

Faculty of Biomedical Science



**JSS Academy of Higher Education & Research**

(Deemed to be University)

Accredited "A" Grade by NAAC

Sri Shivarathreeswara Nagar, Mysuru – 570 015

# Regulation & Syllabus

BSc PERFUSION TECHNOLOGY

2016

***BSc AHS***

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## REGULATIONS

### B.Sc. Perfusion Technology

#### 1. Courses offered in Allied Health Sciences:

- a) Bachelor of Science in Medical Laboratory Technology [B.Sc. (MLT)]
- b) Bachelor of Science in Anesthesia & Operation Theatre Technology [B.Sc. (AOTT)]
- c) Bachelor of Science in Renal Dialysis Technology [B.Sc. (RDT)]
- d) Bachelor of Science in Respiratory Care Technology [B.Sc. (RCT)]
- e) Bachelor of Science in Medical Imaging Technology [B.Sc. (MIT)]
- f) Bachelor of Science in Cardiac Care Technology [B.Sc. (CCT)]
- g) Bachelor of Science in Perfusion Technology [B.Sc. (PT)]
- h) Bachelor of Science in Emergency Medicine Technology [B.Sc. (EMT)].
- i) Bachelor of Science in Physician Assistant [B.Sc. (PA)]
- j) Bachelor of Science in Optometry [B.Sc. (optometry)]

#### 1. Eligibility for admission

A candidate seeking admission to the Bachelor of Science Degree in Allied Health Sciences [a) to j) above], shall have studied English as one of the principal subjects and shall have passed (except for B.Sc. Imaging Technology):

- a) Two year Pre-University examination or equivalent as recognized by JSS University, Mysore (JSSU) with Physics, Chemistry and Biology as principal subjects of study.  
OR
  - b) Pre-degree course from a recognized University considered as equivalent by JSSU, (two years after ten years of schooling) with Physics, Chemistry and Biology as principal subjects of study.  
OR
  - c) Any equivalent examination recognized by the JSSU for the above purpose, with Physics, Chemistry and Biology as principal subjects of study.  
OR
  - d) 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, considered equivalent to 'plus - two' [10+2] examinations of Government of Karnataka Pre University Course.  
OR
  - e) Two years diploma from a recognized Government Board in a subject for which the candidate desires to enroll in the respective Allied Health Sciences course and shall have passed 'plus two' [10+2] with Physics, Chemistry and Biology, as principle subjects.
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OR

- f) Three years diploma from a recognized Government Board in a subject for which the candidate desires to enroll in the respective Allied Health Sciences course, with Physics, Chemistry and Biology as principal subjects during the tenure of the course.

OR

- g) Senior secondary course with Physics, Chemistry and Biology as principal subject of study equivalent to class XII, of open school education system of the central government and state government approved institutions.
- h) In case of B.Sc. Imaging Technology the candidate shall have passed Pre-University or equivalent examination with Physics, Chemistry, Biology and Mathematics, as principal subjects of study.

**1. Duration of the course**

Duration shall be for a period of Six semesters (three years) followed by 12 months (one year) of internship.

**2. Medium of instruction**

The medium of instruction and examination shall be English.

**3. Attendance**

Candidates should have attended at least 75% 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 the University, in each of the subjects prescribed for that year (theory, practicals, and clinical jointly) to be eligible to appear for the University examinations. Candidates lacking prescribed percentage of attendance in any subject shall not be eligible to appear for the University examination in that subject.

**4. Internal assessment (IA)**

There shall be a minimum of two Internal assessment examinations in theory and practical of each core subject spread over evenly in each semester. The average marks of the two IA examinations shall be submitted to the University at least 15 days before the commencement of the University examination. The University shall have access to the records of IA examinations. Candidates have to secure 35% marks in the IA theory and practical jointly in each subject to become eligible to appear for the University examination. The marks of the IA examinations must be displayed on the notice board of the respective departments within a fortnight from the date of IA examination. If a candidate is absent for any of the IA examinations due to genuine and satisfactory reasons, such a candidate may be given a re-examination, within a fortnight.

**5. Subject and hours of teaching for theory and practicals**

The number of hours of teaching theory and practical, course wise in each semester are shown in table I, II, III, IV, V and VI.

There are three compulsory core subjects in each semester. Language, Allied and Skill enhancement subjects are mandatory for all courses. Candidates shall select one elective subject each in fifth and sixth semester from the list mentioned in the table VII.

**Table I: Distribution of teaching hours in first year subjects.**

Category	Subjects	Theory hours	Credits	Practical hours	Credits	Total hours	Total credits
Core - 1	Anatomy	60	4	20	2	80	6
Core - 2	Physiology	60	4	20	2	80	6
Core - 3	Basic Biochemistry	60	4	20	2	80	6
Language -1	English	30	2	-	-	30	2
Language - 2	Kannada	30	2	-	-	30	2
Total Credits	18 + 2 + 2						

**Table II: Distribution of teaching hours in Second Semester subjects**

Category	Subjects	Theory hours	Credits	Practical hours	Credits	Total hours	Total credits
Core - 4	Pathology-	60	4	20	2	80	6
Core - 5	Microbiology	60	4	20	2	80	6
Core - 6	Pharmacology	60	4	20	2	80	6
Allied - 1	Health care	30	2	-	-	30	2
Allied - 2	Psychology	30	2	-	-	30	2
Total Credits	18 + 2 + 2						

**Table III: Distribution of teaching hours in Third Semester subjects**

Category	Subjects	Theory hours	Credits	Practical hours	Credits	Total hours	Total Credits
Core - 7	Applied pathology	60	4	20	2	80	6
Core - 8	Applied Microbiology	60	4	20	2	80	6
Core - 9	Introduction to Perfusion Technology	60	4	20	2	80	6
Skill Enhancement-1	Computer application	30	2	-	-	30	2
Allied-3	Environment science and Health	30	2	-	-	30	2
Total Credits	18 + 2 + 2						

**Table IV: Distribution of teaching hours in Fourth Semester subjects**

Category	Subjects	Theory hours	Credits	Modality Posting + Practicals	Credits	Total hours	Total Credits
Core - 10	Patient care and basic nursing	60	4	200	2	260	6
Core - 11	Basics of Pumps, Oxygenators, Alters & blood components	60	4	200	2	260	6
Core - 12	Basics of Medical Disorders	60	4	200	2	260	6
Skill Enhancement-2	Biostatistics and Research Methodology	30	2	-	-	30	2
Allied-4	Constitution of India	30	2	-	-	30	2
Total Credits	18 + 2 + 2						

**Table V: Distribution of teaching hours in Fifth Semester subjects**

Category	Subjects	Theory hours	Credits	Modality Posting + Practicals	Credits	Total hours	Total Credits
Core - 13	Conduct of Cardiopulmonary bypass, priming solutions and cannulation techniques	60	4	200	2	260	6
Core - 14	Myocardial protection and various drugs used in CPB	60	4	200	2	260	6
Core - 15	Cardiac, Thoracic and Vascular surgical disorders.	60	4	200	2	260	6
Elective 1		30	2	-	-	30	2
Allied - 5	Medical Ethics	30	2	-	-	30	2
Total Credits	18 + 2 + 2						

**Table VI: Distribution of teaching hours in Sixth Semester subjects**

Category	Subjects	Theory hours	Credits	Modality Posting + Practicals	Credits	Total hours	Total Credits
Core - 16	Effects on various organs during CPB and introduction to IABP and ECMO	60	4	200	2	260	6
Core - 17	Special situations in Perfusion Technology	60	4	200	2	260	6
Core - 18	Cardiac Support Devices, DHCA and Blood conservation techniques	60	4	200	2	260	6
Elective-2		30	2	-	-	30	2
Allied-6	Hospital Management	30	2	-	-	30	2
Total Credits	18 + 2 + 2						

**Table VII: Elective Subjects**

Elective Subjects	Offering Departments
<b>Fifth Semester</b>	
Immunotechniques in diagnosis of diseases	Pathology and Microbiology
Dental Radiography	Radio diagnosis
Pulmonary Function Testing	Pulmonary Medicine
Telemedicine	Dermatology (Dr Kantharaj)
Hands on training in Continuous ambulatory peritoneal dialysis	Nephrology
Echocardiography (Cardiology)	Cardiology
Echocardiography (CTVS)	Cardio Thoracic Vascular Surgery
Difficult airway intubation	Anesthesiology
<b>Sixth Semester</b>	
Molecular Techniques	Biochemistry
Digital Subtraction Angiography	Radio diagnosis
Polysomnography	Pulmonary Medicine
Practice Management	Health system management studies
Renal Transplant	Nephrology
Coronary angiography	Cardiology
Intra Aortic Balloon pump	Cardio Thoracic Vascular Surgery
Ventilator management	Anesthesiology

**Extension Activity**

The following extension activities shall be provided for the ability enhancement of the candidates, to provide better health care services. The certificate shall be provided by the offering departments. The Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS) shall be as per the American Heart Association guidelines and certification.

Extension Activity	Courses	Semester	Offering departments
Phlebotomy	All courses	III	Anaesthesiology
Basic life support *(Optional on payment basis)	All courses	IV	Emergency medicine
Small Project/data Analysis/Industrial visit	All courses	V	Concerned departments of the Course
Advanced cardiac life support *(Optional on payment basis)	Respiratory Care Technology, Emergency Medicine Technology, Anaesthesia and OT Technology, Cardiac Care	VI	Emergency medicine

**7. End Semester Examination**

- a) University examinations (UE): The University shall conduct examination for the core subjects at the end of each semester. The candidates, who satisfy the requirement of attendance and internal assessment, shall be eligible to appear for the University examination. The head of the institution shall verify the same before forwarding the applications to the University within stipulated time along with the prescribed fee.

- b) Non-University Examinations (NUE): Examination for Languages, Allied subjects, Skill enhancement and Elective subjects shall be conducted by the college and the marks obtained shall be submitted to the University along with the IA marks of the core subjects at least 15 days before the commencement of the University examination. The marks of non-core subjects shall be incorporated in the marks card issued by the University.
- c) The candidate must have passed all the previous subjects (Core/Language/Skill enhancement/ Allied/elective), to appear for the sixth semester University examination.

### 8. Scheme of Examination:

Distribution of subjects and marks for each semester theory and practical examinations are shown in the Table - VIII, IX, X, XI, XII and XIII.

**Table VIII: Distribution of Subjects and marks for First Semester theory and practical examination**

Category	Subjects	Theory				Practical			
		IA	UE	NUE	Total	IA	UE	NUE	Total
Core - 1	Anatomy	30	70	-	100	10	40	-	50
Core - 2	Physiology	30	70	-	100	10	40	-	50
Core - 3	Basic Biochemistry	30	70	-	100	10	40	-	50
Language-1	English	-	-	50	50	-	-	-	-
Language-2	Kannada	-	-	50	50	-	-	-	-

**Table IX: Distribution of Subjects and marks for Second Semester theory and practical examination**

Category	Subjects	Theory				Practical			
		IA	UE	NUE	Total	IA	UE	NUE	Total
Core - 4	Pathology	30	70	-	100	10	40	-	50
Core - 5	Microbiology	30	70	-	100	10	40	-	50
Core - 6	Health care	30	70	-	100	10	40	-	50
Allied -1	Psychology	-	-	50	50	-	-	-	-
Allied -2	Kannada	-	-	50	50	-	-	-	-



**Table X: Distribution of Subjects and marks for Third Semester theory and practical examination**

Category	Subjects	Theory				Practical			
		IA	UE	NUE	Total	IA	UE	NUE	Total
Core - 7	Applied pathology	30	70	-	100	10	40	-	50
Core - 8	Applied Microbiology	30	70	-	100	10	40	-	50
Core - 9	Introduction to Perfusion Technology	30	70	-	100	10	40	-	50
Skill Enhancement-1	Computer application	-	-	50	50	-	-	-	-
Allied-3	Environment science and Health	-	-	50	50	-	-	-	-

**Table XI: Distribution of Subjects and marks for Fourth Semester theory and practical examination**

Category	Subjects	Theory				Practical			
		IA	UE	NUE	Total	IA	UE	NUE	Total
Core - 10	Patient care and basic nursing	30	70	-	100	10	40	-	50
Core - 11	Basics of pumps, Oxygenators, Alters and Blood Components	30	70	-	100	10	40	-	50
Core - 12	Basics of Medical Disorders	30	70	-	100	10	40	-	50
Skill Enhancement-2	Biostatistics and Research methodology	-	-	50	50	-	-	-	-
Allied-4	Constitution of India	-	-	50	50	-	-	-	-

**Table XII: Distribution of Subjects and marks for Fifth Semester theory and practical examination**

Category	Subjects	Theory				Practical			
		IA	UE	NUE	Total	IA	UE	NUE	Total
Core - 13	Conduct of Cardiopulmonary bypass, priming solutions & cannulation techniques	30	70	-	100	10	40	-	50
Core - 14	Myocardial protection and various drugs used in CPB	30	70	-	100	10	40	-	50
Core - 15	Cardiac, Thoracic & Vascular surgical disorders.	30	70	-	100	10	40	-	50
Elective 1		-	-	50	50	-	-	-	-
Allied-5	Medical Ethics	-	-	50	50	-	-	-	-

**Table XIII: Distribution of Subjects and marks for Sixth Semester theory and practical examination**

Category	Subjects	Theory				Practical			
		IA	UE	NUE	Total	IA	UE	NUE	Total
Core - 16	Effects on various organs during CPB & introduction to IABP and ECMO	30	70	-	100	10	40	-	50
Core - 17	Special situations in Perfusion Technology	30	70	-	100	10	40	-	50
Core - 18	Cardiac Support Devices, DHCA & Blood Conservation Techniques	30	70	-	100	10	40	-	50
Elective 2		-	-	50	50	-	-	-	-
Allied-6	Hospital Management	-	-	50	50	-	-	-	-

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**Question paper pattern for end semester University theory examinations  
(70 marks)**

I	Long Answers	(Answer 2 out of 3)	$2 \times 10 = 20$
II	Short Essay	(Answer 7 out of 9)	$7 \times 5 = 35$
III	Answer	(Answer all 5)	$5 \times 3 = 15$
	Total	=	70 marks

**Question paper pattern for end semester Non-University theory examinations  
(50 marks)**

I	Long Answers	(Answer 1 out of 3)	$1 \times 10 = 10$
II	Short Essay	(Answer 5 out of 7)	$5 \times 5 = 25$
III	Answer	(Answer all 5)	$5 \times 3 = 15$
	Total	=	50 marks

**Examiners**

a) Appointment of Examiners

Examiners shall be appointed by the University to conduct the end semester University examinations, from the panel of examiners approved by the Board of Studies. For Practical examinations, there shall be one external examiner and one internal examiner. Theory paper shall be valued by both the examiners.

b) Qualification and Experience of Examiners

For question paper setting and external examiner: Post graduation in the respective field with five years of teaching experience.

