



**Dr. M. G. R.**  
**EDUCATIONAL AND RESEARCH INSTITUTE**  
**UNIVERSITY**

(Declared as Deemed to be University u/s. 3 of UGC Act, 1956)

**MADURAVOYAL, CHENNAI – 600 095**

**FACULTY OF ALLIED HEALTH SCIENCES**

**B.Sc. Cardiac and Perfusion Technology**

**Regulations, Curriculum and Syllabus**  
**2017**



# **Dr. M. G. R. EDUCATIONAL AND RESEARCH INSTITUTE**

(Deemed to be University)

**MADURAVOYAL, CHENNAI – 600 095**

## **Regulations for B.Sc. (Allied Health Science) Courses**

### **Introduction:**

**B.Sc. (Allied Health Science), a (3-year course work + 1-year internship)** program under the **Faculty of Allied Health Sciences**, is aimed at training students who will be able to meticulously assist the doctors for providing quality patient care in selected areas of clinical specialty. This program is a taught course that covers relevant topics and specialized areas of knowledge as opted. The aim of this B.Sc. program is to provide a thorough training to the candidates through formal lectures and/or seminars and practical programs which culminate in a one year internship that finally prepares the student for the rigors of the medical world.

### **1. Short Title and Commencement:**

These Regulations shall be called the “Regulations for B.Sc. (Allied Health Science) Course” of Dr. M.G.R Educational and Research Institute. These regulations shall come into force from the academic year 2017-2018. These regulations are subject to modifications as may be approved by the Academic Council from time to time.

### **2. Eligibility for Admission:**

- a) A candidate desiring to join the (3-year course work + 1-year internship) program, leading to the degree B.Sc. (Allied Health Science)

should have passed the HSC/CBSE/ISC or equivalent examination with one of the following subject combinations:

- i) Physics, Chemistry, Biology
  - ii) Physics, Chemistry, Botany and Zoology
- b) A candidate shall, at the time of admission submit to the Head of the Institution, a certificate of medical fitness from an authorized Medical Officer certifying that the candidate is physically fit to undergo the academic course and does not suffer from any disability or contagious disease.

### **3. Age limit for admission**

A candidate should have completed the age of 17 years or would complete the age as on 31<sup>st</sup> December of the year of admission to the BSc .Allied Health Science Course.

### **4. Eligibility Certificate**

Candidates, who have passed any qualifying examination other than the Higher Secondary Course examination conducted by the Government of Tamil Nadu, shall obtain an Eligibility Certificate from Dr. M.G.R Educational and Research Institute and produce the same at the time of admission.

### **5. Registration**

A candidate admitted to the course shall register his/her name with the University by submitting the application form for registration, duly filled in along with the prescribed fee, through the Head of the Institution within the stipulated date.

### **6. Duration of the course**

The duration of the B.Sc. (Allied Health Science) Degree Course shall be 3-year course work comprising of 6(six) semesters and one year (semesters 7 & 8) of compulsory internship. The candidate is required to pursue the course

on a full time basis, and must complete the course within seven years from the date of provisional registration.

#### **7. Commencement of the Course:**

The course shall ordinarily commence by the month of August of the academic year.

#### **8. Curriculum:**

The Curriculum and syllabus for the course shall be as specified in the annexure to these regulations which are subject to modifications by the standing Academic Board from time to time.

(i) The first three years of the course will be utilized as follows:

- The first two semesters will be spent on Pre and Para clinical subjects including Anatomy, Physiology, Biochemistry, Microbiology, Pathology, Physics , English and Communication skills, Introduction to Computers, and Pharmacology.
- At the beginning of the third semester, students will be assigned to one of the following branches of specialization as per the admission policy, and they will be offered specialized training in that specialty during the third, fourth, fifth and sixth semesters.

(ii) The fourth year of the course shall be compulsory internship in the respective specialty.

#### **9. Medium of Instruction:**

English shall be the medium of instruction for all the subjects of study and for the examination.

## **10. Working Days:**

Each semester shall consist of not less than 100 working days and each academic year shall have a total of 200 working days or above in the first to Sixth Semesters. In the Seventh and Eighth semesters, each semester shall have a minimum of 120 working days.

## **11. Attendance:**

The candidate shall have not less than 80 % attendance in Theory and Practical separately. The candidate lacking attendance in a subject shall be denied permission to appear for the University Examination in that subject.

## **12. Condonation of Lack of Attendance:**

The discretionary power of condonation of shortage of attendance to appear for University Examination rests with the University.

Lack of attendance can be condoned up to a maximum of 10% of the minimum attendance required in the following exceptional circumstances:

- (i) Any illness/ accident (for which Medical certificate from a registered medical practitioner must be produced)
- (ii) Any unforeseen tragedy in the family (should produce the letter from the parent/guardian)
- (iii) Participation in NCC/NSS and other co-curricular activities representing the Institution / University. (Certificate from competent authority is required)

For any of the above reasons, request shall be made by the candidate with prescribed fees to the Controller of Examination through proper channel, ten days prior to the commencement of the theory examination.

### **13. Commencement of the examinations**

There shall be two sessions of University examinations in an academic year, viz., February and August.

### **14. Continuous (Internal) Assessment:**

Continuous (Internal) Assessment for Theory shall be the average of the best two out of three.

Continuous (Internal) Assessment for Practical shall be the average of the best two out of three.

### **15. Semester - End Examination (University/Department):**

a. The examination in B.Sc. (Allied Health Science) shall consist of Written Theory examinations and Practical examinations. The Semester - End Examination (University/Department) shall be conducted at the end of each semester.

b. Papers for which Internal Examination is recommended by the Board of Studies and approved by the Academic Council, the date of Semester - End Examinations (Internal examinations) shall be as per the University guidelines.

**16. Pattern of Semester - End Examination (University/Department):**

**EXAMINATION PATTERN-**

**SEMESTER- I AND SEMESTER-II (FOR ALL SPECIALITIES)**

**THEORY**

**MAX.MARKS-** 60 Marks    **DURATION** -2<sup>1</sup>/<sub>2</sub> Hours

**PART –A (Answer any one from Two)**

1. Essay (1x15=15 Marks)

**PART-B (Answer all questions)**

1. Short Notes (5x5=25 Marks)

**PART-C (Answer all questions)**

1. Short answers (10x2=20 Marks)

**PRACTICAL**

Practical (including Orals) 15 Marks

**CONTINUOUS (INTERNAL) ASSESSMENT**

(i) Theory 20 Marks

(ii) Practical 5 Marks

**TOTAL 100 Marks**

**Question pattern for SEMESTER III – SEMESTER VI**

**Duration -**

**3hours**

**Theory Pattern**

**80 marks**

**Section –A (Answer any TWO from THREE)**

1. Essay (2x15=30)

**Section-B (Answer any EIGHT from TEN)**

1. Short notes (8x5=40)

**Section-C**

1. Very short notes (5x2=10)

**Internal assessment**

**20 marks**

- Based on CAT Exams

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**TOTAL**

**100 Marks**

**Practicals Pattern**

**Max**

**marks:80**

- |                              |          |
|------------------------------|----------|
| 1. Spotters                  | 20 marks |
| 2. Viva (Theory &Practicals) | 20 marks |
| 3. Charts/stations           | 20 marks |
| 4. Record                    | 20 marks |

