation to sickness and disability remedies to prevent these problems

Population explosion

Poverty and unemployment Beggary

Juvenile delinquency

Prostitution

Alcoholism

Problems of women in employment

Social Security :

Social Security and social legislation in relation to the disabled

Social Work :

Meaning of Social Work

The role of a Medical Social Worker

INDIAN CONSTITUTION

Prescribed for the First Year students of all degree classes

Unit-I: Meaning of the term 'Constitution' making of the Indian Constitution 1946-1949.

Unit-II: The democratic institutions created by the constitution Bicameral system of Legislature at the Centre and in the States.

Unit-III: Fundamental Rights and Duties their content and significance.

Unit – IV: Directive Principles of States Policies the need to balance Fundamental Rights with Directive Principles.

Unit – V: Special Rights created in the Constitution for: Dalits, Backwards, Women and Children and the Religious and Linguistic Minorities.

Unit-VI: Doctrine of Separation of Powers legislative, Executive and Judicial and their functioning in India.

Unit – VII: The Election Commission and State Public Service commissions.

Unit – VIII: Method of amending the Constitution.

Unit – IX: Enforcing rights through Writs:

Unit – X: Constitution and Sustainable Development in India.

Books: 1. J.C. Johari: The Constitution of India- A Politico-Legal Study-Sterling Publication, Pvt. Ltd. New Delhi.

2. J.N . Pandey: Constitution Law of India, Allahbad, Central Law Agency, 1998.
3. Granville Austin: The Indian Constitution – Corner Stone of a Nation-Oxford, New Delhi, 2000.

ENVIRONMENT SCIENCE AND HEALTH

Introduction to Environment and Health

Sources, health hazards and control of environmental pollution Water

The concept of safe and wholesome water.

The requirements of sanitary sources of water.

Understanding the methods of purification of water on small scale and large scale.

Various biological standards, including WHO guidelines for third world countries.

Concept and methods for assessing quality of water.

Domestic refuse, sullage, human excreta and sewage their effects on environment and health, methods and issues related to their disposal.

Awareness of standards of housing and the effect of poor housing on health.

Role of arthropods in the causation of diseases, mode of transmission of arthropods borne diseases, methods of control

Recommended Books.

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

THIRD YEAR B.SC PERFUSION TECHNOLOGY

Paper-I Perfusion Technology Clinical

1. Pharmacokinetics and Pharmacodynamics of Cardiopulmonary bypass
2. Drugs (including anesthetic drugs) used in cardiopulmonary bypass
3. Conduct and monitoring of Cardiopulmonary bypass
4. Adequacy of perfusion – General considerations, specific aspects of perfusion, monitoring, other concomitants which may affect its adequacy
5. Pulsatile perfusion – Introduction, theory & physiology of pulsatile flow, hemodynamic, metabolic effects, Clinical use, hematological effects
6. Cannulation techniques during cardiopulmonary bypass
7. Termination of cardiopulmonary bypass – principles and methodology
8. 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
9. Oxygenation – general consideration, bubble & membrane (including assessment and comparison of oxygenator function)
10. Heat exchangers-principles function of heat exchangers & their assessment. Complications related to heat exchange and their management
11. Priming fluids and hemodilution

PRACTICAL EXAMINATION

One common practical for all the three papers with equal weightage of marks i.e. 40 marks for each paper

PAPER-II PERFUSION TECHNOLOGY - APPLIED

1. Blood cell trauma – analysis of forces of fluid motion, effects of physical forces on blood cell, clinical effect. Complications of blood transfusion.
2. Anticoagulation on bypass, its monitoring, its reversal and complications. Heparinless bypass. Platelet aggregation and platelet dysfunction. Coagulopathies due to cardiopulmonary bypass and its management.
3. Inflammatory response to cardiopulmonary bypass & its clinical effects. Methods to minimise the same. Immune response, neuroendocrine, renal, metabolic splanchnic response, pulmonary response and electrolyte response to cardiopulmonary bypass
4. Blood conservation hemofiltration & dialysis during cardiopulmonary bypass including modified ultra filtration reverse autologous priming and other methods
5. Micro emboli- gaseous and particulate, filters used in cardiopulmonary bypass circuit.
6. Micro pore filtration during cardiopulmonary bypass
7. Counter pulsation techniques and assist devices