For Internal examiners: Post graduation in the respective field with three years of teaching experience.

**10. Criteria for pass**

Core Subjects: Candidates are declared to have passed in a subject, if they secure 40% of marks in University examination and internal assessment added together. Theory & practical shall be considered as separate subjects. If a candidate passes in practical examination but fails in theory paper, such candidate is exempted from reappearing for practical but shall have to appear in the subsequent examination for the theory paper in which the candidate has failed OR vice versa.

Language papers, allied papers, skill enhancement and elective papers:

The minimum prescribed marks for a pass shall be 35% of the maximum marks prescribed for a subject.

**11. Grading of performances**

a) Letter grades and grade points allocations

Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course. The letter grades and their corresponding grade points are given in Table - XIV.

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**Table - XIV: Letter grades and grade points equivalent to percentage of marks and performances**

Percentage of Marks obtained	Letter Grade	Grade Point	Performance
90.00 - 100	O	10	Outstanding
80.00 - 89.99	A	9	Excellent
70.00 - 79.99	B	8	Good
60.00 - 69.99	C	7	Fair
50.00 - 59.99	D	6	Satisfactory
40.00 - 49.99	E	5	Average
Less than 40	F	0	Fail
Absent	AB	0	Fail

A candidate who remains absent for any end semester examination shall be assigned a letter grade of AB and a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

b) The Semester Grade Point Average (SGPA)

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). The SGPA is the weighted average of the grade points obtained in all the courses by the student during the semester. For example, if a student takes five courses (Theory/Practical) in a semester with credits  $C_1, C_2, C_3, C_4$  and  $C_5$  and the student's grade points in these courses are  $G_1, G_2, G_3, G_4$  and  $G_5$ , respectively, and then students' SGPA is equal to:

$$SGPA = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4G_4 + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and ABS grade awarded in that semester. For example if a learner has a F or ABS grade in course 4, the SGPA shall then be computed as:

$$SGPA = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4 * ZERO + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

c) Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the VIII semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all VIII semesters and their courses. The CGPA shall reflect the failed status in case of F grade(s), till the course(s) is/are passed. When the course(s) is/are passed by obtaining a pass grade on subsequent examination(s) the CGPA shall only reflect the new grade and not the fail grades earned earlier. The CGPA is calculated as:

$$CGPA = \frac{C_1S_1 + C_2S_2 + C_3S_3 + C_4S_4 + C_5S_5 + C_6S_6 + C_7S_7 + C_8S_8}{C_1 + C_2 + C_3 + C_4 + C_5 + C_6 + C_7 + C_8}$$

where  $C_1, C_2, C_3, \dots$  is the total number of credits for semester I, II, III,  $\dots$  and  $S_1, S_2, S_3, \dots$  is the SGPA of semester I, II, III,  $\dots$ .

### **12. Declaration of class**

The class shall be awarded on the basis of CGPA as follows:

First Class with Distinction	= CGPA of. 7.50 and above
First Class	= CGPA of 6.00 to 7.49
Second Class	= CGPA of 5.00 to 5.99
Pass Class	= CGPA of 4.00 to 4.99

### **13. Carry over**

A candidate should pass all the subjects (core/language/skill enhancement/allied/elective) of first semester, to enter into the third semester. Similarly, second semester subjects should be cleared before entering fourth semester and third semester subjects should be cleared before entering fifth semester. However, the candidate must have passed all the previous subjects (core/language/skill enhancement/ allied/elective) to appear for the sixth semester University examination.

### **14. Internship**

Twelve months (one year) internship shall be mandatory after successful completion of sixth semester examination. The 'Internship Completion Certificate' shall be issued by the college and copy of same is submitted to the University.

### **15. Award of Ranks/Medals**

Ranks and Medals shall be awarded on the basis of final CGPA. However, candidates who fail in one or more subject during the course shall not be eligible for award of ranks.

### **16. Award of degree**

A candidate who has passed in all the subjects (core/language/allied/skill enhancement/elective papers) of all the semesters and has successfully completed the internship shall be eligible for award of degree.

### **17. Revaluation and Re-totaling of answer papers**

There is no provision for revaluation of the answer papers in any examination. However, the candidates can apply for re-totaling by paying prescribed fee.

### **18. Maximum duration for completion of course**

A candidate shall complete the course within six years from date of admission, failing, which candidate shall re-register for the course.

## I Semester Core-1 Anatomy

### Objectives:

**At the end of the course the student Should be able to:**

- Describe the structure, composition and functions of the organ systems of human body.
- Describe how the organ systems function and interrelate.
- Learn basic technical terminology and language associated with anatomy.

### Learning Objectives: Skills

- Use the process of prosection to investigate anatomical structure.
- Use the microscope to learn anatomical or histological structure.
- Learn how to study, interpret and care for anatomical specimens.

## Contents

### Theory:

#### Unit I

- |  |              |
|--|--------------|
| Organization of the Human Body   | <b>12hrs</b> |
| Introduction to the human body   |              |
| Definition and subdivisions of anatomy   |              |
| Anatomical position and terminology  |              |
| Cell - Definition of a cell, shapes and sizes of cells                                 |              |
| - Parts of a cell - cell membranes, cytoplasm, sub cellular organelles.                |              |
| Cell Division - Definition and main events in different stages of mitosis and meiosis. |              |
| Tissues - Tissues of the body  |              |
| - Definition and types of tissues  |              |
| - Characteristics, functions and locations of different types of tissues               |              |
| - Epithelial tissue - definition, classification with examples                         |              |
| - Glands- classification with examples   |              |

#### Unit II

**Locomotion and Support** **12hrs**

**1. Cartilage - Types with examples**

**2. Skeletal system**

Skeleton - Definition, axial and appendicular skeleton with names and number of bones, Types of bones. Marking of bones. Functions of bones. Development (types and ossification) and growth of bone. Name, location and general features of the bones of the body.

Joints - Definition and types of joints with examples. Axes and kind of movements possible. Name, location, type, bones forming, ligaments, movements possible and the muscles producing such movements of the joints of the body.

### 3. Muscular system

Parts of the Skeletal muscle. Definition of origin and insertion. Classification of muscular tissue. Compartment muscles of upper limb, lower limb, sternocleidomastoid

## Unit III

### Maintenance of the Human Body

**12hrs**

#### 1. Cardio-vascular system

Types and general structure of blood vessels. Structure and types of arteries and veins. Structure of capillaries. Shape, size, location, coverings, external and internal features of heart. Structure of heart wall. Conducting system and blood supply of the heart. The systemic arteries and veins. Name, location, branches and main-distribution of major arteries and veins.

#### 2. Lymphatic system

Lymph, lymphatic vessels, name, location and features of the lymphoid organs.

#### 3. Respiratory system

Names of organs of respiration, Location and features of nose, pharynx, larynx, trachea, bronchi, lungs and pleura.

#### 4. Digestive system

Names of organs of digestion. Location and features of mouth, pharynx, esophagus, stomach, small and large intestines. Location and features of salivary glands, pancreas, liver and gall bladder

## Unit IV

### 1. Urinary system and Reproductive system

**12hrs**

Names of urinary organs, location and features of kidney, ureter, urinary bladder and urethra.

Names of male and female organs of reproduction. Location and features of scrotum, testis, epididymis, vas deferens, seminal vesicle, ejaculatory duct, prostate gland, penis and spermatic cord.

Location and features of uterus & its supports, uterine tube, ovary & mammary gland.

#### 2. Development

Gametes, period of gestation, gametogenesis, structure of sperm and ovum, growth of ovarian follicles, events of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> weeks of development, folding of embryo. Derivatives of germ layers, placenta

## Unit V

### Control Systems of the Body

**12hrs**

#### 1. Nervous system

Sub-divisions of the nervous system

Brain - Sub-divisions, location external features and internal structure of medulla oblongata, pons, mid-brain, cerebellum and cerebrum.

Spinal cord - Location, extent, spinal segments, external features and internal structure.

Location and features of thalamus and hypothalamus.

Locations and subdivisions of basal ganglia. Meninges and spaces around them.

Name and location of ventricles of brain and circulation of cerebrospinal fluid.

Blood supply of the brain and spinal cord. Cranial nerves

## 2. Sense organs

Location and features of the nose, tongue, eye, ear and skin

## 3. Endocrine system

Names of the endocrine glands. Location and features of pituitary, thyroid, parathyroid, suprarenal, pancreas, ovaries and testes. Names of hormones produced by each gland.

### Practical :

1. Demonstration of parts of microscope and its uses
2. Demonstration of skeleton and joint
3. Demonstration of deltoid and gluteus maximus, Cubital fossa
4. Demonstration of heart and its blood supply, demonstration of major arteries of upper limb and lower limb, histology of cardiac muscle and histology of vessels
5. Demonstration of location and parts of lungs, histology of trachea and lungs
6. Demonstration of location of stomach, small and large intestines. Location and features of pancreas, liver and gall bladder
7. Demonstration of location and features of kidney, ureter, urinary bladder and urethra. Histology of urinary system except urethra
8. Demonstration of location of male and female reproductive organs
9. Demonstration of brain and spinal cord
10. Histology of cornea and retina

### Practical Examination Pattern

**40 Marks**

1. Gross Anatomy- Discussion of any one specimen -10 Marks  
Discussion of specimens of Cardiovascular system, Respiratory System, Gastrointestinal system, Urinary system, Reproductive system
2. Spotters - Cardiovascular system, Respiratory System, Gastrointestinal system, Urinary system, Reproductive system - 10x2=20 Marks
3. Histology discussion of any one demonstrated slide - 10 Marks

### Recommended Books Recent Editions:

1. Ross and Wilson: Anatomy and Physiology in Health and illness
2. Understanding Human Anatomy and Physiology, William Davis (p) MC Graw Hill
3. Essentials of Human Embryology. Bhatnagar, Orient Blackswan Pvt. Ltd.
4. Anatomy for B.Sc Nursing by Renu Chauhan. Arichal publishing company 2012
5. Hand book of Anatomy BD Chaurasia
6. Basics in Human Anatomy for B.Sc. Paramedical Courses 1<sup>st</sup> edition 2008 Jaypee Publishers

### Reference books:

1. B D Chaurasia: Regional Anatomy. Vol I, II, III 6<sup>th</sup> edition



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## I Semester Core- 2 Physiology

### Objectives

At the end of the semester students should be able to describe

1. Blood cell counts
2. Nerve and muscle functions
3. Cardiac functions
4. Pulmonary functions
5. Renal functions
6. The actions of various hormones
7. Functions of Central nervous system and special senses

### Contents:

#### Theory

#### Unit -I

#### General physiology and Blood

**12 Hrs**

#### General Physiology (2 Hrs)

- Organization of the cell and its function, homeostasis
- Transport across cell membrane
- Membrane Potentials - Resting Membrane Potential & Action Potential
- Body Fluid Compartments - Normal Values

#### Blood (10 Hrs)

- Introduction: composition and function of blood.
  - Red blood cells: erythropoiesis, stages of differentiation, function, count, physiological variation.
  - Structure, function, concentration, physiological variation, methods of estimation of haemoglobin.
  - White blood cells: production, function, count.
  - Platelets: origin, normal count, morphology & functions.
  - Plasma proteins: types, functions
  - Haemostasis: definition, normal haemostasis, clotting factors, mechanism of clotting, disorders of clotting - Blood groups: ABO system, Rh system. Blood grouping & typing, cross matching.  
Rh system: Rh factor, Rh incompatibility. Blood transfusion: indication. transfusion reactions.
  - Anticoagulants: classification, examples and uses.  
Anaemias: morphological and etiological classification, -Blood indices: CI, MCH, MCV, MCHC.
  - Erythrocyte sedimentation rate (ESR) and packed cell volume, normal values.
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**Unit -II****Digestive system & Respiratory system****12hrs****Digestive System (4Hrs)**

- Physiological anatomy of gastro intestinal tract, functions of digestive system.
- Salivary glands: structure and functions, deglutition: stages and regulation.
- Stomach: structure and functions. Gastric secretion: composition function regulation of gastric juice secretion.
- Pancreas : structure, function, composition of pancreatic juice
- Functions of liver. Bile secretion, composition, function. jaundice: types.
- Functions of gall bladder.
- Small intestine: functions, digestion, absorption, movements.
- Large intestine: functions, movements defecation

**Respiratory system (8 Hrs)**

- Functions of respiratory system, physiological anatomy of respiratory system, respiratory tract, respiratory muscles.
- Mechanism of normal and rigorous respiration, forces opposing and favoring expansion of the lungs. Intra pulmonary & intrapleural pressure.
- Surface tension, recoil tendency of the thoracic cage and lungs .
- Transport of respiratory gases: transport of oxygen & carbon dioxide, oxy haemoglobin dissociation curve, factors affecting it.
- Lung volumes and capacities - normal values
- Regulation of respiration: mechanisms of regulation, nervous and chemical regulation, respiratory centre.
- Applied physiology : hypoxia, cyanosis, dyspnoea, apnoea.