**Internal assessment**

**Max marks:20**

- Based on CAT Exams
- Attendance
- Log book

**TOTAL**

**100 Marks**



### **17. Marks Qualifying for a Pass:**

For passing the University/End-Semester Examination from Semester I to Semester VI, the candidate shall secure the marks as stated below,

- (i) 40% minimum in the University End-Semester Theory examination
- (ii) 40% minimum in the University End-Semester Practical examination
- (iii) 40% of marks in the subject where internal evaluation alone is conducted
- (iv) 40% of aggregate of theory, practical and internal assessment taken together

### **18. Classification of successful candidates:**

- a) Successful candidates who secure 75% marks and above as a course aggregate in the first appearance taking University theory, practical, and project/dissertation evaluation shall alone be awarded Distinction. This will also apply for award of University rank.
- b) Successful candidates who secure 60% marks and above as a course aggregate in the University theory, practical, project/dissertation evaluation and viva shall be awarded First Class.
- c) All others who secure 40-59% in gross percentage will be classified to have passed in Second Class.

### **19. Revaluation of answer papers**

There shall be revaluation and retotaling of answer papers of failed candidates.

Failed candidates are however, permitted to apply to the University within fifteen days of publication of the results for revaluation and retotaling.

### **20. Carry- over of failed subjects**

- 1) A candidate has to pass in theory and practical examinations separately in each of the paper.
- 2) If the candidate fails either in theory or practical examinations, he/she has to reappear for both (theory and practical)

3) The student shall start the Internship training (VII & VIII semester) only after he/she clears all the papers from Semester I to Semester VI.

## **21. Temporary break of study**

- a) A candidate is not normally permitted to temporarily break the study.
- b) If a candidate is continuously absent from the institute for four or more weeks,
  - i) Having notified the Dean/Director/Principal within this period, this absence shall be treated as “Temporary Break of Study”.
  - ii) Without notifying the Dean/Director/Principal, his/her name will be removed from the institute rolls.
- c) If a candidate is compelled to temporarily break the study for valid reasons (such as accident or hospitalization due to prolonged ill health), he/she shall apply for condonation of the break to the Dean/Director/Principal through the Head of the Department.
- d) For condonable break of study:
  - i) If the lack of attendance is within condonable limits as per Clause No. 12, the candidate shall be permitted to write the examination for the current semester.
  - ii) If there is non-condonable lack of attendance, the candidate shall rejoin the program at the respective semester as and when it is offered after the break and shall be governed by the rules and regulations in force at the time of rejoining.
- e) The total period for completion of the program reckoned from the commencement of the semester to which the candidate was first admitted shall not exceed the maximum period specified in Clause No.6 irrespective of the period of break of study in order that he/she may be qualified for the award of the degree.

- f) In any case, a candidate shall be permitted to temporarily break the study only once during the entire duration of the program. The candidate shall forfeit the registration in case of a second break or in case of a non-condonable break of study.
- g) Without prejudice to the above rules, the candidate who has completed the attendance requirement for a semester, but has proceeded on a condonable break of study without appearing for the University Examination, shall be permitted to appear for the examinations without repeating the semester and thereafter continue the subsequent semester.

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**FACULTY OF ALLIED HEALTH SCIENCES**  
**SCHEME OF EXAMINATION**

**SEMESTER – I**

**TOTAL HOURS : 330**

S.No.	Paper	Hours/ Semester		Evaluation (Marks)				
		Lecture	Practical	Continuous Assessment (Internals)		End Semester examination (University/Department Exams)		Total
				Theory	Practical	Theory	Practical	
1	Anatomy -I	40 hours	20 hours	20	5	60	15	100
2	Physiology -I	40 hours	20 hours	20	5	60	15	100
3	Biochemistry -I	40 hours	20 hours	20	5	60	15	100
4	Microbiology -I	40 hours	20 hours	20	5	60	15	100
5	Pathology -I	40 hours	20 hours	20	5	60	15	100
6	English	30 hours	-	50	15	20	05	50

## SEMESTER – II

**TOTAL HOURS : 420hrs**

S.No.	Paper	Hours / Semester		Evaluation (Marks)				
		Lecture	Practical	Continuous Assessment (Internals)		End Semester examination (University/Department Exams)		Total
				Theory	Practical	Theory	Practical	
1	Anatomy -II	40 hours	20 hours	20	5	60	15	100
2	Physiology -II	40 hours	20 hours	20	5	60	15	100
3	Biochemistry -II	40 hours	20 hours	20	5	60	15	100
4	Microbiology -II	40 hours	20 hours	20	5	60	15	100
5	Pathology -II	40 hours	20 hours	20	5	60	15	100
6	Pharmacology	40 hours	20 hours	20	5	60	15	100
7	Physics	30 hours	-	50	-	-	-	50
8	Computer Science	30 hours	-	50	-	-	-	50

## SCHEME OF EXAMINATION

### SEMESTER – III (CARDIAC AND PERFUSION TECHNOLOGY)

**Total Hours: 420 Hrs**

S.No	PAPER	Hours / Semester		Evaluation (Marks)				
		Theory	Practical	Continuous Assessment (Internals)		End Semester Examination (University/ Department Exams)		Total
				Theory	Practical	Theory	Practical	
1.	Anatomy, Physiology and Pharmacology Related to cardiac and perfusion technology- Theory(UE)	60 hours	-	20	-	80	-	100
2.	Anatomy, Physiology and Pharmacology Related to cardiac and perfusion technology- Practical (UE)	-	120 hours	-	20	-	80	100
3.	Pathology related to cardiac and perfusion technology- Theory (UE)	60 hours	-	20	-	80	-	100
4.	Pathology related to cardiac and perfusion technology- Practical (UE)	-	120 hours	-	20	-	80	100
5.	Medical Ethics & Biosafety(IE)	30 hours	-	-	-	50	-	50
6.	Psychology (IE)	30 hours	-	-	-	50	-	50