PRACTICAL EXAMINATION

One common practical for all the three papers with equal weightage of marks i.e. 40 marks for each paper

PAPER-III PERFUSION TECHNOLOGY - ADVANCED

1. Perfusion techniques for Paediatric cardiac surgery
2. ECMO- special perfusion techniques for special cardiac surgeries and medical conditions (including thoracic aortic surgeries deep hypothermia and circulatory arrest). Perfusion for non cardiac surgery, invasive cardiology and outside the operation suite.
3. Perfusion as a method of cardiopulmonary bypass
4. Complications and safety during cardiopulmonary bypass – bypass safety, organizational aspects, accidents, coagulopathies, mechanical and electrical failures, perfusion management, perfusion systems, safety for the perfusionist and surgical team management of perfusion accidents.
5. Minimally invasive surgery and the perfusionist
6. Recent advances in perfusion techniques
7. Experimental perfusion

PRACTICAL EXAMINATION

One common practical for all the three papers with equal weightage of marks i.e. 40 marks for each Paper

SUBSIDIARY SUBJECTS

BIO STATISTICS

Time Allotted: 20 Hours

Course Description:

Introduction to basic statistical concepts: methods of statistical analysis; and interpretation of data

Behavioural Objectives:

Understands statistical terms.

Possesses knowledge and skill in the use of basic statistical and research methodology.

Unit – I : Introduction

Meaning, definition, characteristics of statistics.

Importance of the study of statistics.

Branches of statistics.

Statistics and health science including nursing.

Parameters and estimates.

Descriptive and inferential statistics. Variables and their types.

Measurement scales

Unit – II : Tabulation of Data

Raw data, the array, frequency distribution.

Basic principles of graphical representation.

Types of diagrams - histograms, frequency polygons, smooth frequency polygon, commulative frequency curve, ogive.

Normal probability curve.

Unit - III : Measure of Central Tendency

Need for measures of central tendency

Definition and calculation of mean - ungrouped and grouped

Meaning, interpretation and calculation of median ungrouped and grouped.

Meaning and calculation of mode.

Comparison of the mean, and mode.

Guidelines for the use of various measures of central tendency.

Unit - IV : Measure of Variability

Need for measure of dispersion.

The range, the average deviation.

The variance and standard deviation.

Calculation of variance and standard deviation ungrouped and grouped.

Properties and uses of variance and SO

Unit -V : Probability and Standard Distributions.

Meaning of probability of standard distribution.

The Binominal distribution.

The normal distribution.

Divergence from normality - skewness, kurtosis.

Samling Technique , sampling - Criteria for good samples. Application of sampling in Community.

Procedures of sampling and sampling designs errors.

Sampling variation and tests of significance.

Unit - VII : Health Indicator

Importance of health Indicator.

Indicators of population, morbidity, mortality, health services.

Calculation of rates and rations of health.

Recommended Books.

B.K. Mahajan & M. Gupta (1995) Text Book of Preventive & Social Medicine, 2002, 17th Edition
Jaypee Broth

BASICS IN COMPUTER APPLICATIONS

The course enables the students to understand the fundamentals of computer and its applications.

Introduction to Data processing :

Features of computers, Advantages of using computers. Getting data into / out of computers. Role of computers. What is Data processing? Application areas of computers involved in Data processing. Common activities in processing. Types of Data processing, Characteristics of information. What are Hardware and Software?

Hardware Concepts :

Architecture of computers, Classification of computers, Concept of damage. Types of storage devices. Characteristics of disks, tapes, Terminals, Printers, Network. Applications of networking concept of PC System care, Floppy care, Data care.

Concept of Software.

Classification of software : System software. Application of software. Operating system. Computer system. Computer virus. Precautions against viruses. Dealing with viruses. Computers in medical electronics

Basic Anatomy of Computers

Principles of programming

Computer application - principles in scientific research ; work processing, medicine, libraries, museum , education, information system.

Data processing

Computers in physical therapy - principles in EMG, Exercise testing equipment, Laser.