**Unit -III****Cardiovascular and Endocrine system****12hrs****Cardiovascular system (7Hrs)**

- Heart: Physiological Anatomy, Nerve supply.
- Properties of cardiac muscle, cardiac cycle:
- Conducting System of Heart, Origin and Spread of Cardiac Impulse
- Electrocardiogram (ECG) waves and normal duration. Recording
- Cardiac Cycle: Phases and Volume Changes
- Normal heart sounds, areas of auscultation. Pulse: jugular, radial pulse,
- Cardiac output : definitions of stroke volume, cardiac index, factors Affecting It. measurement of Cardiac output.
- General principles of circulation
- Blood pressure: definition, normal value, clinical measurement of blood pressure, hypotension, hypertension. Factors affecting it and regulation

- Physiological variations & regulation of heart rate.
- Coronary circulation.
- Shock

### **Endocrine System (5 Hrs)**

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

### **Unit -IV**

#### **Excretory system and Reproductive system**

**12 hrs**

#### **Excretory System (8Hrs)**

- Functional anatomy of kidney
- Juxta glomerular apparatus: structure and function.
- Glomerular filtration
- Tubular function(reabsorption and secretion)
- Micturition, innervation of bladder, cystometrogram.
- Artificial kidney, renal function tests skin and body temperature

#### **Reproductive system (4Hrs)**

- Male reproductive system: functions of testes, spermatogenesis: Endocrine functions of testes -Female reproductive system: oestrogen, progesteron, menstrual cycle: ovulation, physiological changes during pregnancy, pregnancy tests.
- Lactation: composition of milk, factors controlling lactation.

### **Unit -V**

#### **Muscle nerve physiology, Nervous system and Special senses**

**12hrs**

#### **Muscle nerve physiology (3Hrs)**

- Classification and properties of neuron and neuroglia. Classification of nerve fibers
- Classification of muscle, structure of skeletal muscle,
- Neuromuscular junction. Transmission across nmj
- Excitation contraction coupling. muscle tone, fatigue, rigor mortis

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**Nervous system (5Hrs)**

- Organisation of nervous system
- Synapse: structure, types, properties.
- Receptors: definition, classification, properties. Sensations-pain
- Organization Spinal cord. Ascending tracts, descending tracts.
- Reflex : definition reflex arc, clinical classification of reflexes : Babinski's sign.
- Hypothalamus- functions
- Cerebral cortex lobes - functions,
- Cerebellum- functions
- Basal ganglia functions.
- Cerebro Spinal Fluid (CSF) : formation, circulation & reabsorption . composition and functions. Lumbar puncture.
- Autonomic Nervous System: Sympathetic and parasympathetic distribution

**Special senses (4Hrs)**

- Vision: structure of eye, function of different parts. Structure of retina. visual pathway, errors of refraction
- Hearing: structure and functions of ear.
- Taste : taste buds and taste pathway.
- Olfaction : receptors, pathway.

**Practicals (20 Hrs)**

1. Haemoglobinometry.
2. Haemocytometry
3. Total leucocyte count.
4. Total Red blood cell count.
5. Determination of blood groups.
6. Differential WBC count.
7. Determination of clotting time, bleeding time.
8. Erythrocyte sedimentation rate (ESR). Determination of packed cell Volume, Calculation of Blood indices: CI, MCH, MCV, MCHC.
9. Blood pressure recording.
10. Spirometry, Artificial Respiration

**Practical Examination : 40 Marks**

1. Estimation of Hemoglobin. - 10 marks
  2. Determination of Blood Groups. - 10 marks
  3. Determination of Bleeding and Clotting time. - 10 marks
  4. Spotters-Haemocytometer, (Identification of cells) Differential Count, Sphygmomanometer, Spirometer . - 10 marks
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**Recommended Books Recent Editions**

1. A.K.Jain, Human Physiology and Biochemistry for Physical Therapy and Occupational Therapy, 1st Ed. Arya Publication.
2. Dr. Venkatesh.D and Dr. Sudhakar H.S.Basic of Medical Physiology, 2nd Ed., Wolter-Kluwer Publication.
3. Chaudhari (Sujith K) Concise Medical Physiology 6th Ed. New Central Book.

**Reference Books**

1. A.K.Jain, Text book of Physiology for Medical Students, 4th Ed. Arya Publication.
  2. Guyton (Arthur) Text Book of Physiology.11th Ed. Prism Publishers.
  3. Ganong (William F) Review of Medical Physiology. 23rd Ed . Appleton.
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## I Semester Core- 3- Basic Biochemistry

**Unit I****12hrs****Chemistry of Cell & Chemistry of Carbohydrates, Proteins, Lipids & Nucleotides-**

Cell- Structure & Function of Cell Membrane, Subcellular Organelles and their Functions.

Carbohydrates- Definition, Classification & Biological importance of carbohydrates, Derivatives of Monosaccharides.

Proteins- Definition & Classification of amino acids & Proteins, Biologically important peptides Plasma proteins, Immunoglobulins.

Lipids- Definition, Classification & Biological importance and Functions of Lipids. Structure and functions of Cholesterol, types and functions of Lipoproteins.

Nucleotides- Structure and Functions of DNA & RNA. Biologically important nucleotides.

**Unit II****12hrs****Enzymes & Acid base balance**

Enzymes- Definition and Classification. Factors affecting enzyme activity. Coenzymes and Cofactors. Enzyme inhibition & Regulation of enzyme activity

Acid Base balance- Acids, Bases & Body Buffers, Regulation of pH, Acid base disorders.

**Unit III****12hrs****Vitamins & Minerals**

Vitamins- Classification, Sources, RDA, Functions( in brief), deficiency manifestations and hypervitaminosis.

Minerals- Classification, Sources, RDA, Functions (in Brief), deficiency manifestations of the following: calcium, phosphorous, iron, copper, iodine, zinc, fluoride, magnesium, selenium, sodium, potassium and chloride.

**Unit IV****12hrs****Nutrition, Blood chemistry & Urine Chemistry**

Nutrition- Nutrients, Calorific value of food, BMR, SDA, respiratory quotient and its applications, Balanced diet based on age, sex and activity, biological value of proteins, nitrogen balance, Protein energy malnutrition, Total parenteral nutrition, dietary fibers.

Blood chemistry- Biochemical components & their reference ranges in normal & diseased states.

Urine chemistry- Biochemical components & their reference ranges in normal & diseased states

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**Unit V****12hrs****Clinical Biochemistry- 10 hrs**

Specimen Collection- Blood,Urine and Body fluids.

Preamalytical, analytical and postanalytical errors

Clinical Biochemistry- Parameters to diagnose Diabetes & Cardiovascular diseases.

Diagnostic enzymology, Assessment of arterial Blood gas status and electrolyte balance, Point of Care Testing. Renal Function tests( in brief), Liver function tests(in brief), Biomedical Waste Management.

**Practicals**

1. General Reactions of Carbohydrates.
2. Color reactions of Proteins.
3. Reactions of Non Protein nitrogenous substances.
4. Demonstration of pH meter, Colorimeter and spectrophotometer.
5. Demonstration of Chromatography and Electrophoresis.

**Practical Examination**

1. Identification of Substance of physiological importance - 10 Marks
2. Color reactions of Proteins - 10 Marks
3. Spotters - 10 Marks
4. Charts on Clinical biochemistry - 10 Marks

**Recommended books Recent edition**

1. Textbook of Biochemistry -D.M.Vasudevan
2. Biochemistry -Pankaja Naik
3. Clinical Biochemistry-Principles and Practice-Praful.B.Godkar
4. Textbook of Biochemistry-Chatterjea and Shinde
5. Textbook of Clinical Chemistry-Norbert W Teitz

**Reference Books Recent Edition**

1. Harpers Biochemistry
2. Clinical Biochemistry-Michael L.Bishop
3. Textbook of Biochemistry-Rafi M.D
4. Lippincott's Illustrated review of Biochemistry
5. Practical Clinical Biochemistry-Harold Varley

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## I Semester Language-1 English

### Unit I

#### Introduction

a) Study Techniques - Reading Comprehension

Exercises on reading passages and answering questions based on the passage.

b) Organization of Effective Note Taking

Why good note-taking is important

Effective note-taking is an important practice to master at university. You have a lot of new knowledge and you need to develop reliable mechanisms for recording and retrieving it when necessary. But note-taking is also a learning process in itself, helping you to process and understand the information you receive.

c) Use of the Dictionary

Tips on how to use the dictionary

1. Choose the right dictionary.

2. Read the introduction.

3. Learn the abbreviations.

4. Learn the guide to pronunciation.

5. Looking Up a Word

a) Find the section of the dictionary with first letter of your word.

b) Read the guide words.

c) Scan down the page for your word.

d) Read the definition.

6. Online dictionaries

7. Research various facts.

8. Thesaurus

It is a dictionary of synonyms and antonyms, such as the online Thesaurus.com.

Enlargement of Vocabulary

Roots : A to G

Effective Diction

Foreign Expressions - meaning and pronunciation

### Unit II

#### Applied Grammar

a) Correct Usage

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## The Eight Parts of Speech

1. Noun
2. Pronoun
3. Adjective
4. Verb
5. Adverb
6. Preposition
7. Conjunction
8. Interjection

### b) The Structure of Sentences

What is a sentence?

What are clauses?

What are phrases?

Types of sentences:

1. Simple sentences
2. Compound sentences
3. Complex sentences

### c) The Structure of Paragraphs

#### 1. What is a Paragraph?

Paragraphs are comprised of sentences, but not random sentences. A paragraph is a group of sentences organized around a central topic.

#### 2. The Secrets to Good Paragraph Writing:

Four Essential Elements

The four elements essential to good paragraph writing are: unity, order, coherence, and completeness.

#### 4. Paragraph Structure

A paragraph consists of 3 main structures :

1. Claim
2. Evidence
3. Analysis

#### d) Enlargements of Vocabulary

Roots: H to M

## Unit III

### Written Composition

- a) Precise writing and Summarizing
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1. Definition of precise:

A precise or summary is an encapsulation of someone's writing or ideas.

Technically it should be one - third the length of the actual passage given.

2. Definition of summary:

Summaries may not always follow a direct line through what they're summarizing - if you want to summarize someone else's ideas in a few sentences, it might make more sense if you begin with their conclusion, and work back to the arguments they use to develop that conclusion.

**Guidelines to follow while writing a summary are:**

- 1) Divide...and conquer.
- 2) Read.
- 3) Reread.
- 4) One sentence at a time.
- 5) Write a thesis statement.
- 6) Check for accuracy.
- 7) Revise.

b) Writing of a Bibliography

I. What is a bibliography?

A bibliography is an alphabetical list of all materials consulted in the preparation of your assignment.

II. What is an annotated bibliography?

An annotated bibliography is an alphabetical list of books or articles for which you have added explanatory or critical notes.

III. Why you must do a bibliography?

- a) To acknowledge and give credit to sources of words, ideas, diagrams, illustrations and quotations borrowed, or any materials summarized or paraphrased.
- b) To show that you are respectfully borrowing other people's ideas, not stealing them, i.e. to prove that you are not plagiarizing.

IV. What must be included in a bibliography?

author

title

place of publication

publisher

date of publication

page number(s) (for articles from magazines, journals, periodicals, newspapers, encyclopedias, or in anthologies).

## V. Writing a bibliography in MLA style

### 1. Standard Format for a Book:

Author. Title: Subtitle. City or Town: Publisher, Year of Publication.

If a book has no author or editor stated, begin with the title. If the city or town is not commonly known, add the abbreviation for the State or Province.

### 2. Standard Format for a Magazine, Periodical, Journal, or Newspaper Article:

Author. "Title: Subtitle of Article." Title of Magazine, Journal, or Newspaper Day, Month, Year of Publication: Page Number(s).

#### c) Enlargement of Vocabulary

Roots - N to S

## Unit IV

### Reading and Comprehension

#### a) Review of selected materials and express oneself in one's words

Seminar for students on powerpoint presentation and book review.

#### b) Enlargement of Vocabulary

Roots - T to Z

## Unit V

### The study of Various forms of Composition

#### a) Paragraph

Exercises for students on short paragraph topics.

#### b) Essay

How to Write an Essay

The writing of an essay has three stages :

#### 1. Essay writing

#### 2. Close reading

#### 3. Research

#### c) Letter

Mechanics of writing formal and business letters.

Exercises on writing letters for students.

#### d) Summary

Writing reports: project report, magazine article and reporting in newspapers on sporting events.

#### e) Practice In Writing

Exercises and assignments on report writing for students.

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## Unit VI

### Verbal Communication

#### a) Discussions And Summarization

Tips on taking minutes of a meeting

Why Meeting Minutes Matter

Meeting minutes are important. They capture the essential information of a meeting - decisions and assigned actions. The following instructions will help you take useful and concise meeting minutes.

#### Before the Meeting

If you are recording the minutes, make sure you aren't a major participant in the meeting. You can't perform both tasks well.

Create a template for recording your meeting minutes and make sure you leave some blank space to record your notes.

Decide how you want to record your notes. If you aren't comfortable relying on your pen and notepad, try using a tape recorder or, if you're a fast typist, take a laptop to the meeting.

#### During the Meeting

As people enter the room, check off their names on your attendee list. Ask the meeting lead to introduce you to meeting attendees you aren't familiar with. This will be helpful later when you are recording assigned tasks or decisions.

#### After the Meeting

Review the notes and add additional comments, or clarify what you didn't understand right after the meeting.

#### a) Debates

Group Discussions:

#### 1. Do's in a group discussion:

■ **B**onfident. Introduce yourself with warm smile and get into topic soon.

■ **M**ake eye contact with all group members

■ **L**earn to listen.

■ **B**e polite.

■ **B**e a good team player. Move with all group members and help them when needed.

#### 2. Don'ts in a group discussion:

■ **D**on't be harsh when you are interrupted.

■ **D**on't interrupt the other person

■ **D**on't try to push your ideas on others.

■ **D**on't argue. Everyone is free to express their ideas.

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c) Oral Reports

An oral report is a presentation, usually done for a student's teacher and classmates, though it can also be done for a larger segment of the school community, for parents, or for a more open group, depending on the circumstances. For example, at a science fair, a student might present a report on his or her project periodically for the class, for other visitors who pass by, and for judges.

d) Use in Teaching

Writing of dialogues

Originating from dialogos, the Greek word for conversation, the term dialogue refers to a verbal conversation between two or more people.