## SEMESTER – IV (CARDIAC AND PERFUSION TECHNOLOGY)

**Total Hours: 420 Hrs**

S.No	PAPER	Hours / Semester		Evaluation (Marks)				
		Theory	Practical	Continuous Assessment (Internals)		End Semester Examination (University/ Department Exams)		Total
				Theory	Practical	Theory	Practical	
1.	<b>Electrocardiogram(ECG) – Theory(UE)</b>	60 hours	-	20	-	80	-	100
2.	<b>Electrocardiogram(ECG) – Practical(UE)</b>	-	120 hours	-	20	-	80	100
3.	<b>Principles of perfusion technology – Theory(UE)</b>	60 hours	-	20	-	80	-	100
4.	<b>Principles of perfusion technology – Practical(UE)</b>	-	120 hours	-	20	-	80	100
5.	<b>Medical Sociology(IE)</b>	30 hours	-	-	-	50	-	50
6.	<b>Basic and Advanced Life support(IE)</b>	30 hours	-	-	-	50	-	50

## SEMESTER –V (CARDIAC AND PERFUSION TECHNOLOGY)

**Total Hours: 390 Hrs**

S.No	PAPER	Hours / Semester		Evaluation (Marks)				
		Theory	Practical	Continuous assessment (Internals)		End Semester Examination (University/ Department Exams)		Total
				Theory	Practical	Theory	Practical	
1.	<b>Perfusion technology part I– Theory(UE)</b>	60 hours	-	20	-	80	-	100
2.	<b>Perfusion technology part I- Practical (UE)</b>	-	120 hours	-	20	-	80	100
3.	<b>Advance ECG and treadmill testing and basics of echo cardiography-Theory (UE)</b>	60 hours	-	20	-	80	-	100
4.	<b>Advance ECG and treadmill testing and basics of echocardiography-Practical (UE)</b>	-	120 hours	-	20	-	80	100
5.	<b>Environmental science and Community medicine (IE)</b>	30 hours	-	-	-	50	-	50



**SEMESTER –VI (CARDIAC AND PERFUSION TECHNOLOGY)**

**Total Hours: 390 Hrs**

S.no.	PAPER	Hours/Semester		Evaluation (Marks)				
		Theory	Practical	Continuous Assesment (Internals)		End Semester examination (University/Department Exams)		Total
				Theory	Practical	Theory	Practical	
1	<b>Perfusion Technology part II - Theory (UE)</b>	60 hours	-	20	-	80	-	100
2	<b>Perfusion Technology part II - Practical (UE)</b>	-	120 hours	-	20	-	80	100
3	<b>Echocardiography and cardiac catheterization - Theory (UE)</b>	60 hours	-	20	-	80	-	100
4	<b>Echocardiography and cardiac catheterization - Practical (UE)</b>	-	120 hours	-	20	-	80	100
5	<b>Health care and basic principles (IE)</b>	30 hours	-	-	-	50	-	50

**SEMESTER – VII (FOR ALL SPECIALITIES)**  
**Project/Dissertation**

S.No	PAPER	Hours / Semester		Evaluation (Marks)				
		Theory	Practical	Continuous assessment (Internals)		End Semester Examination		TOTAL
				Project	Viva	Project	Viva	
1.	Project/ Dissertation(UE)	-	-	100	-	100	-	200
2.	BioStatistics and research methodology(IE)	30 hours	-	-	-	Theory		50
						50		

**SEMESTER – VI & VIII (FOR ALL SPECIALITIES)**

**Internship -1 YEAR**

**SEMESTER - I**

<b>S.No</b>	<b>Subject</b>
1.	Anatomy – I(UE)
2.	Physiology –I (UE)
3.	Biochemistry - I(UE)
4	Microbiology - I(UE)
5.	Pathology – I(UE)
6.	English (IE)

## **SEMESTER - I**

### **ANATOMY – I (UE)**

#### **Course description:**

- A study of the anatomical structure of the human body.
- Body structure will be studied by organ systems.
- Form-function relationships with emphasis on clinically relevant anatomy.
- The laboratory study will involve observing and learning from human skeletal collections and dissected cadavers and preserved specimens.

#### **Objectives:**

- At the end of the course the student should be able to:
- Describe the structure and functions of the organ systems of the human body.
- Describe how the organ systems function and interrelate.
- Learn basic technical terminology and language associated with anatomy.
- Develop a self-identity of what it means to be “human”.

#### **Learning Objectives: Skills**

- Identify the anatomical structure in the dissected specimen.
- Learn to correlate anatomical structures with relevant clinical conditions.

### **CONTENTS**

#### **Unit I**

##### **Organization of the Human Body**

- Introduction to the human body
- Definition and subdivisions of anatomy
- Anatomical position and terminology
- Regions and Systems of the body
- Cavities of the body and their contents
- Levels of organization of the body

##### **Cell**

- Definition of a cell, shapes and sizes of cells
- Parts of a cell – cell membranes cytoplasm, subcellular organelles and their main function
- Cell Division – Definition and main events that occur in different stages of mitosis and meiosis.

##### **Tissues**

- Tissues of the body
- Definition and types of basic tissues
- Characteristics, functions and locations of different types of tissues

## Unit II

### **Systems of Support and Movement**

#### **1. Skeletal system**

- Skeleton – Definition, axial and appendicular skeleton with names and number of bones, Types of bones. Parts of bones. Functions of bones. 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, movements possible.

#### **2. Muscular system**

- Parts of the skeletal muscle. Definition of origin and insertion. Name and location of the skeletal muscles of the body. Origin, insertion, nerve supply and action of large muscles like sternocleidomastoid, pectoralis major, deltoid, Biceps brachii, Triceps brachii, gluteus, gastrocnemius and diaphragm.

## Unit III

### **Control Systems of the Body**

#### **1. Nervous system**

- Sub-divisions of the nervous system
- **Spinal cord** – Location, extent, spinal segments, external features and internal structure.
- **Brain** – Sub-divisions, location external features of medulla oblongata, pons, mid-brain, cerebellum and cerebrum. 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** - Name, number, location and general distribution.
- **Spinal nerves** - Typical spinal nerve groups and number of spinal nerves. Name and location of cervical plexus and brachial plexus. Location and general distribution of the branches.
- **Autonomic Nervous system** –definition and functions

#### **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 & VIVA VOCE SYLLABUS**

### **1. Histology – Epithelium**

### **2. Axial & Appendicular Skeleton With Names & Number Of Bones**

### **3. Muscles**

- a. Trapezius
- b. Lattisimusdorsi
- c. Biceps

d. Triceps

e. Deltoid

**4. Nervous System**

a. Cerebrum

b. Cerebellum

c. Brain Stem

d. Spinal Cord

**5. Special Senses**

a. Tongue

b. Ear

c. Skin

d. Eye ballSS

**6. Viva Voce**

a. Radiology – Xrays

b. Osteology

c. Charts

d. Models

e. Gluteus Muscles

**Recommended books:**

1. Manipal manual of Anatomy for Allied Health Sciences, Sampathmadhyastha
2. B D Chaurasia: General human anatomy

**References:**

1. B D Chaurasia: Regional Anatomy. Vol I, II,III
2. Richard S. Snell: Clinical Anatomy

# **PHYSIOLOGY-I**

## **Objectives of the course:**

At the end of this course the students should be able to:

Comprehend basic terminologies used in the field of Human Physiology

Define and describe basic Physiological processes governing the normal functioning of the human body.