When writing dialogues, it is important to adhere to specific grammar rules. The following points need to be remembered while writing dialogues for role play.

1. Quotation Marks
2. Periods
3. Question Marks
4. Commas
5. Capitalization and Paragraphs
6. How Dialogue Enhances Writing

Dialogue reveals information about the speaker(s) within a written work. Dialogue also enhances the story line and plot.

a) Exposes Character Traits

Through indirect characterization, dialogue reveals details about a character by what they say, how they say it, and perhaps what they choose not to say.

b) Unveils Mood/Emotions

A character's word choice, description of tone, and choice of language reveal the inner state of the character without directly "telling" the audience. Showing instead of telling creates a deeper understanding of the character through the eyes of the reader or audience.

c) Reveals Motivation/Influences

Dialogue can illuminate a character's internal motivation or desires.

d) Establishes Relationships

Seeing how a character addresses and responds to other characters shows the type of relationships that they form and where their relationships currently stand. Dialogue can demonstrate how relationships change throughout the course of the story. It can show how a character changes or responds to various situations.

Exercises for students on preparing a dialogue exchange between two people

1. On the street (with a vegetable vendor)
2. At college with a lecturer (regarding admissions)
3. In a bank with the manager (for opening a bank account)
4. Telephone conversation with a hotel receptionist (make room reservations )
5. Telephone conversation (taking an appointment with the dentist/doctor)



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## II Semester Core 4-General Pathology

### Unit I

#### Introduction- & scope of pathology

**12hrs**

Cell injury and Cellular adaptations - Normal cell, Cell injury - types, etiology, morphology, Cell death-autolysis, necrosis, apoptosis, Cellular adaptations-atrophy, hypertrophy, hyperplasia, metaplasia.

Inflammation-Introduction, acute inflammation-vascular events, cellular events, chemical mediators, chronic inflammation-general features, granulomatous inflammation, tuberculosis.

Healing and repair - Definition, different phases of healing, factors influencing wound healing, fracture healing.

Haemodynamic disorders-Oedema, hypermia, congestion, haemorrhage, embolism, thrombosis, infarction.

Neoplasia - definition, nomenclature, features of benign and malignant tumors, spread of tumors, dysplasia, carcinoma in situ, precancerous lesions.

Environmental and nutritional pathology - smoking, radiation injury, malnutrition, obesity, vitamin deficiencies.

### Unit II

#### Haematological Disorders

**12hrs.**

Introduction and Haematopoiesis

Anaemia - introduction and classification (morphological and etiological), iron deficiency anemia: distribution of body iron, iron absorption, causes of iron deficiency, lab findings, megaloblastic anemia: causes, labfindings, haemolytic anemias: definition. Causes, classification and labfindings.

WBC disorders - quantitative disorders, leukemia - introduction and classification, acute leukemias, chronic leukemias.

Bleeding disorders - introduction, physiology of hemostasis. Classification, causes of inherited and acquired bleeding disorders, thrombocytopenia, DIC, laboratory findings. Pancytopenia.

### Unit- III

#### Basic Hematological Techniques

**12 hrs**

Characteristics of good technician, Blood collection - methods (capillary blood, venipuncture, arterial puncture) complications, patient after care, anticoagulants, transport of the specimen, preservation, effects of storage, separation of serum and plasma, universal precautions, complete hemogram - CBC, peripheral smear, BT, CT, PT, APTT, ESR, disposal of the waste in the laboratory.

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**Unit IV****Transfusion Medicine****12 hrs**

Selection of donor, blood grouping, Rh typing, cross matching, storage, transfusion transmitted diseases, transfusion reactions, components - types, indications.

**Unit V****Clinical Pathology****12 hrs**

Introduction to clinical pathology - collection, transport, preservation, and processing of various clinical specimens.

Urinalysis - collection. Preservatives, physical, chemical examination and microscopy. Physical examination; volume, color, odor, appearance, specific gravity and pH. Chemical examination; strip method- protein - heat and acetic acid test, sulfosalicylic acid method, reducing sugar-benedicts test, ketone bodies - rothas test, bile pigments fouchet method, bile salt - hays method, blood - benzidine test, urobilinogen and porphobilinogen - ehrlich aldehyde and schwartz test, bence jones protein., microscopy.

Examination of cerebrospinal fluid - physical examination, chemical examination, microscopic examination, examination of body fluids (pleural, pericardial and peritoneal), physical examination, chemical examination, microscopic examination, sputum examination.

**Practicals:**

Laboratory organization-

Reception of specimen, dispatch of reports, records keeping, coding of cases.

Laboratory safety guidelines.

SI units and conventional units in hospital laboratory.

Haematology techniques

Basic requirements for hematology laboratory

Glasswares for hematology

Equipments for haematology.

Anticoagulant vials

Complete blood counts.

Determination of haemoglobin.

RBC count and TLC by hemocytometer.

Differential leukocyte count.

Determination of platelet count

Determination of ESR and PCV.

Erythrocyte Indices - MCV, MCH, MCHC.

Reticulocyte count

Absolute eosinophilic count

Morphology of blood cells

Urinalysis

Examination of cerebrospinal fluid

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Examination of body fluids (pleural, pericardial, peritoneal)

Sputum examination.

**Practical Examination- 40 marks.**

**Spotters- 10 marks.**

Estimation of Haemoglobin or blood grouping- 10 marks.

Urine analysis- 10 marks.

Determination of ESR and PCV- 10 marks.

**1.Recommended Books Recent Editions.**

1. Basic Pathology Robbins Saunders, an imprint of Elsevier Inc., Philadelphia, USA.
2. Text book of Pathology Harsha Mmohan Jaypee Brothers, New Delhi.
3. Practical Pathology P. Chakraborty, Gargi Chakarborty New Central book agency, Kolkata.
4. Text book of Haematology Dr Tejinder Singh Arya Publications, Sirmour (H P)
5. Text book of Medical Laboratory Technology Praful Godkar Bhalani Publications house, Mumbai.
6. Textbook of Medical Laboratory Technology Ramanik Sood.
7. Practical Haematology Sir John Dacie Churchill Livingstone, London.
8. Todd and Sanford, Clinical Diagnosis and Management by Laboratory
9. Methods John Bernard Henry, All India Traveller Bookseller.
10. Histopathology Techniques, Culling.
11. Histopathology Techniques Bancroft.
12. Diagnostic Cytopathology Koss.
13. Diagnostic Cytopathology Winfred Grey.
14. Hand book of Medical Laboratory Technology, CMC Vellore.
15. Basic Haematological Techniques Manipal.

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**II Semester**  
**Core 5- Microbiology**  
**Theory**

**Unit - I****General Microbiology****12 hrs**

1. Morphology and classification of microorganisms.
2. Growth, nutrition and multiplication of bacteria
3. Sterilization and Disinfection - Principles and use of equipments of sterilization namely hot air oven, autoclave and serum inspissator, pasteurization, antiseptics and disinfectants
4. Immunology - antigen, Antibodies, Immunity, vaccines, types of vaccine and immunization schedule.
5. Hospital acquired infection - Causative agents, transmission methods, investigation, prevention and control of hospital Acquired infections.

**Unit - II****Bacteriology****12 hrs**

Classification of bacteria, morphology, infections, lab diagnosis, treatment and prevention of common bacterial infections. Staphylococcus, Streptococcus, Pneumococcus, Neisseria, Corynebacterium diphtheriae, Clostridia, Enterobacteriaceae - Shigella, Salmonella, Klebsiella, E.coli, Proteus, Vibrio cholerae, Pseudomonas and Spirochetes

**Unit III****Mycobacteriology & Parasitology****12 hrs**

Mycobacteria- classification, pathogenesis, lab diagnosis and prevention  
Classification, infections and lab diagnosis of following parasites. Entamoeba, Giardia, Malaria, Hookworm, Roundworm and Filarial worms.

**Unit IV****Mycology****12 hrs**

Morphology, disease caused and lab diagnosis of following fungi. Candida, Cryptococcus, Dermatophytes, opportunistic fungi (Aspergillus, Zygomycetes and Penicillium)

**Unit V****Virology****12 hrs**

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

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**Practicals: 20 hours**

1. Compound microscope and its application in microbiology.
2. Demonstration of sterilization equipments: hot air oven, autoclave, bacterial filters. Demonstration of commonly used culture media, nutrient broth, nutrient agar, blood agar, chocolate agar, MacConkey medium, L J media, Robertson cooked meat media, MacConkey agar with LF & NLF, Nutrient agar with staph colonies. Anaerobic culture, Methods and Antibiotic susceptibility test.
3. Demonstration of common serological tests: Widal, VDRL, ASLO, CRP, RF, Rapid tests for HIV, Hbsag and HCV.
4. Grams staining.
5. Acid fast staining.
6. Principles and practice of Biomedical waste management.
7. Stool Microscopy.

**Practical examination pattern**

Spotters (10 spotters carrying 2 marks each) 20 marks

Culture media - 6

Equipments - 2

Slides - 2

Discussion:

1. Gram stain 10 marks
2. Ziehl - Neelsen stain 10 marks

**Recommended Books Recent Editions.**

1. Anathanarayana & Panikar: Medical Microbiology - Revised 8th edition University Press.
2. Parasitology by Chatterjee - Interpretation to Clinical Medicine.
3. Textbook of Microbiology - Baveja, 5th edition, Arya Publications
4. Textbook for Laboratory technicians by RamnikSood. Jaypee Publishers
5. Textbook of Parasitology by Paniker. 7th edition

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## II Semester Core - 6 - Pharmacology

### Unit I

#### General Pharmacology, ANS, PNS.

**12 Hrs**

Sources of Drugs

Route of drug administration

Pharmacokinetics (Absorption, Metabolism, Distribution, Excretion)

Pharmacodynamics (Mechanisms of action)

Adverse drug reactions

ANS : ADRENERGIC Drugs - Adrenaline, Noradrenaline, Ephedrine, Dopamine, Dobutamine

Anti adrenergic - Phentolamine, Phenoxybenzamine, Prazocin, Tamsulosin, Propranolol, Atenolol, Carvidelol

Cholinergic drugs-Acetyl choline, Pilocarpine, Neostigmine, Organophosphorous compounds

Anti cholinergic agents-Atropine, Glycopyrrolate, Ipratropium Bromide, Dicyclomine

### Unit II

#### PNS, CVS, Renal System

**12 hrs**

Skeletal muscle relaxants - D Tubocurarine, Succinyl choline, Diazepam, Dantrolin

Local anaesthetics - lignocaine, la + vasoconstrictor

CVS - ionotropic agents - Digoxin,

Antianginal drugs - GTN,

Antihypertensives - Betablockers (Propranolol, Atenolol, carvidelol), CCBs (Nifedine), Diuretics (Thiazide, Furosemide, ace inhibitors, ARBs, Clonidine)

Drugs used in treatment of different types of shock, Plasma expanders

Renal system - Diuretics Furosemide, Thiazide, Spiranolactone

Antidiuretics - Vasopressin

### Unit III

#### CNS, Blood

**12 hrs**

CNS - general Anaesthetics - nitrous oxide, Halothane, iv anaesthetics

Sedative hypnotics - diazepam, barbiturates, zolpidem

Antiepileptics - Phenytoin, carbamezapine, phenobarbitone, valproate

Opioid analgesics - morphine, pethidine, codiene

NSAIDS - Aspirin, Diclofenacibuprofen, Selective COX2 inhibitors

Respiratory system-treatment of cough And Bronchial asthma

Blood - Hematinics, Anticoagulants - Warfarin, Heparin

Thrombolytics &amp; Antiplatelet drugs - streptokinase,/ aspirin, clopidogrel

**Unit IV****GIT, Chemotherapy****12 hrs**

GIT - drugs used in peptic ulcer - ppi, H2 blockers, Antacids

Antiemetics - Metaclopramide, Domperidone, Ondansetron

Purgatives &amp; Laxatives-bran, ispaghula, Lactulose, Bisacodyl &amp; senna

Drugs used in Diarrhoea- ORS, Super ORS, Antimotility drugs (loperamide, diphenoxylate)

Chemotherapy - general considerations MOA, Resistance, Prophylaxis

Sulfonamides, cotrimoxazoles, Quinolones

Tetracyclines, chloramphenicol

Betalactam antibiotics

**Unit V****Chemotherapy, Hormones.****12 hrs**

Aminoglycosides

Macrolides, other antibiotics (vancomycin, linezolid) &amp; treatment of UTI

Antifungal (clotrimazole, fluconazole)

Antiviral (Acyclovir, Few drugs used in HAART,)

Cancer chemotherapy

(names, common Adverse effects, general principles in the treatment of cancer )

Hormones - Corticosteroids its uses and adverse effects,

Treatment of Diabetes mellitus (insulin, Metformin, Glibenclamide)

**Practicals Syllabus : -20 hrs**

Dosage forms

Solid Dosage forms

Liquid Dosage forms

Gaseous Dosage forms

Oral route

Parenteral routes

Novel routes

Fixed dose combination - Amoxicillin + clavulanic acid - cotrimoxazole, Lignocaine + Adrenaline

Drug stations - Adrenaline, dopamine, Dobutamine)

Drug stations - Corticosteroids (hydrocortisone, prednisalone, inhalational steroids)

Drug stations - common antibiotics (amoxicillin, ciprofloxacin, Azithromycin, Metronidazole, Cephalosporins)

Drug stations - Insulin preparations

Instrument &amp; devices (Nasogastric tube, laryngoscope, Different Catheters, nebulizers, Inhalers, Rotahalers)

**Practical examination : 40 marks**

1. Dosage Forms : 15 Marks (5 X 3)

- 
- 
- Capsules, Tablets, Syrup, Iv, Im, Sc, Ia, Intra Articular -  
Advantages (1 Mark), Disadvantages (1 Mark) Examples (1 Mark)
2. Mention the name of the Device / Instruments and uses : 15 marks (5X3)  
Inhalares, Rotahalers, Spacehalers, Dripsets, Vasofix, ryles tube, urinary catheter,  
Endotracheal tube, Hand gloves
  3. 10 Spotters : 10 marks (10X 1) 2 uses of preparation

**Recommended Books Recent Editions.**

1. K.D. Tripathi, Essentials of Medical Pharmacology, V. Edition, M/s. Jaypee Brothers, Post Box, 7193, G-16, Emca House, 23/23, Bansari Road, Daryaganj, New Delhi.
  2. Padmaja Udaykumar -Pharmacology for Allied Sciences.
  3. R.S. Satoskar, S.D. Bhandarkar, S.S. Ainapure, Pharmacology and Pharmacotherapeutics, 18th edition, Single Volume, M/s Popular Prakashan, 350, Madan Mohan Marg, Tardeo, Bombay - 400 034.
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## II Semester Allied - 1 Health Care

### Learning Objectives

1. To define Health and understand various concepts of Health
2. To know the Health care delivery system in India
3. To know various National Health Programmes of India
4. To have overview of First Aid Principles and guidelines

### Unit I

#### 1a Concepts of Health

Definition of health; evolution in concepts of public health; public health events-sanitary awakening, germ theory of disease, rise of public health in various countries, changing concepts of health- biomedical concept, ecological concept, psycho-social concept and holistic concept.

#### 1b. Dimensions of Health

Physical dimension, mental dimension, Social dimension etc; Common health problems in India - Communicable diseases, Non communicable diseases, MCH problems, Nutritional problems, Environmental sanitation, Glance over National Health profile.

### Unit II

#### 2a Evolution of health care delivery systems

History of health care delivery services; Genesis of primary health care; National health policy; MDGs.

#### 2b Levels of health care

Primary health care, secondary health care, tertiary health care.

Primary health care-principles of primary health care, elements of primary health care.

### Unit III

#### 3a Primary health care: Delivery of services

Introduction; Structure of health care delivery system; Delivery of primary health care services at village level; Village health guide, ASHA, ICDS: Subcentre: Primary health centre.

#### 3b Secondary and tertiary health care: Delivery of services

Community Health centre; First referral unit; District hospital.

### Unit IV

#### 4a Primary health care - Current status in India

Status of health care infrastructure; Health team concept; Health insurance; Social security and social assistance in health; AYUSH.

#### 4b National Health Programmes

Introduction; National Vector Borne Disease Control Programme; National Leprosy Eradication Programme; Revised National Tuberculosis Control

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Programme; National AIDS Control Programme; Universal Immunization Programme; National Rural Health Mission.

### **Unit V**

#### **5a National Health Programmes**

Reproductive and Child Health Programme; Integrated Management of Neonatal and Childhood Illnesses; National Nutritional Anemia Prophylaxis Programme; National Programme for Control of Blindness; National Cancer Control Programme; National Mental Health Programme.

#### **5b First aid**

Basic terminologies; general guidelines; first aid in specific situations; Wound, bleeding, fracture, choking, burns, epistaxis, strains and sprain, animal bites (classification, causes and first aid), Cardio-pulmonary resuscitation

#### **Recommended Books Recent Editions.**

1. Park K. Park's Textbook of Preventive and Social Medicine. 23rd ed. Jabalpur: Banarsidas Bhanot Publishers, 2015. p.135-141
  2. Suryakantha. Textbook of Community Medicine with recent advances. 4th edition
  3. Bhalwar R editor. Textbook of Public Health and Community Medicine. 2nd Pune, Department of Community medicine AFMC; 2012
  4. Essentials of Community Medicine for Allied Health Sciences, JSS University Publications, 2015
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## II Semester Allied -2- Psychology

### **Objective**

After studying this applied paper, at the end of the semester students shall be able to demonstrate and develop the skills to understand patients better in the respective field.

### **Unit -I**

Introduction to Psychology; Meaning and Definitions psychology. Evolution of modern psychology. Scope of Psychology. Branches of psychology. Concept of normality and abnormality.

### **Unit -II**

Identifying psychological disorders. Anxiety disorders (panic, phobia, OCD, PTSD signs symptoms and management).

### **Unit -III**

Stress, Hans Selye Model of stress. Lazarus and Folkman model of stress. Sources of stress. Stress, disease and health. Changing health- impairing behavior.

### **Unit-IV**

Learning; Meaning, definition, Theories of learning .Pavlov's classical conditioning .Skinner's operant conditioning.

### **Unit-V**

Therapeutic Techniques. Counselling-meaning and definition. Psychotherapy- meaning and definition. Relaxation-types. (Brief introduction to psychoanalytical, behavioral and cbt techniques)

### **Recommended Books Recent Editions.**

1. C.P. Khokhar (2003) Text book of Stress Coping and Management Shalab Publishing House.
  2. S.M.Kosslyn and R.S.Rosenberg (2006) Psychology in Context. Pearson Education Inc.
  3. C.R. Carson, J.N. Bitcher, S.Mineka and J.M. Hooley (2007), Abnormal Psychology 13th, Pearson Education, Inc.
  4. D.A. Barlow and V.M. Durand (2004) Abnormal Psychology Wadsworth, Thompson Learning, 3rd edition USA.
  5. R.J . Gerrig & P.G. Zimbardo (2006) Psychology and life, Pearson Education, Inc.
  6. Pestonjee, D.M. (1999). Stress & Coping, The Indian Experience 2nd edn. New Delhi, Sage India Publications.
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**B.Sc. Perfusion Technology**  
**III Semester**  
**Core-7- Applied Pathology**

**UNIT I**

- \* Atherosclerosis-definition, risk factors, pathogenesis, morphology and complications
- \* Ischemic heart disease: Myocardial infarction- definition, pathogenesis, morphology and complications
- \* Hypertension- Benign and malignant hypertension: pathogenesis, pathology and complications

**UNIT II**

- \* Heart failure-Right and left heart failure: causes, pathophysiology and morphology
- \* Rheumatic heart disease and infectious endocarditis- definition, etiopathogenesis, morphology and complications
- \* Congenital heart disease- Types and atrial septal defect; aneurysms- types and morphology; cardiomyopathies in brief

**UNIT III**

- \* Atelectasis - types, Adult respiratory distress syndrome - causes , pathogenesis and morphology; pulmonary edema- classification, causes and morphology
- \* Chronic obstructive pulmonary disease- Chronic bronchitis, emphysema, asthma, bronchiectasis: Definition, etiopathogenesis and morphology
- \* Restrictive pulmonary diseases- Definition, categories, pathogenesis and morphology

**UNIT IV**

- \* Pneumoconiosis-types, asbestosis, coal workers pneumoconiosis- etiopathogenesis and morphology
- \* Pulmonary embolism, infarction, pulmonary hypertension-Definition, etiopathogenesis and morphology
- \* Pneumonia-Classification of pneumonias; Lobar pneumonia and bronchopneumonia - etiology, pathology and complications

**UNIT V**

- \* Clinical manifestations of renal diseases
  - \* Glomerular lesions in systemic diseases- diabetes, amyloidosis and systemic lupus erythematosus
  - \* Pericardial and pleural effusions- causes and microscopy
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**Practicals:**

1. Urine examination: physical, chemical, microscopy
2. Blood grouping & Rh typing
3. Hemoglobin estimation, packed cell volume (PCV), erythrocyte sedimentation rate (ESR)
4. Charts
5. Specimens
  - \* Atherosclerosis
  - \* Pneumonia
  - \* Tuberculosis
  - \* Infarct - lung
  - \* Contracted kidney
  - \* Hydronephrosis

**Final examination (practicals)**

1. Hemoglobin - 10 marks
2. Blood group - 10 marks
3. Charts + Specimens - 10 marks (5 marks each)
4. Urinalysis - 10 marks

**Reference Books (latest edition)**

- 1 Basic Pathology Robbins Saunders an imprint of Elsevier Inc., Philadelphia, USA
- 2 Text book of Pathology Harsh Mohan Jaypee Brothers, New Delhi
- 3 Practical Pathology P. Chakraborty, Gargi Chakraborty New Central Book Agency, Kolkata
- 4 Text Book of Haematology Dr. Tejinder Singh Arya Publications, Sirmour (H.P)
- 5 Text Book of Medical Laboratory Technology Praful Godkar, Bhalani Publication House, Mumbai
- 6 Text Book of Medical Laboratory Technology RamanikSood
- 7 Practical Haematology Sir John Dacie Churchill Livingstone, London.
- 8 Todd & Sanford, Clinical Diagnosis & Management by Laboratory Methods John Bernard Henry All India Travellar Bookseller
- 9 Histopathology Techniques. Culling
- 10 Histopathology Techniques Bancroft
- 11 Diagnostic Cytopathology Koss
- 12 Diagnostic Cytopathology Winifred grey
- 13 Hand-Book of Medical Laboratory Technology CMC Vellore
- 14 Basic Haematological Techniques Manipal Manual

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**III Semester**  
**Core-8-Applied Microbiology**  
**Theory**

**Unit I.****Sterilization and disinfection** **12 hrs**

- Sterilization and disinfection - classification, principle, methods
- Central sterile supply department

**Unit II.****Importance of sterilization and disinfection** **12 hrs**

- Disinfection of instruments used in patient care
- Disinfection of patient care unit
- Infection control measures for ICUs

**Unit III.****Health care associated infections** **12 hrs**

- Surgical site infections
- Urinary tract infections
- Ventilator associated pneumonia
- Catheter associated blood stream infections
- Antibiotic associated diarrhea

**Unit IV.****Drug resistant bacteria** **12 hrs**

- MRSA
- VRE
- Drug resistant Gram negative bacteria

**Unit V.****Occupationally acquired infections and its prevention** **12hrs**

- a. Respiratory route - Tuberculosis, Varicella zoster virus, Influenza, RSV
- b. Blood borne route - HIV, HBV, HCV, CMV, Ebola
- c. Orofecal route - Salmonella, Hepatitis A
- d. Direct contact - Herpes virus

**Practicals 20 hrs**

1. Sterilization and disinfection practices in tertiary care hospital
  2. Quality control of sterilization and Interpretation of results of sterility testing
  3. Collection of specimen from outpatient units, inpatient units, minor operation theatre and major operation theatre for sterility testing.
  4. Preparation of materials for autoclaving - packing of materials, loading, holding time and unloading
  5. Disinfection of wards, operation theatres and laboratory and air sampling methods
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**Practical Examination Pattern**

1. Sterilization and disinfection practices in tertiary care hospital and quality control of sterilization and Interpretation of results of sterility testing.  
20 Marks
2. Preparation of materials for autoclaving - packing of materials, loading, holding time and unloading.  
10Marks
3. Disinfection of wards, operation theatres, dialysis units and laboratory and air sampling methods. Collection of specimen from outpatient units, inpatient units, minor operation theatre and major operation theatre for sterility testing.  
10Marks

**Recommended Books:**

1. Textbook of Microbiology by Ananthnarayan and paniker
  2. Textbook of hospital infection control by Purvamathur
  3. Textbook of Microbiology by Baveja
  4. Hospital infection control by Mayhall
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**III Semester**  
**Core - 9 - Introduction to Perfusion Technology**

**UNIT I** **12hrs**

**History and evolution of Cardiac Surgery & Cardiopulmonary Bypass.**

- \* Dr John Gibbons Heart Lung Machine
- \* Cross circulation (Gross Well) technique
- \* Hypothermic Cardiac Surgery
- \* Advent of Cardiopulmonary Bypass

**UNIT II** **12hrs**

**Basic Principles of:**

- \* Extracorporeal Circulation
- \* Extracorporeal gas exchange

Biocompatible Materials used in Perfusion

Aseptic techniques and Sterility in perfusion.

**UNIT III** **12hrs**

**Basics of diagnostic techniques**

- \* Chest X-ray
- \* ECG
- \* Echo
- \* Coronary Angiography
- \* Nuclear Cardiology
- \* Laboratory investigations- arterial blood gas, Venous blood gas, Renal function test, liver function test, coagulation profile, Haemoglobin, haematocrit, platelet, RBC, WBC, Electrolytes

**UNIT IV** **12hrs**

**Basic components used in CPB-**

Heart lung machine,

Oxygenator,

Heater cooler unit

Blood cardioplegia device

ACT Machine

Basics of general Anaesthesia.