Apply this knowledge in their Allied Health Science practice.

## **Contents**

### **Unit 1**

#### **Ia. General Physiology**

- Concept of Homeostasis
- Cell structure and functions
- Transport across membranes

#### **Ib. Nerve and muscle**

- Nerve structure, classification of nerve fibres,
- Muscles- classification, structure, Neuro-Muscular junction(NMJ).
- Muscle contraction-mechanism, types.

#### **Ic. Blood and body fluids**

- Body fluid volumes, compartments, and composition
- Blood composition and functions
- Plasma proteins
- Erythrocytes -Morphology and functions
- Leucocytes-Morphology and functions
- Platelets-Morphology and functions
- Blood groups.

### **Unit II**

#### **IIa. Digestive system**

- Salivary glands -Nerve supply, functions of saliva.
- Gastric juice-composition & functions of gastric juice.
- Pancreatic juice-composition, functions and regulation of pancreatic juice.
- Bile- composition, functions of bile and bile salts.
- Succus entericus and small intestinal movements.
- Deglutition, vomiting, functions of large intestine.

#### **IIb. Excretory system**

- Structure of Nephron and its blood supply, Juxtaglomerular Apparatus(JGA).
- Formation of urine-Filtration, Reabsorption and secretion.
- Counter-Current mechanism



- Micturition.

## **PRACTICAL & VIVA VOCE SYLLABUS**

### **I. Microscope**

**II. Estimation of Hemoglobin**

**III. RBC**

**IV. WBC**

**V. Spotters**

## **BIOCHEMISTRY-I (UE)**

### **Objectives:**

- To have a knowledge about the chemistry and metabolism of various macromolecules- carbohydrate, protein and lipids
- To learn about enzymes, vitamins, minerals and nutrition
- To know the structure and function of Hemoglobins, Nucleic acids.
- To learn about the organ function tests like Liver Function Tests and Renal Function Tests.

### **CONTENTS**

#### **Unit I - CARBOHYDRATES**

##### **Carbohydrates:**

- Classification of carbohydrates and their biological importance,
- Reducing property of sugars.

##### **Metabolism of Carbohydrates :**

- Digestion and Absorption of carbohydrates,
- Steps of Glycolysis and energetics,
- Steps of TCA cycle and energetics,
- Steps of Glycogen synthesis and breakdown,
- Significance of HMP shunt pathway,
- Definition and steps of Gluconeogenesis, Galactose metabolism
- Galactosemia.
- Diabetes mellitus ,

##### **Bioenergetics :**

- Importance of ATP, Outline of respiratory chain.

#### **Unit II - LIPIDS**

##### **Lipids:**

- Classification of lipids,
- Essential fatty acids,
- Functions of cholesterol,
- Triglycerides,
- Phospholipids

##### **Metabolism of Lipids :**

- Digestion and Absorption of lipids,
- Fatty acid synthesis & Steps of  $\beta$  oxidation of fatty acids,
- Types and functions of lipoprotein,
- Lipid profile, hyper cholesterolemia

### **Unit III - VITAMINS**

#### **Vitamins:**

- Vitamins, its classification
- Vitamin A
- Vitamin D
- Vitamin E & K
- Vitamin B complex
- Vitamin C

### **Unit IV - ENZYMES**

#### **Enzymes:**

- Definition,
- Classification,
- Coenzymes,

Factors affecting enzyme activity, Types and examples of enzyme inhibition

## **PRACTICAL & VIVA VOCE**

- 1 Reactions of Glucose
- 2 Reactions of Fructose
- 3 Reactions of Maltose
- 4 Reactions of Lactose
- 5 Tests for Sucrose
- 6 Tests for Starch
- 7 Identification of unknown Carbohydrates
- 8 Spotters

#### **Spotters:**

**The student must identify the spotter and write some important uses of the spotter.**

- **CRYSTALS**

- Maltosazone
- Lactosazone

- Glucosazone/Fructosazone

- **REAGENTS**

- Benedict's reagent
- Barfoeds reagent
- Foulgers reagent
- Seliwanoff reagent
- Fouchets reagent

- **CHEMICALS**

- Sodium Acetate
- Phenylhydrazine
- $\alpha$ Naphthol

- **STRUCTURES.**

- Structure of Cholesterol
- Structure of Glucose
- Structure of Fructose

- **VITAMINS**

- Carrots
- Rickets
- Scurvy
- Egg

## **MICROBIOLOGY – I (UE)**

### **OBJECTIVE:**

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

- Know the concepts of sterilization and disinfection procedures and their applications.
- Understand the basic principles of immunology.
- Understand the basic fundamental aspect of bacteria and study the common disease caused by them.

### **Contents**

#### **Unit I:**

**General Microbiology**-History and Introduction of Microbiology, Microscopy and Morphology of bacterial cell and their function, Growth and nutrition of Bacteria, Sterilization and Disinfection , Culture media, Culture methods and Identification of bacteria.

#### **Unit II:**

**Immunology**-Basic concept about Infection (Source, Portal of entry and Spread), Immunity, Antigen, Antibody, Antigen-Antibody reaction, Hypersensitivity.

#### **Unit III**

**Systemic bacteriology**- Disease caused and lab diagnosis of medically important bacteria (Staphylococcus, Streptococcus, Neisseria, Echerichia coli, Salmonella, Shigella, Vibrio, Mycobacteria, Spirochetes)

### **PRACTICAL & VIVA VOCE**

#### **1. Gram staining**

#### **2. Spotters:**

- Disposable syringe
- Sterile cotton swab
- Bacteriological loop
- Sterile tube
- McIntosh fildes Jar
- Autoclave
- Nutrient Agar plate
- Mac Conkey agar plate
- Mac conkey with LF
- Mac conkey with NLF
- Blood agar plate
- L J Media
- RCM
- BHI broth
- Antibiotic susceptibility test
- Gram Positive Cocci in Clusters
- Gram negative bacilli

- AFB
- VDRL Slide
- Microtitre plate

# **PATHOLOGY-I (UE)**

## **1.Introduction to cell**

- Normal Cell Structure Function

## **2.Cell injury and Adaptation**

- Types of cell injury
- Adaptation
- Necrosis
- Apoptosis
- Pathological calcification

## **3.Inflammation and Repair**

- Acute Inflammation
- Chronic Inflammation
- Wound Healing and Repair

## **4.Infectious Disease**

- TB
- Leprosy

## **5.Hemodynamic Disorder**

- Edema
- Thrombosis and Embolism
- Shock

## **6.Neoplasia**

- Classification
- Nomenclature
- Characteristics of Benign & Malignant neoplasm
- Pathogenesis of cancer
- Spread of Cancer

## **7.Genetic Disorders**

- Down syndrome
- Klinefelter Syndrome
- Turner Syndrome

## **8.Radiation**

- Biological Effect of Radiation

## **PRACTICAL & VIVA VOCE**

- **DIFFERENTIAL COUNT**
  - Spotter
  
- **GROSS (SPOTTER)**
  - Fatty liver
  - Lipoma
  - Dry gangrene foot
  - Wet gangrene bowel
  - CVC Spleen
  - Hydatid cyst
  - TB – Lung
  
- **INSTRUMENTS**
  - Westergrens ESR tube
  - Sahlihemocytometer
  - Neubaur's chamber
  - Bone Marrow Needle



**SEMESTER-II**

<b>S.No:</b>	<b>Subject</b>
1.	Anatomy – II
2.	Physiology –II
3.	Biochemistry – II
4	Microbiology – II
5.	Pathology – II
6.	Pharmacology
7.	Physics
8.	Computer science

## **SEMESTER II**

### **ANATOMY – II (UE)**

#### **Objectives:**

- At the end of the course the student should be able to:
- Describe the structure and functions of the organ systems of the human body.
- Describe how the organ systems function and interrelate.
- Learn basic technical terminology and language associated with anatomy.
- Develop a self-identity of what it means to be “human”.

#### **Unit I**

##### **Maintenance of the Human Body**

##### **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 of the heart.
- Blood supply of the heart. The systemic arteries and veins. Name, location, branches and main-distribution of principal arteries and veins.

##### **2. Lymphatic system**

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

##### **3. Respiratory system**

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

#### **Unit II**

##### **4. Digestive system**

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

##### **5. Urinary system**

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

#### **Unit III**

##### **6. Reproductive system**

- 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 and its supports, uterine tube, ovary vagina vulva and breast.

##### **Anatomical Regions**

- Simple ideas about scalp, triangles of neck, axilla, cubital fossa, mediastinum, inguinal canal, femoral triangle, popliteal fossa.

## PRACTICAL & VIVA VOCE SYLLABUS

- **Endocrine System**
  - Pituitary gland
  - Pineal body
  - Thyroid & parathyroid gland
  - Adrenal
  - Pancreas
  - Gonads – Ovary & Testis
  
- **Cardio-Vascular System**
  - Heart
  
- **Lymphatic system**
  - Spleen
  
- **Respiratory System**
  - Lungs
  - Larynx
  - Trachea
  
- **Digestive System**
  - Salivary glands
  - Esophagus
  - Pharynx
  - Stomach
  - Liver, Gall bladder
  - Duodenum
  - Small intestine
  - Large intestine
  
- **Urinary system**
  - Kidneys
  - Ureter
  - Urinary bladder
  
- **Reproductive System**
  - Saggital section – Male & Female pelvis
  - Uterus & ligaments
  - Ovary
  - Prostate
  - Seminal vesicals
  - Vas deferens

- Testis
- **Viva Voce**
  - Radiology – Xrays
  - Osteology
  - Charts
  - Models

**Recommended books:**

1. Manipal manual of Anatomy for Allied Health Sciences, Sampathmadhyastha.
2. B D Chaurasia: General human anatomy.

**References:**

1. B D Chaurasia: Regional Anatomy. Vol I, II,III.
2. Richard S. Snell: Clinical Anatomy.

## **PHYSIOLOGY-II (UE)**

### **Unit III Cardiovascular System**

- Cardiac muscle, action potential and conducting system of the heart.
- Cardiac cycle.
- ECG, heart sounds, Heart Rate.
- Cardiac output-Definition, factors regulating cardiac output and measurement of cardiac output.
- Blood pressure-Definition, measurement, factors maintaining BP.
- Regional circulation-Coronary and cerebral.

### **Unit -IV Nervous system**

- Structure & Properties of Neuron.
- Nerve- Classification, injury.
- Types and properties of Receptors
- Synapse and synaptic transmission.
- Reflex and its properties.
- Spinal cord-Ascending & Descending tracts.
- Thalamus, Basal ganglia, Cerebellum, Cerebral cortex, Hypothalamus & Cerebrospinal fluid.
- Autonomic nervous system.
- Ascending and descending tracts.

### **Unit -V Respiratory system**

- Structure of upper and lower respiratory tract. Muscles of respiration and Mechanism of respiration.
- Lung volumes and capacities-definition, normal values, intrapulmonary and intrapleural pressures, surfactant.
- Oxygen transport, carbon-dioxide transport.
- Neural and chemical regulation of respiration.
- Hypoxia, cyanosis, Artificial Respiration.

### **Unit – VI Special sense and skin**

- Vision,
- Audition,
- Olfaction,
- Gustation.

### **Unit – VII Reproductive system**

- Male reproductive organs-Spermatogenesis and testosterone actions.
- Female reproductive organs.
- Contraception Methods.

### **Unit – VIII Endocrine system**

- Hypothalamus hypophyseal inter relationship.
- Anterior pituitary hormones and their functions.
- Posterior pituitary hormones and their actions.
- Thyroid hormones, biosynthesis and functions.

- Parathyroid hormones ,functions.
- Insulin, glucagons, actions and Diabetes mellitus.
- Adrenal cortex hormones and their functions.
- Adrenal medullary hormones and their actions.

### **PRACTICAL & VIVA VOCE SYLLABUS**

1. WBC.
2. Blood pressure.
3. Bleeding time
4. Clotting time.
5. Charts and spotters.

## **BIOCHEMISTRY – II (UE)**

### **Objectives:**

- To have a knowledge about the chemistry and metabolism of various macromolecules- carbohydrate, protein and lipids
- To learn about enzymes, vitamins, minerals and nutrition
- To know the structure and function of Hemoglobins, Nucleic acids.
- To learn about the organ function tests like Liver Function Tests and Renal Function Tests.

### **Unit I - PROTEINS**

#### **Proteins :**

- Classification of amino acids,
- Structure of proteins,
- Plasma proteins,
- Immunoglobulins.