Types of anaesthesia - general anaesthesia, regional anaesthesia, local anaesthesia

Drugs in anaesthesia- Propofol, Thiopentone, Keatamine, Etomidate, Muscle

relaxants- Vecuronium, Pancuronium, Atracurium

Benzodiazepine- Midazolam, Diazepam,

Inhalations agents - Halothane, Sevoflurane, Isoflurane

**UNIT V** **12hrs**

**Basics of monitoring**

Setting up of ECG machine

Pressure transducer

Syringe and peristaltic pumps

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Anaesthesia Monitors  
Pulse oximeters  
Temperature probes and Thermoregulatory monitoring  
Defibrillators  
Fibrillators  
ACT (Activated Clotting Time)

**Practical syllabus**

- 1 Chest X-ray
- 2 ECG
- 3 Echo
- 4 Coronary Angiography
- 5 Nuclear Cardiology, ACT Machine
- 6 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

**Practical examination: 40 marks**

Identification, Uses, Principles, Discussion and Demonstration of the above practical syllabus

**Reference Books**

1. Cardiac surgery in the Adult- Lawrence H. Cohn.
  2. Paediatric cardiac surgery, Constantine Mauraoudis, Isbn 978-1-4051-9652-9.
  3. General Thoracic Surgery. Thomas W. Shields (2 Vols) -isbn-13-978-078-779821, Isbn-10-0781779820.
  4. Principles and Practice of Medicine.(for Neurology, Nephrology, Cardiology, Gastroenterology, Pulmonology). Davidsons
  5. A. Concise Textbook of Surgery. S.Das
  6. Braunwalds Heart Disease.
  7. L Ees Synopsis of Anaesthesia, Nicholas J H Davies.
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## III Semester Skill Enhancement-1 Computer Application

### 1 Overview

- Functionalities of a computer
- Definition
- Advantages
- Disadvantages

### 2 Applications

- Banking
- Insurance
- Education
- Marketing
- Health Care
- Engineering Design
- Military
- Communication
- Government

### 3 Generations

- First Generation
- Second Generation
- Third Generation
- Fourth Generation
- Fifth Generation

### 4 Types of Computer

- PC (Personal Computer)
- Workstation
- Minicomputer
- Mainframe
- Supercomputer

### 5 Components

- Input Unit
- CPU (Central Processing Unit)
- Output Unit

### 6 CPU - Central Processing Unit

- Memory or Storage Unit
  - Control Unit
  - ALU (Arithmetic Logic Unit)
  - Arithmetic Section
  - Logic Section
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## 7 Input Devices

■■■■■	Keyboard
■■■■■	Mouse
■■■■■	Advantages
■■■■■	Joystick
■■■■■	Light Pen
■■■■■	Track Ball
■■■■■	Scanner
■■■■■	Digitizer
■■■■■	Microphone
■■■■■	Magnetic Ink Card Reader(MICR)
■■■■■	Optical Character Reader(OCR)
■■■■■	Bar Code Readers
■■■■■	Optical Mark Reader(OMR)

## 8 Output Devices

■■■■■	Monitors
■■■■■	Cathode-Ray Tube (CRT) Monitor
■■■■■	Flat-Panel Display Monitor
■■■■■	Printers
■■■■■	Impact Printers
■■■■■	Character Printers
■■■■■	Dot Matrix Printer
■■■■■	Daisy Wheel
■■■■■	Line Printers
■■■■■	Drum Printer
■■■■■	Chain Printer
■■■■■	Non-impact Printers
■■■■■	Laser Printers
■■■■■	Inkjet Printers

## 9 Memory

■■■■■	Cache Memory
■■■■■	Primary Memory (Main Memory)
■■■■■	Secondary Memory

## 10 Random Access Memory

■■■■■	Static RAM (SRAM)
■■■■■	Dynamic RAM (DRAM)

## 11 Read Only Memory

■■■■■	MROM (Masked ROM)
■■■■■	PROM (Programmable Read only Memory)
■■■■■	EPROM(Erasable and Programmable Read Only Memory)
■■■■■	EEPROM (Electrically Erasable and Programmable Read Only Memory)
■■■■■	Advantages of ROM

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## 12 Mother board

- Features of Mother board
- Popular Manufacturers
- Description of Mother board

## 13 Memory Units

### 14 Ports

- Serial Port
- Parallel Port
- PS/2 Port
- VGA Port
- Power Connector
- Firewire Port
- Modem Port
- Ethernet Port
- Game Port
- Digital Video Interface, DVI port
- Sockets

### 15 Hardware

- Relationship between Hardware and Software

### 16 Software

- System Software
- Application Software

### 17 Number System

- Decimal Number System
- Binary Number System
- Octal Number
- Hexadecimal Number System

### 18 Data and Information

- Data Processing Cycle

### 19 Networking

- Characteristics of Computer Network
- Cables
- Router
- Network Card
- Internal Network Cards
- External Network Cards

### 20 Operating System

- Objectives of Operating System
  - Characteristics of Operating System
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**21 Internet and Intranet**

- Similarities in Internet and Intranet
- Differences in Internet and Intranet

**22 Computer Viruses**

- Types of computer virus
- Use of Antivirus software

**Practicals:****Suggested Hands on Exercises****Operating System:**

1. Starting the Windows Starting a program, running a program Running multiple programs and switching between windows Customizing the Task bar Recycle bin, restoring the deleted files
2. Creating and removing folders Making the taskbar wider, arranging icons on the Desktop Displaying and hiding the taskbar clock Controlling the size of start menu options Creating Shortcuts.
3. Customizing desktop view Adding a program to the start menu Adding a program shortcut in the Desktop Customizing the mouse settings
4. Expanding and collapsing a folder Recognizing File types using icons Running a program from explorer Renaming a file or folder Sorting a folder
5. Displaying the properties for a file or folder Using cut and paste operations to move a file Using copy and paste operations to copy a file Moving and copying files with mouse Searching a file or folder by using search command
6. Finding a file or folder, by name Defragmenting the disk, using disk defragmenter Controlling the speaker volume Recording and saving an audio file Connecting a printer to the PC

**Word Processing:**

1. Preparing a Govt. Order / Official Letter / Business Letter / Circular Letter Covering formatting commands - font size and styles - bold, underline, upper case, lower case, superscript, subscript, indenting paragraphs, spacing between lines and characters, tab settings etc.
2. Preparing a news letter: To prepare a newsletter with borders, two columns text, header and footer and inserting a graphic image and page layout.
3. Creating and using styles and templates To create a style and apply that style in a document To create a template for the styles created and assemble the styles for the template.
4. Creating and editing the table to create a table using table menu To create a monthly calendar using cell editing operations like inserting, joining, deleting, splitting and merging cells To create a simple statement for math calculations viz. Totaling the column.
5. Creating numbered lists and bulleted lists To create numbered list with different formats (with numbers, alphabets, roman letters) To create a bulleted list with different bullet characters.
6. Printing envelopes and mail merge. To print envelopes with from addresses and to

addresses To use mail merge facility for sending a circular letter to many persons To use mail merge facility for printing mailing labels.

7. Using the special features of word To find and replace the text To spell check and correct. To generate table of contents for a document To prepare index for a document.
- 8 Create an advertisement Prepare a resume. Prepare a Corporate Circular letter inviting the shareholders to attend the Annual Meeting.

### **Work Sheet:**

1. Using formulas and functions: To prepare a Worksheet showing the monthly sales of a company in different branch offices (Showing Total Sales, Average Sales). Prepare a Statement for preparing Result of 10 students in 5 subjects (using formula to get Distinction, I Class, II Class and Fail under Result column against each student).
2. Operating on the sheets: Finding, deleting and adding records, formatting columns, row height, merging, splitting columns etc. Connecting the Worksheets and enter the data.
3. Creating Different type of Charts: To create a chart for comparing the monthly sales of a company in different branch offices.
4. Using the data consolidate command: To use the data consolidate command to calculate the total amount budgeted for all departments (wages, travel and entertainment, office supplies and so on) or to calculate the average amount budgeted for - say, department office expenses.
5. Sorting Data, Filtering Data and creation of Pivot tables.

### **Presentation::**

1. Creating a new Presentation based on a template - using Auto content wizard, design template and Plain blank presentation.
2. Creating a Presentation with Slide Transition - Automatic and Manual with different effects.
3. Creating a Presentation applying Custom Animation effects - Applying multiple effects to the same object and changing to a different effect and removing effects.
4. Inserting Objects Creating and Printing handouts.
5. Publishing Presentation Exporting Presentations.

### **Internet:**

1. Understanding different types of Browser Programs and Internet file types. (.html, pdf etc.)
2. Searching for a web site / application / text documents viewing and downloading.
3. Create an E-mail account, Retrieving messages from inbox, replying, attaching files filtering and forwarding
4. Operating on a Tablet / Smart Phone - browsing and practicing on some important applications (UcBrowser, Skype) - operating on internet - creating and sending messages / mails using the applications like WhatsApp and We Chat etc.- downloading text and media files and video conferencing using Skype.

### III Semester

## Allied-3- Environment Science and Health

### Learning Objectives

1. To know various Environmental factors Health
2. To learn the modes of disease transmission and various control measures

### Unit I

1. a. Introduction to Environment and Health and Water

Ecological definition of Health, Population perspective of relations, Health & environment perspective of relations, Environmental factors, Environmental Sanitation, Need to study environmental health, Predominant reasons for ill-health in India

- 1.b. Water

Safe and wholesome water, requirements, uses, sources; sanitary well; Hand pump; water Pollution; Purification of water; large scale & small scale; slow sand filters; rapid sand filters; Purification of Water on a small scale; Household purification, Disinfection of wells; water quality criteria & standards.

### Unit II

#### Air, Light, Noise, Radiation

- 2 a. Air

Composition, Indices of Thermal Comfort, Air pollutants, Air Pollution - Health Effects, Environmental Effects, Green-house effect, Social & Economic Effects, Monitoring, Prevention & Control.

- 2 b. Light, Noise, Radiation

Natural and Artificial light; Properties, sources, noise pollution and its control, types, sources, biological effects and protection.

### Unit III

#### Waste and Excreta Disposal

- 3 a. Disposal of Wastes

Solid Wastes, Health hazards, Methods of Disposal; Dumping, Controlled tipping/ sanitary landfill, Incineration, Composting.

- 3 b. Excreta Disposal

Public health importance, Health hazards, sanitation barrier, Methods of excreta disposal, unsewered areas and sewerage areas, sewage, Modern Sewage Treatment.

### Unit IV

#### Housing and Health and Medical Entomology

- 4 a. Housing and Health

Human Settlement, Social goals of housing, Criteria for Healthful Housing by Expert Committee of the WHO, Housing standards- Environmental Hygiene Committee, Rural Housing Standards, Overcrowding, Indicators of Housing.

- 4 b. Medical Entomology

Classification of Arthropods, Routes of Disease transmission, Control measures.

**Unit V****Insecticides and Rodents**

- 5 a. Insecticides  
Types, mechanism of action, dosage and application for control of insects.
- 5 b. Rodents  
Rodents and its importance in disease, along with anti-rodent measures.

**Reference Books (latest edition)**

1. Park K. Park's Textbook of Preventive and Social Medicine. 23rd ed. Jabalpur: Banarsidas Bhanot Publishers; 2015. p.135-141
  2. Suryakantha. Textbook of Community Medicine with recent advances. 4th edition.
  3. Bhalwar R. Textbook of Public Health and Community Medicine. 2nd edition. Pune: Department of Community Medicine AFMC, 2012
  4. Essentials of Community Medicine for Allied Health Sciences, JSS University Publications, 2015.
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## IV Semester

### Core-10- Patient care and basic nursing

**Objectives:**

To learn about patient care and basics of nursing activities, communication and documentation, infection control, medication administration and wound care.

**Unit I -**

Introduction, Communication and Documentation - 12 hours

**1. Introduction to Patient Care:**

- a) Principles of patient care
- b) Types of patients (gender, age, diseases, severity of illness, triage)

**2. Communication & Documentation:**

- a) Communication with doctors, colleagues and other staffs.
- b) Non-verbal communication, Inter-personnel relationships.
- c) patient contact techniques, communication with patients and their relatives

**3. Documentation:**

- a. Importance of documentation,
- b. initial and follow up notes;
- c. documentation of therapy, procedures and communication

**Unit II -**

Universal Precautions and Infection Control - 10 hours

**4. Universal Precautions and Infection Control:**

- a) Hand washing and hygiene.
- b) Injuries and Personal protection, Insulation and safety procedures.
- c) Aseptic techniques, sterilization and disinfection.
- d) Disinfection and Sterilization of devices and equipment
- e) Central sterilization and supply department
- f) Biomedical Medical waste management

**Unit III -**

Medication Administration and Transport of patient - 14 hours

**5. Medication Administration:**

- a) Oral / Parenteral route
- b) Parenteral medication administration: Intra venous, intra muscular, sub-cutaneous, intra dermal routes, Intra venous Infusion
- c) Aerosol medication administration, Oxygen therapy
- d) Intravenous fluids,
- e) Blood and blood component transfusion

**6. Position and Transport of patient:**

- a) Patient position, prone, lateral, dorsal, dorsal recumbent, Fowler's positions, comfort measures, bed making, rest and sleep.
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- b) Lifting and transporting patients: lifting patients up in the bed, transferring from bed to wheel chair, transferring from bed to stretcher.
- c) Transport of ill patients (inotropes, intubated / ventilated patients)

#### **Unit IV -**

#### **Bedside care and monitoring - 14 hours**

##### **7. Bedside care:**

- a) Methods of giving nourishment: feeding, tube feeding, drips, transfusion.
- b) Recording of pulse, blood pressure, respiration, saturation and temperature.
- c) Bed side management: giving and taking bed pan, urine container.
- d) Observation of stools, urine, sputum, drains
- e) Use and care of catheters and rubber goods.
- f) Care of immobile/bed ridden patients, bed sore and aspiration prevention

##### **8. Monitoring of Patient:**

- a) Pulse, ECG (Cardiac Monitor), Oxygen Saturation, Blood Pressure, Respiration
- b) Multi parameter monitors, Capnography and End Tidal CO<sub>2</sub> (ETCO<sub>2</sub>)
- c) Hydration, intake and output monitoring
- d) Monitoring ventilator parameters: Respiratory Rate, Volumes, Pressures, Compliance, Resistance

#### **Unit IV -**

#### **Wound care and first aid - 10 hours**

##### **9. Dressing and wound care:**

- a) Bandaging: basic turns, bandaging extremities, triangular bandages and their application.
- b) Surgical dressing: observation of dressing procedures.
- c) Suture materials and suturing techniques
- d) Splinting
- e) Basic care of patient with burns

##### **10. First Aid and Basic Life Support (BLS)**

##### **Practical:**

###### **1. Demonstration of Patient care Procedures:**

- a) Positioning of patient, transport of the patient, Dressing and Bandaging, Care of inter costal drain tube, Insertion of naso-gastric tube and feeding
- b) Phlebotomy and obtaining blood samples, Arterial Blood sampling for ABG
- c) Injections: intra muscular, intra venous, sub cutaneous, intra dermal
- d) Insertion of intra venous catheter and infusion of medications, blood transfusion
- e) Recording of ECG and monitoring of patient
- f) Oxygen therapy: oxygen cannula, masks. Aerosol therapy: nebulization, inhalers



- g) Suctioning and care of artificial airway
- h) Insertion of urinary bladder catheter
- 2. Uses, principles, advantages and disadvantages of instruments and Devices in patient care
- 3. First aid and Basic Life Support (BLS)

**Practical Exam Pattern:**

Spotters, Drugs, Instruments and devices - identification and usage, demonstration of patient care procedures.