#### **Metabolism of Proteins :**

- Digestion and absorption of proteins,
- Transamination,
- Deamination,
- Steps of urea cycle,
- Phenylketonuria,
- Alkaptonuria,
- Transmethylation,
- Products derived from Glycine and tyrosine

### **Unit II -- NUCLEIC ACIDS**

#### **Nucleic acids:**

- Structure & Function of DNA,
- Structure, Its types & Functions of RNA
- Nucleic Acid Metabolism

### **Unit III - HAEMOGLOBIN**

#### **Haemoglobin:**

- Structure & Function of Haemoglobin
- Haemoglobin Metabolism

## **Unit IV-- MINERALS**

### **Minerals:**

- Macro & Minor Minerals & Metabolism

## **Unit V -- NUTRITION**

### **Nutrition:**

- BMR, SDA & Glycemic Index
- Dietary Fibers & Balanced Diet
- Protein Energy Malnutrition

## **Unit VI -- ORGAN FUNCTION TEST**

- RFT

## **Unit XI - ACID BASE BALANCE**

### **Acid Base Balance:**

- pH Homeostasis
- Buffers
- Buffers
- Acidosis
- Alkalosis

## **PRACTICAL & VIVA VOCE**

- Non- Protein Nitrogenous Substances
- Analysis Constituents of normal urine
- Analysis Constituents of abnormal urine
- Identification of abnormal constituents in urine
- Estimation of Glucose in blood
- Estimation of Urea in blood.

## **Spotters**

**Spotters: The student must identify the spotter and write some important uses of the spotter.**



1. Urinometer
2. Lactometer
3. Centrifuge
4. Spectroscope
5. Colorimeter
6. pH meter
7. Ryles's Tube
8. Chromatography apparatus
9. Electrophoresis apparatus
10. Micropipette
11. Fluorosis
12. Inborn Errors of Metabolism
13. Protein Energy Malnutrition
14. Benzidine powder
15. Sulphur powder
16. Fouchet's Reagent
17. Structure of t RNA
18. Egg White
19. Jaundice
20. Gout
- 21.

## MICROBIOLOGY – II (UE)

### **OBJECTIVE:**

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

- Know the concepts of sterilization and disinfection procedures and their applications.
- Understand the basic principles of immunology.
- Understand the basic fundamental aspect of bacteria and study the common disease caused by them.

### **Unit- I**

**Virology:** Introduction to virology, List of medically important viruses and diseases (AIDS, Hepatitis, Rabies, Polio) and Lab diagnosis of viral infections

### **Unit - II**

**Mycology:** Introduction to Mycology, List of medically important fungi and diseases (Candidiasis, Cryptococcosis, Dermatophytes, Aspergillosis and Mucor mycosis) and Lab diagnosis of fungal infections.

### **Unit - III**

**Parasitology:** Introduction to Parasitology, List of medically important parasites and diseases (E.histolytica, Plasmodium, W.bancrofti, Ascaris,Ancylostoma) and Lab diagnosis of parasitic infections

### **Unit - IV**

**Applied Microbiology-**Collection and transport of clinical specimen, Sexually transmitted disease, Hospital acquired infection, Urinary tract infection, Skin and Soft tissue infection, Anaerobic infection, Respiratory tract infection and Bloodstream infection, Immunoprophylaxis, Biomedical Waste Management and standard precautions.

## PRACTICAL & VIVA VOCE

### **I.SPOTTERS**

1. Ascarislumbricoides
2. Taenia
3. Gram stained smears showing Candida

4. Universal container
5. Vaccine-OPV
6. BCG
7. Hepatitis
8. DPT
9. TT
10. MMR
11. Virology –Embryonated egg
12. Tissue culture
13. Rhabdovirus
14. Polio virus
15. HIV

## **II. Clinical case discussion with charts**

1. Skin and soft tissue infections
2. Ring worm/ Tinea infections
3. Food poisoning
4. Gastroenteritis

### **RECOMMENDED BOOK:**

1. Dr.C.P.Baveja- Microbiology in Nutshell (Arya Publications).

### **REFERENCE BOOKS:**

1. Ananthanaryanan and Paniker's - Textbook of Microbiology.
2. Dr.C.P.Baveja – Textbook of Microbiology.

### **PRACTICAL BOOK:**

1. Patwardhan,Bhat,SatishPatwardhan – Handbook of Practical examination in Microbiology.

## **PATHOLOGY- II (UE)**

### **1. CVS**

- Atherosclerosis
- Ischemic heart disease
- Congenital heart disease
- Valvular heart disease

### **2. RESPIRATORY SYSTEM**

- Bronchial Asthma
- Emphysema
- Bronchiectasis

### **3. GIT**

- Gastric ulcer
- Tumors of GIT

### **4. HEPATOBILIARY**

- Hepatitis
- Liver Abscess
- Cirrhosis
- Cholecystitis

### **5. KIDNEY AND URINARY TRACT**

- Renal stones
- UTI and Pyelonephritis
- Renal cell carcinoma(RCC)
- Renal Failure

### **6. REPRODUCTIVE SYSTEM**

- Diseases of testis, uterus, cervix and ovary

### **7. CNS**

- Infections

### **8. BONES and JOINTS**

- Septic Arthritis
- Osteomyelitis
- Rheumatoid Arthritis

### **9. ANEMIA**

### **10. AUTOIMMUNE DISEASES**

## **PRACTICAL & VIVA VOCE**

### **INSTRUMENT TEST**

- RBC Pipette
- WBC Pipette
- Sahli's Pipette
- Wintrobe's PCV tube
- Hb Estimation
- Blood grouping

### **SPECIMEN**

- Chronic Pyelonephritis
- RCC
- SCC – Foot
- Leiomyoma – Fibroid uterus
- Gall stones
- Appendicitis
- Liver abscess

## **PHARMACOLOGY (UE)**

### **COURSE OBJECTIVES:**

To understand the terminologies and basic principles of pharmacokinetic and pharmacodynamic involved in the use of drugs.

To understand the pharmacological action and mechanism of action of common drugs used for different disease conditions.

To know the therapeutic uses and adverse effects of common drugs used for different disease conditions

Introduction

General pharmacological principles-Definition-Routes of drug administration-Pharmacokinetics-

#### **Unit I:**

- Pharmacodynamics-Adverse drug effects
- Drugs acting on Autonomic Nervous System, Peripheral Nervous System and Drugs acting on Central Nervous system

#### **Unit II**

- General considerations-Cholinergic system & drugs-Anticholinergic drugs-Adrenergic drugs-antiadrenergic drugs-Drugs acting on autonomic ganglia.

#### **Unit III:**

- Skeletal muscle relaxants-Local anaesthetics,General anaesthetics-Ethyl & Methyl alcohol-Sedatives-Hypnotics-Antiepileptics-Antiparkinsonian drugs-Drugs used in mental illness-Opioid analgesics and Non opioid Analgesics-Nonsteroidal Antiinflammatory drugs

#### **Unit IV**

- Cardiovascular drugs , Drugs affecting Blood & Blood formation and Drugs on Respiratory system
- Cardiac glycosides,Antiarrhythmic drugs, Antianginal drugs,Antihypertensives and Diuretics,Haematinics,Erythropoietin,,Drugs affecting-coagulation,Fibrinolytic and Antiplatelet drugs,Treatment of cough and antiasthmatic drugs.

#### **Unit V**

- Antimicrobial drugs

- General consideration-Antibiotics-Antibacterial agents-Antitubercular drugs-Antifungal-Antileprotic-Antiviral-Antimalarial-Antiamoebic-Antiprotozoal drugs-Cancer Chemotherapy,Antiseptic-Disinfectant-others.

## Unit VI

- Hormones & related Drugs, Drugs used in Gastrointestinal diseases & Miscellaneous drugs
- Corticosteroids,Antithyroid drugs and Drugs for Diabetes Mellitus, Treatment of Vomiting,Constipation,Diarrhoea and Treatment of peptic ulcer
- Vitamins, Vaccines, Sera and chelating agents.

### Recommended books:

Prep Manual for Undergraduates in Pharmacology by Tara V Shanbag, 2<sup>nd</sup> edition  
Pharmacology for Dental and Allied Health Sciences by Padmaja Udaykumar, 3<sup>rd</sup> edition

### Reference books:

Essentials of Medical Pharmacology by KD Tripathi, 7<sup>th</sup> edition  
Basic and Clinical Pharmacology by Bertram G Katzung, 12<sup>th</sup> edition

## PRACTICAL & VIVA VOCE

### Learning Objective

This module is intended to discuss the various modalities of drug delivery and instruments relevant to it.

Instruments

Needles	Intravenous Intrathecal Spinal Intra arterial Syringes: Tuberculin
Students Discussion Insulin I.V cannula Scalp. Vein set	
Students Discussion	Enema can Inhalers
Spacers Nebulizers	
Students Discussion	Tablets – Enteric coated, Sustained release, Sub-lingual
Students Discussion	Capsules, Spansules, Pessary, Suppository
Students Discussion	Topical Preparation, Ointment, Lotion, Powder, Drops – eye / ear

Charts: Mechanism of action of drugs, adverse effects, toxicology

Spotters: drugs

### Text books suggested for reading:

- Text book of pharmacology for Dental & Allied Health Science 2<sup>rd</sup> edition Padmaja Udaykumar
- Pharmacology for dental students Tara V shanbhag, Smita Shenoy, Veena Nayak
- Principles of pharmacology 2<sup>rd</sup> edition H.L.Sharma & KK Sharma

## **PHYSICS**

### **Unit 1: Basic concepts**

Basic Units, Heat, Acoustics etc. Basic concepts of power, work, force, energy Einstein's formula Electronics, Electricity & Magnetism, electromagnetic waves Units and measurements temperature and heat SI units of above parameters Atomic structure Nucleus Atomic Number, Mass Number electron orbit and energy levels Periodic table Isotopes Isobars Ionization and excitation Radioactivity, Natural and artificial radioactivity alpha decay beta decay.

### **Unit 2: Electromagnetic induction**

Electric charges electric induction electric potential capacitance and capacitors. Electrical energy and power unit of current resistance and Ohm's law circuit laws heating effect of current sources of electrical energy E.M.F. Magnetism, Magnetic effect of an electric current application of magnetic field. Electromagnetic induction, laws of mutual induction and self-induction. Alternating current transformers theory and losses practical aspects reactance – resonance impedance and power factors.

### **Unit 3: Laser**

Nature of light-Reflection-Refraction-Total internal reflection- Optical fibers- Applications in Medicine - Laser-Principles-Action-Types of laser, Basic principles of laser in Medical application - Argon-Iron laser photo coagulator-Photo thermal-Photochemical application - Applications of laser in Medicine- Laser hazards and safety measures.

### **Unit 4: Radiation Physics**

Introduction to nuclear physics and radioactivity, Radioactive radiations - X-ray, production of x-ray, Properties of x-ray radiations - Biological effects of radiation, Radiation damage in matter, Radiation protection principles, radiation detection and measurement - Ultrasound and generation of ultrasound.



### **Unit 5: Introduction to Imaging Technique**

Principles of Microscope: Simple microscope and compound microscope - Radiography: Making an X-ray image –Fluoroscopy-. CT Scans, MRI - Ultrasonography: Ultrasound picture of Body-A-Scan-B-Scan-M-Scan-Ultrasound diathermy-Phonocardiography - Radio isotopes: Uses of radio isotopes -<sup>99m</sup>Tc Generator- Scintillation detectors - Application of scintillation detectors - Gamma Camera - Positron Camera.

### **Unit 6: Semiconductor devices**

Principles of diodes and Transistors – Integrated circuits – Amplifiers – Basic configuration and types – differential and operational amplifiers– Waveform generators – Timer – A/D and D/A converters – Active filters – Transducers – Basic configuration and types.

### **Unit 7: Biopotential Recording Systems**

Introduction to bioelectric potential – Electrodes and surfaces – Biopotential amplifier – Frequency ranges of various Biopotential signals – Working principles of bio potential recording systems – Electrocardiography – Electroencephalography – Electromyography.

## Computer Science

### **1. History of computers,**

- Definition of computers,
- Input devices,
- Output devices,
- Storage devices,
- Types of memory,
- And units of measurement,
- Range of computers,
- Generations of computers,
- Characteristics of computers

### **2. System:**

- Hardware,
- Software,
- system definition,
- Fundamentals of Networking,
- Internet,
- Performing searches and working with search engines,
- types of software and its applications

### **3. Office application suite –**

- Word processor,
- spreadsheet,
- presentations,
- other utility tools,
- Fundamentals of Linux / Windows operating system, functions, interfaces, basic commands, working with the shell and other standard utilities.

### **4. Language**

- Comparison chart of conventional language,
- programming languages,
- generations of programming languages,
- Compilers and interpreters,
- Universal programming constructs based on SDLC,
- Variable, constant, identifiers, functions, procedures, if while, do – while,
- For and other Structures.

## **5. Programming in C language,**

- Data types, identifiers, functions and its types, arrays, union, structures and pointers
- Introduction to object oriented programming with C++: classes, objects, inheritance
- Polymorphism and encapsulation. Introduction to databases, and query languages,
- Introduction to Bioinformatics

### **Practicals:**

1. Various browsers, search engines, email
2. Text document with mages with multiple formatting options using a specified office package
3. Spreadsheet using a specified office package
4. Presentation on a specified topic using the specified locations
5. Shell programming-parameters
6. Shell program- regular expressions
7. C program- functions
8. C program – file handling
9. C program demonstrating the usage of user defined variables
10. Databases
11. Applications in Optometry

### SEMESTER – III

<b>S.NO</b>	<b>SUBJECT</b>
1.	Anatomy, Physiology and Pharmacology Related to cardiac and perfusion technology- Theory(UE)
2.	Anatomy, Physiology and Pharmacology Related to cardiac and perfusion technology- Practical (UE)
3.	Pathology related to cardiac and perfusion technology- Theory (UE)
4.	Pathology related to cardiac and perfusion technology- Practical (UE)
5.	Medical Ethics (IE)
6.	Psychology (IE)

## **B.Sc. CARDIAC PERFUSION TECHNOLOGY**

### **SEMESTER – III**

#### **Anatomy, Physiology & Pharmacology related to Cardiac and Perfusion Technology-Theory(UE)**

##### **Course description:**

This course will provide an outline of Anatomy, physiology, Pharmacology to improve the students understanding of the technical and diagnostic procedures used with special emphasis on applied aspects.