**Reference Books:**

1. Principles and practice of Nursing - Sr Nancy
  2. Introduction to Critical Care Nursing - Mary Lou Sole
  3. First Aid - Redcross society guidelines
  4. Basic Life Support (BLS) - American Heart Association guidelines
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**IV Semester**  
**Core -11- Basics of Pumps, Oxygenators, Alters**  
**and Blood Components**

**UNIT I** **12hrs**

**Oxygenators**

- \* History of Oxygenators
- \* Types of Oxygenators
- 1. Disc and Screen Oxygenators
- 2. Bubble Oxygenators
- 3. Membrane Oxygenators
- \* Design & function of various Oxygenators

**UNIT II** **12hrs**

**Pumps**

- \* History of Pumps
- \* Characteristics of an Ideal Pump
- \* Types of Pumps
- 1. Roller pumps
- 2. Centrifugal pumps
- 3. Peristaltic pumps
- \* Design & function of Roller pumps
- \* Design & function of Centrifugal pumps

**UNIT III** **12hrs**

**Filters**

- \* Arterial filters
  - \* Cardiotomy filters
  - \* Gas line filters
  - \* Leucocyte filters
- Types of tubing's used in CPB  
Heat Exchangers

**UNIT IV** **12hrs**

**Blood components -**

- Blood grouping and Cross Matching
  - PRBC
  - Whole blood
  - Platelets
  - FFP
  - Cryoprecipitate
- 
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**UNIT V****12hrs****Coagulation system**

Platelet Disorders- Thrombocytopenia, Thrombophilia

Coagulation pathway disorders - Von willibrands diseases Haemophilia

DIC- Disseminated intravascular coagulation

- \* Fibrinolytic system and its disorders

**Practical Syllabus**

Design & function of Roller pumps

- \* Arterial filters
- \* Cardiotomy filters
- \* Gas line filters
- \* Leucocyte filters

Types of tubing's used in CPB

Heat Exchangers

**Practical Examination: 40 Marks**

Identification, Uses, Principles, Discussion and Demonstration of above practical syllabus

**Recommended Books**

- 1 Cardiopulmonary Bypass Principles and practice 3rd edition- Glenn P. Gravlee, M.D, (Editor) Richard F.Davis MD (Editor), Alfred H.Stammers MSA CCP(Editor)
- 2 Techniques in Extracorporeal Circulation 4th Edition- Philip H. Kay MADM FRCS and Christopher M Munsch ChM FRCS (Editors)
- 3 Cardiopulmonary Bypass Cambridge University- Sunit Ghosh , Florian Falter, Davis J.Cook (Editors)
- 4 Perfusion for Congenital Heart Surgery notes on cardiopulmonary Bypass for a complex Patient Population - Gregory Matte CCP, LP,FPP (editor)
- 5 ECMO, Extracorporeal cardiopulmonary Support in Critical Car, Red Book, Gail M.Annich (author) Publisher: Extracorporeal Life Support Organization.
- 6 Cardiopulmonary Bypass Neonates , Richard A. Jonas (Editor) Publisher: CRC Press
- 7 Cardiac Assist Devices, Daniel Goldstein(editor), Mehmet Oz (Editor) Publisher: Wiley-Blackwell
- 8 Drugs for the heart: Expert Consult- Online and Print,8e Paperback, Lionel H. Opie MD Dphi L Dsc FRCP (Author), Bernard J. Gersh Mb ChB DPhi FACC (Author) Publisher.

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**IV Semester**  
**Core-12- Basics of Medical Disorders**

**Objective:**

To learn about basic concepts of common medical disorders and its therapeutic options.

**Unit I -****Cardiac and Respiratory diseases -****12 hours**

1. Cardio vascular diseases
  - a. Hypertension, Ischemic heart diseases, Myocardial Infarction, arrhythmias
  - b. Heart failure, shock - types, causes
2. Respiratory diseases
  - a. Pneumonia, tuberculosis,
  - b. Chronic obstructive pulmonary disease, asthma
  - c. Pleural effusion, pneumothorax
  - d. Interstitial lung disease

**Unit II -****Neurological, Renal, GI and infectious diseases -****12 hours**

3. Neurological diseases
  - a. Polio myelitis, Gullian Barre Syndrome, Myasthenia Gravis, epilepsy / seizure disorder, cerebro vascular accident / stroke
4. Renal Diseases
  - a. Acute kidney injury
  - b. Chronic Kidney Disease
5. Gastro intestinal and Liver Diseases
  - a. Gastritis / APD, peptic ulcer
  - b. Acute gastroenteritis
  - c. Hepatitis, Hepatic failure, alcoholic liver disease
6. Infectious diseases: Dengue, malaria, leptospirosis

**Unit III -****Blood, fluid, electrolyte and acid base abnormalities -****12 hours**

7. Blood loss and Anemia, thrombocytopenia
8. Fluid Electrolyte imbalance and corrective methods
9. Acid Base abnormalities and corrective methods

**Unit IV -****Pulmonary Oedema, Sepsis and MODS - 10 hours**

10. Pulmonary Oedema, Acute Lung Injury and Acute Respiratory Distress Syndrome
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11. Sepsis, multi-organ failure, Multi-organ dysfunction syndrome

**Unit V -**

**Health problems in Specific conditions and Toxicology -**

**14 hours**

12. Health problems in specific conditions

- a. Pregnancy - antenatal care, disorders in pregnancy
- b. Children and new born
- c. Obesity
- d. Diabetes mellitus
- e. HIV infections and AIDS
- f. Elderly subjects and disability
- g. Brief mention about endocrine disorders

13. Poisoning and drug over dosing

- a. Classification of poisons
- b. Principles of treatment of poisoning and Primary care
- c. Poisons and drug over dosing requiring ventilation

14. Miscellaneous

- a. Drowning
- b. Hanging

**Practical:**

1. History Taking and clinical examination, monitoring of patient.
2. Therapeutic options for various diseases and conditions

**Practical Examination:**

**40 marks**

\* Spotters -20 marks

Drugs, Instruments and devices

X rays, Basic Blood investigation reports

\* Case Discussion - 10 marks

\* Demonstration of Procedures - 10 marks

**Reference Books:**

Davidson's Principles and Practice of Medicine - Elsevier Publications

Harrison's Principle of Internal Medicine

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## IV Semester

# Skill Enhancement-2 Biostatistics and Research Methodology

### Learning Objectives

1. To have a basic knowledge of biostatistics and its applications in medicine
2. To know various types of data presentation and data summarization in Medical field
3. To have overview of data analysis and sampling techniques
4. To understand various study designs in Medical field
5. To know applications of various study designs in Medical Research

### Unit I.

#### Introduction and Presentation of data

Meaning, Branches of Statistics, Uses of statistics in medicine, Basic concepts, Scales of measurement, Collection of data, Presentation of data; Tabulation, Frequency Distribution, Diagrammatic and Graphical Representation of Data.

### Unit II.

Measures of central tendency and Measures of Variation

Arithmetic Mean (Mean), Median, Mode, Partition values, Range, Interquartile range, Mean Deviation, Standard Deviation, Coefficient of Variation.

### Unit III.

#### Probability and standard distributions

Definition of some terms commonly encountered in probability, Probability distributions; Binomial distribution, Poisson distribution, Normal distribution, Divergence from normality; Skewness and kurtosis

### Unit IV.

#### Census and Sampling Methods

Census and sample survey, Common terms used in sampling theory, Non-probability (Non random) Sampling Methods; Convenience sampling, Consecutive Sampling, Quota sampling, Snowball sampling, Judgmental sampling or Purposive sampling, Volunteer sampling, Probability (Random) Sampling methods; Simple random sampling, Systematic Sampling, Stratified Sampling, Cluster sampling, Multi-stage sampling, Sampling error, Non-sampling error.

### Unit V.

#### Inferential statistics

Parameter and statistic, Estimation of parameters; Point estimation, Interval Estimation, Testing of hypothesis; Null and alternative hypotheses, Type-I and Type-II Errors.

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## **Research Methodology**

### **Unit I -**

Introduction to research methodology

Types of research; Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical, Some other types of Research

### **Unit II -**

Study Designs-Observational Studies

Epidemiological study designs; Observational studies, Descriptive studies; Case reports, Case series, Analytical studies; Case control studies, Cohort studies, Cross sectional

### **Unit III-**

Experimental Studies

Experimental studies (Intervention studies); Randomized control trials (Clinical trials), Field trials, Community trials.

### **Unit IV-**

Uses of Epidemiology

### **Unit V-**

Application of study Designs in Medical Research

## **Recommended Books**

1. K.R.Sundaram, S.N.Dwivedi and V Sreenivas (2010): Medical statistics, principles and methods, BI Publications Pvt Ltd, New Delhi.
  2. NSN Rao and NS Murthy (2008): Applied Statistics in Health Sciences, Second Edition, Jaypee Brothers Medical Publishers (P) Ltd.
  3. J.V.Dixit and L.B.Suryavanshi (1996): Principles and practice of biostatistics, First Edition, M/S Banarsidas Bhanot Publishers.
  4. GetuDegu and Fasil Tessema (2005): Biostatistics, Ethiopia Public Health Training Initiative.
  5. Essentials of Community Medicine for Allied Health Sciences, JSS University Publications.
  6. Park K. Park's Textbook of Preventive and Social Medicine. 23rd ed. Jabalpur: Banarsidas Bhanot Publishers; 2015. p.135-141.
  7. Suryakantha. Textbook of Community medicine with recent advances. 3rd edition.
  8. Bhalwar R. Textbook of Public Health and Community Medicine.2nd Edition. Pune: Department of Community Medicine AFMC; 2012.
  9. Leon Gordis. Epidemiology Fourth Edition - Elsevier Saunders Publication.
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**IV Semester**  
**Allied-4**  
**Constitution of India**

**Unit - I**

Meaning of the term 'Constitution'. Making of the Indian Constitution 1946-1950.

**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.

**Recommended Books Recent Editions.**

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.
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**V Semester****Core-13- Conduct of Cardiopulmonary Bypass, Priming Solutions and Cannulation Techniques**

<b>UNIT I</b>	<b>12hrs</b>
<b>Cardiopulmonary Bypass Circuitry</b>	
* Adult circuit	
* Paediatric circuit	
* Neonatal circuit	
<b>UNIT II</b>	<b>12hrs</b>
<b>Cannulation Techniques</b>	
* Arterial cannulation- Aortic, femoral, iliac	
* Venous cannulation- SVC, IVC, RA, femoral vein	
* Cardioplegia cannulation- Antegrade, Retrograde, Osteal	
<b>UNIT III</b>	<b>12hrs</b>
<b>Priming solutions and Haemodilution in CPB</b>	
Crystalloids	
Ringer lactate	
Normal saline	
Plasmalyte A	
Dextrose	
Colloids - Hetastarch	
Albumin	
FFP	
Additional drugs used in them - Mannitol, Heparin, Bicarbonate	
<b>UNIT IV</b>	<b>12hrs</b>
<b>Conduct of CPB-</b>	
Chart Review and selection of Equipments	
Assembling the circuit:	
Priming and Setting occlusion	
Initiation of CPB and Gas management.	
Venting of the Heart and Cardiomy Suction	
Pre-CPB checklist	
Pre weaning off bypass checklist	
Cardioplegia dosage and management	
ABG and ACT management	
Adequacy of Perfusion	
Weaning From CPB	

**UNIT V****12hrs****Renal System - Presentation, Diagnosis and Management**

ARF Acute renal failure

CRF Chronic renal failure

Why and when do we do Haemodialysis

Types of Dialysis

**CNS** Aetiology, presentation and diagnosis of

Hemiplegia

Paraplegia

Stroke

Cerebral haemorrhage

**Practical syllabus**

- 1 Adult circuit
- 2 Paediatric circuit
- 3 Neonatal circuit
- 4 Arterial cannulation- Aortic, femoral, iliac
- 5 Venous cannulation- SVC, IVC, RA, femoral vein
- 6 Cardioplegia cannulation- Antegrade, Retrograde, Osteal
- 7 Assembling the circuit:
- 8 Priming and Setting occlusion
- 9 Initiation of CPB and Gas management.
- 10 Venting of the Heart and Cardiomy Suction
- 11 Cardioplegia dosage and management
- 12 ABG and ACT management
- 13 Adequacy of Perfusion
  - Pre-CPB checklist
  - Pre weaning off bypass checklist

**Practical examination: 40 MARKS**

Identification, Uses, Principles, Discussion and Demonstration of above practical syllabus

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**V Semester****Core-14- Myocardial Protection and Various Ddrugs used in CPB****UNIT I****12hrs****Myocardial protection**

- a) Crystalloid Cardioplegia -  
St Thomas solution,  
Del Nido solution,  
Custodiol HTK solution -Histidine-Tryptophan-Ketoglutarate
- b) Blood cardioplegia delivery Devices-  
MPS myocardial protection system,  
Cardioplegia reservoir

**UNIT II****12hrs**

Drugs used in CPB:

Vasodilators- Sodium Nitroprusside, Nitroglycerine,

Vasoconstrictors- Phenylephrine,

Anti Arrhythmics- Amiodarone, Magnesium, Lignocaine

Diuretic- Frusemide, Mannitol

Anticoagulants- Heparin, Low molecular Weight heparin, Dabagantrin Argatroban  
Protamine

Steroids- Dexamethasone

**UNIT III****12hrs**

- a) Coagulation management during CPB and its reversal
  - Heparin Pharmacology
  - Heparin Dosing And Monitoring
  - Heparin Resistance
  - Alternatives To Unfractionated Heparin
  - Heparin-Induced Thrombocytopenia
  - Protamine Pharmacology
  - Protamine reaction
- b) Temperature management during CPB
  - Temperature monitoring sites
  - Types of hypothermia
  - Temperature gradient

**UNIT IV****12hrs****Inhalation agents-**

Sevoflurane, Isoflurane

Analgesics- Fentanyl, Morphine

Sedatives- Midazolam, Thiopentone

Antiplatelets- Aspirin, Clopidogrel, Ticlopidine, Prasugrel

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**UNIT V****12hrs**

Sodium Bicarbonate

Potassium Chloride

Heparin and its alternatives- Bivalirudin, Argatroban, Lepirudin

Inotropes-

Adrenaline,

Noradrenaline,

Dopamine,

Dobutamine,

Milrinone

Vasopressin

Levosimendan

**Practical syllabus**

St Thomas solution,

Del Nido solution,

Custodiol HTK solution -Histidine-Tryptophan-Ketoglutarate

MPS myocardial protection system,

Cardioplegia reservoir

Vasodilators- Sodium Nitroprusside, Nitroglycerine,

Vasoconstrictors- Phenylephrine,

Anti Arrhythmics- Amiodarone, Magnesium, Lignocaine

Diuretic- Frusemide, Mannitol

Anticoagulants- Heparin, Low molecular Weight heparin

Protamine

Steroids- Dexamethasone

Sodium Bicarbonate

Potassium Chloride

Heparin and its alternatives- Bivalirudin, Argatroban,

Adrenaline,

Noradrenaline,

Dopamine,

Dobutamine,

Milrinone

Vasopressin

Levosimendan

**Practical examination: 40 marks**

Identification, Uses, Principles, Discussion and Demonstration of above practical syllabus

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**V Semester**  
**Core-15- Cardiac, Thoracic and Vascular Surgical**  
**Disorders**

<b>UNIT I</b>	<b>12hrs</b>
IHD (Ischaemic Heart Disease) ACS - angina types - typical, atypical STEMI NSTEMI MI Cardiomyopathy-Types, presentation, diagnosis and management of Presentation, Diagnosis and Management of Left ventricular failure Right ventricular failure	
<b>UNIT II</b>	<b>12hrs</b>
Rheumatic Heart Disease- Causes, presentation, diagnosis and management of Mitral stenosis Mitral regurgitation Aortic regurgitation Aortic stenosis Tricuspid regurgitation Tricuspid stenosis	
<b>UNIT III</b>	<b>12hrs</b>
Congenital Heart Disease, presentation, diagnosis and management of Atrial septal defect VSD PDA TOF TGA TAPVC Coarctation of aorta	
<b>UNIT IV</b>	<b>12hrs</b>
Vascular Diseases- Classification, presentation, diagnosis and management of Aneurysms and dissections Ascending aorta Arch of aorta Descending thoracic aorta	

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**UNIT V****12hrs**

Respiratory System  
Presentation, Diagnosis and Management  
Chronic obstructive airway diseases  
Bronchial asthma  
Pneumonia  
H<sub>1</sub>N<sub>1</sub>  
Pneumothorax  
Haemothorax  
Basics of PFT and its interpretation

**Practicals syllabus**

Case scenarios of adult heart disease, congenital heart disease and thoracic vascular disease and lung diseases mentioned in the above units

**Practicals examination: 40 marks**

Identify and Discuss - CXR, CT thorax, angiogram, CT angiogram and PFT and ECHO findings of the above diseases

**Recommended Books**

- 1 Cardiopulmonary Bypass Principles and practice 3rd edition- Glenn P. Gravlee, M.D, (Editor) Richard F.Davis MD (Editor), Alfred H.Stammers MSA CCP(Editor)
- 2 Techniques in Extracorporeal Circulation 4th Edition- Philip H. Kay MADM FRCS and Christopher M Munsch ChM FRCS (Editors)
- 3 Cardiopulmonary Bypass Cambridge University- Sunit Ghosh , Florian Falter, Davis J.Cook (Editors)
- 4 Perfusion for Congenital Heart Surgery notes on cardiopulmonary Bypass for a complex Patient Population - Gregory Matte CCP, LP, FPP (editor)
- 5 ECMO, Extracorporeal cardiopulmonary Support in Critical Care, Red Book, Gail M.Annich (author) Publisher: Extracorporeal Life Support Organization.
- 6 Cardiopulmonary Bypass Neonates, Richard A. Jonas (Editor) Publisher: CRC Pres
- 7 Cardiac Assist Devices, Daniel Goldstein(editor), Mehmet Oz (Editor) Publisher: Wiley-Blackwell
- 8 Drugs for the heart: Expert Consult- Online and Print, 8e Paperback, Lionel H. Opie MD DPhi L Dsc FRCP (Author), Bernard J. Gersh Mb ChB DPhi FACC (Author) Publisher.

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## V Semester Elective-1- Echocardiography

**Objective:**

To learn about the basics of principles, practice and applications of echocardiography.

Introduction to echocardiography.

**Principles of echocardiography:****4 hours**

Ultrasound

Its application to obtain echocardiograms

Principles of two dimensional echo and its applications

Principles of M - mode and its application

Principles of colour Doppler and spectral Doppler and their applications

**Practice of Echocardiography:****12 hours**

ECHO views

ECHO windows

Obtaining Left ventricular images

Obtaining Doppler data

Echocardiographic measurements

Other methods of imaging

**Indications for echocardiography:****10 hours**

Assessment of anatomy

Assessment of etiology

Assessment of pathology

Assessment of physiology

Assessment of follow up of cardiac diseases

**Technical pit falls of echocardiography:****4 hours**

Echo windows

Suboptimal use of technology of ultrasound

Artefacts in echocardiography

Echocardiography in special situations

**Practical assessment :**

a) Spotters

b) Video Clips

c) Demonstration of common disorders

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## V Semester Allied-5-Medical Ethics

### **General considerations of Medical Ethics**

1. Medical Ethics - Introduction
2. Three cor contents in Medical Ethics - Best interest, autonomy unrights
3. Doctors, patient & Profession

### **Special considerations of Medical Ethics**

1. Consent
2. Confidentiality
3. Genetics
4. Reproductive Medicine
5. Mental Health
6. End of life and organ transporentation
7. Research & clinical Trials

### **Reference Book**

Medical Ethics & law, The cor curriculum

Author- Tony hope atla

Reference book no:- 16715 Center library

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**VI Semester**  
**Core 16 - Effects on Various Organs During CPB and**  
**Introduction to IABP and ECMO**

<b>UNIT I</b>	<b>12hrs</b>
<b>Effect of CPB</b>	
Effect of CPB on CNS	
Effect of CPB on Respiratory System	
Effect of CPB on Renal system	
Effect of CPB on Hepatic system	
<b>UNIT II</b>	<b>12hrs</b>
Effect of CPB on Immune system	
Effect of CPB on Endocrine system	
Systemic Inflammatory Response Syndrome	
Heparin Resistance	
Heparin Induced Thrombocytopenia	
Protamine Reactions	
<b>UNIT III</b>	<b>12hrs</b>
Introduction to IABP	
Parts of IABP machine	
Parts of IABP balloon	
Insertion sites	
Different IABP sizes	
Indications, steps of insertion and removal, complications and contraindications	
<b>UNIT IV</b>	<b>12hrs</b>
Introduction to ECMO	
Components of ECMO circuits	
Indications and contraindications to ECMO	
Types of ECMO	
<b>UNIT V</b>	<b>12hrs</b>
Safety devices in CPB	
Level detector	
Bubble detector	
Pressure sensor	
Pump slave	
Hand cranks	
Pulsatile Perfusion	
<b>Practical syllabus</b>	
Level detector	
Bubble detector	
Pressure sensor	
Pump slave	
Hand cranks	
Pulsatile Perfusion	
Introduction to IABP	
Indications, steps of insertion and removal, complications and contraindications	
<b>Practical examination: 40 marks</b>	
Identification, Uses, Principles, Discussion and Demonstration of above practical syllabus-20 marks	
Connecting and setting up the IABP - 20 marks	

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**VI Semester**  
**Core -17 Special Situations in Perfusion Technology**

**UNIT I** **12hrs**  
CPB CHECK LIST  
Prebypass check list  
Initiation of CPB  
Maintenance of CPB  
Weaning of CPB

**UNIT II** **12hrs**  
CPB special conditions  
Foetal circulation  
CPB in pregnancy  
Reperfusion injury

**UNIT III** **12hrs**  
CPB in Infants & Children  
Selection of circuit  
Selection of cannulae  
Blood prime

**UNIT IV** **12hrs**  
Management of CPB in Cyanotic patients  
Blood Gas Management  
ABG  
VBG  
calculation of circulating haematocrit  
Various priming options

**UNIT V** **12hrs**  
Hemo-concentration  
\* Conventional ultrafiltration CUF  
\* Modified Ultra filtration MUF

**Practical Syllabus**

Assembling of CPB circuit  
Initiation of CPB  
Maintenance of CPB  
\* Weaning of CPB Conventional ultrafiltration CUF  
\* Modified Ultra filtration MUF

**Practical Examination: 40 Marks**

Identification, Uses, Principles, Discussion and Demonstration of above practical syllabus

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**VI Semester****Core-18- Cardiac Support Devices, DHCA and Blood Conservation Techniques**

<b>UNIT I</b>	<b>12hrs</b>
Intra Aortic Balloon Pump (IABP) in detail	
Indications, and contraindications	
Setting up of IABP	
Steps of insertion	
Steps of removal	
Identification and Management of complications	
<b>UNIT II</b>	<b>12hrs</b>
Cardiac Support Devices	
Extra Corporeal Life Support (ECMO / ECLS)	
Ventricular Assist Devices (LVAD / RVAD)	
Artificial Heart	
<b>UNIT III</b>	<b>12hrs</b>
Blood conservation techniques in Cardiac Surgery	
Preoperative	
Peri Operative	
Post Operative	
Cell Saver	
<b>UNIT IV</b>	<b>12hrs</b>
Deep Hypothermic Circulatory Arrest (DHCA)	
<b>Steps Taken Before Going On DHCA</b>	
Antegrade & Retrograde Cerebral Perfusion	
Alpha stat management	
Ph stat management	
Non hypothermic cardiac surgeries	
<b>UNIT V</b>	<b>12hrs</b>
Minimal Invasive Cardiac Surgeries	
CPB for Minimal Invasive Cardiac Surgeries	
CPB for Non Cardiac Surgeries	
Recent advances in Perfusion	
<b>Practical Syllabus</b>	
Intra Aortic Balloon Pump (IABP) in detail	
Deep Hypothermic Circulatory Arrest (DHCA)	
Antegrade & Retrograde Cerebral Perfusion	

**Practical Examination: 40 Marks**

Setting up of DHCA circuit for ACP and RCP- 20 MARKS

Identification, Uses, Principles, Discussion and Demonstration of above practical syllabus- 20 Marks

**Recommended Books**

- 1 Cardiopulmonary Bypass Principles and practice 3rd edition- Glenn P. Gravlee, M.D, (Editor) Richard F.Davis MD (Editor), Alfred H.Stammers MSA CCP(Editor)
- 2 Techniques in Extracorporeal Circulation 4th Edition- Philip H. Kay MA DM FRCS and Christopher M Munsch ChM FRCS (Editors)
- 3 Cardiopulmonary Bypass Cambridge University- Sunit Ghosh , Florian Falter, Davis J.Cook (Editors)
- 4 Perfusion for Congenital Heart Surgery notes on cardiopulmonary Bypass for a complex Patient Population - Gregory Matte CCP, LP,FPP (editor)
- 5 ECMO, Extracorporeal cardiopulmonary Support in Critical Car, Red Book, Gail M.Annich (author) Publisher: Extracorporeal Life Support Organization.
- 6 Cardiopulmonary Bypass Neonates, Richard A. Jonas (Editor) Publisher: CRC Press
- 7 Cardiac Assist Devices, Daniel Goldstein(editor), Mehmet Oz (Editor) Publisher: Wiley-Blackwell
- 8 Drugs for the heart: Expert Consult- Online and Print, 8e Paperback, Lionel H. Opie MD Dphi L Dsc FRCP (Author), Bernard J. Gersh Mb ChB DPhi FACC (Author) Publisher.

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## VI Semester Elective-2- Coronary Angiography

**Objective:**

To learn about the basics of coronary angiography.

Introduction to coronary angiogram **4 hours**

- a) History of coronary angiography
- b) Instrumentation in coronary angiography
- c) Indications for coronary angiography
- d) Contraindications for coronary angiography

**Procedure****6 hours**

- a) Approach
- b) Seldingers technique
- c) Catheters for coronary angiography
- d) Views for coronary angiography
- e) Evaluation of a coronary lesion
- f) Reporting of coronary angiography

**Decision making on management****12 hours**

- a) Revascularization PTCA or CABG
- b) Planning review of protocol

**Post procedure care****8 hours**

- a) Drugs
- b) Groin care (femoral approach)
- c) Wrist care (radial approach)

Complications and management

**Practical assessment:**

- a) Spotters
  - b) Video Clips
  - c) Demonstration of common disorders
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## VI Semester

### Allied-6-Hospital Management

1. **Quality Concepts:** Definition of Quality, Dimensions of Quality, Basic concepts of Total Quality Management, Quality Awards. Accreditations for hospitals: Understanding the process of getting started on the road to accreditation, National and International Accreditation bodies, overview of standards- ISO (9000 & 14000 environmental standards), NABH, NABL, JCI, JACHO.
  2. **Hospital Information System:** Hospital Information System Management and software applications in registration, billing, investigations, reporting, ward management and bed distribution, medical records management, materials management and inventory control, pharmacy management, dietary services, management, information processing. Security and ethical challenges.
  3. **Inventory Control:** Concept, various costs of inventory, Inventory techniques- ABC, SDE / VED Analysis, EOQ models. Storage: Importance and functions of storage. Location and layout of stores. Management of receipts and issue of materials from stores, Warehousing costs, Stock verification.
  4. **Equipment Operations management:** Hospital equipment repair and maintenance, types of maintenance, job orders, equipment maintenance log books, AMCS, outsourcing of maintenance services, quality and reliability, concept of failure, equipment history and documents, replacement policy, calibration tests, spare parts stocking techniques and polices
  5. **Biomedical Waste Management:** Meaning, Categories of Biomedical Wastes, Colour code practices, Segregation, Treatment of biomedical waste-Incineration and its importance. Standards for waste autoclaving, microwaving. Packaging, Transportation & Disposal of biomedical wastes.
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