##### **Objectives:**

At the end of the course the students should be able to:

Describe the structure of the cardiovascular system of the human body.

Define and describe basic physiological process governing the normal functioning of the human heart.

To understand the terminologies and basic principles of pharmacokinetic and pharmacodynamic involved in the use of cardiovascular drugs.

To understand the pharmacological actions and mechanism of action of cardiovascular drugs used for different disease conditions.

##### **Learning objective skills:**

Identify the anatomical structure of the human heart.

Learn to correlate the physiological functions.

To know the therapeutic uses and adverse of the cardiovascular drugs used for different disease conditions.

##### **UNIT- I:**

1. Anatomy of the heart and great vessels
2. Gross anatomy and structural features of cardiac chambers  
Atrium  
Ventricle  
AV junction  
Heart valves  
Specialized conduction tissues
3. Conduction system  
Sinus node  
Internodal tracts  
AV node  
Bundle of His
4. Systemic circulation  
Arterial system  
Venous system  
Lymphatic system

Tissue perfusion and microcirculation

5. Pulmonary circulation
  - Pulmonary artery
  - Pulmonary veins
  - Bronchial artery
6. Cerebral circulation
7. Renal circulation
8. Fetal circulation

**UNIT- II:**

1. Innervations of the heart
  - Sympathetic
  - Parasympathetic
  - Sensory
2. coronary vascular system
  - Coronary arteries
  - Myocardial capillary bed
  - Venous drainage
  - Lymphatic drainage
3. Pericardium
4. Cardiac cycle
  - Mechanical events
    - Arterial cycle and central venous pressure cycle
    - Clinical aspects of human cardiac cycle
  - Heart sounds
5. Cardiac output
  - Assessment of cardiac output
  - Ficks principle
  - Thermal dilution and indicator dilution methods
  - Pulse Doppler method
  - Miscellaneous methods

**UNIT-III:**

1. Anatomy of Respiratory System
  - Mechanism of respiration
  - Principles of gas exchange regulation for respiration
2. Cardiac excitation and contraction
  - Mechanism of contraction
  - Pacemaker of conduction system
  - Nodal electricity
  - Nervous control of the heart rate

3. Vascular smooth muscle  
Mechanism of contraction  
Pharmacomechanical coupling, automaticity

#### **UNIT-IV:**

Cardiovascular responses in pathological situations

- Shock and hemorrhage
- Syncope
- Essential hypertension
- Chronic cardiac failure

#### **UNIT-V:**

Hematology and coagulation physiology of blood components

- Blood groups
- Blood transfusion
- Hemostasis

#### **UNIT-VI:**

##### 1. Anti Anginal Agents

- beta blocking agents – propranolol, Atenolol, Metoprolol, Labetolol, Pindolol.
- Nitrates – Nitroglycerine ,Isosorbidedinitrate, Isosorbidemononitrate, transdermal nitrate patches.
- Calcium Channel blockers – Nifedipine , Verapamil , diltiazem , new calcium channel blockers.

##### 2. Anti Failure Agents

- Diuretics – Furosemide, Thiazide diuretics, other thiazide like agents, Potassium sparing diuretics, combination diuretics, special diuretic problems.
- Angiotensin converting enzyme (ACE) inhibitors
- Types of ACE inhibitors – Captopril, Enalapril, ACE inhibitors for diabetics and hypertensive renal disease.
- Digitalis and acute inotropes – Digoxin ,Digitoxin, Dobutamine, Dopamine , Adrenaline, Nonadrenaline , Isoprenaline, Mixed inotropic vasodilators amrinon.

##### 3. Anti hypertensive drugs

- Diuretics, beta blockers, Ace inhibitors, calcium antagonists, direct vasodialotrs,centrally active and peripherally active vasodialators.

##### 4. Anti arrhythmic agents

Quinidine and related compounds, procainamide, lidocaine, mexiletine, phenytoin, flecainide, amiodarone, bupivacaine, combination therapy.

#### 5. Antithrombotic agents

- Platelet inhibitors
  - Aspirin
  - Prasugrel
- Anticoagulants
  - Heparin
  - Warfarin
- Fibrinolytics
- Streptokinase
- Alteplase
- Combination therapy

#### 6. Lipid lowering and anti atherosclerotic drugs

#### 7. Miscellaneous drugs

Protamine, Emergency drugs, Narcotics, Sedatives, Antihistamines, Antibiotics

### **RECOMMENDED BOOKS:**

#### ANATOMY:

1. Manipal manual for Allied Health Science, Sampath Madhyastha.
2. B D Chaurasia: General human anatomy

#### PHYSIOLOGY:

1. Basics of medical physiology, D. Venkatesh, H.H. Sudhakar
2. Guyton and Hall Textbook of medical physiology, John E. Hall

#### PHARMACOLOGY:

1. Pre manual for undergraduates in pharmacology, Tara V Shanbag
2. Pharmacology for dental and allied health science, Padmaja Udhayakumar

### **REFERENCE BOOKS:**

#### ANATOMY:

1. B D Chaurasia: General human anatomy
2. Richard S. Snell: clinical anatomy

#### PHYSIOLOGY:

1. Essentials of medical physiology, K. Sembulingam, Prema Sembulingam

#### PHARMACOLOGY:

1. Essentials of medical pharmacology, KD Tripathi
2. Basic and clinical pharmacology, Bertran G Katzung



## **Anatomy, Physiology & Pharmacology related to Cardiac and Perfusion Technology- Practical(UE)**

### **Learning objective:**

Expected to Describe the structure of the cardiovascular system of the human body.

Define and describe basic physiological process governing the normal functioning of the human heart.

To know the pharmacological actions and mechanism of action of cardiovascular drugs used for different disease conditions.

### **ANATOMY & PHYSIOLOGY:**

#### **Charts and Spotters:**

Structural picture of the  
heart. Conduction system  
Coronary arteries  
Pericardium  
Systemic & pulmonary circulation  
Cardiac cycle  
Cardiac excitation & contraction  
Cardiac output  
Mechanism of respiration

### **PHARMACOLOGY:**

#### **Charts:**

Mechanism of action of drugs  
Adverse effects  
Contraindications

#### **Spotters:**

Cardiovascular drugs

### **SPECIFIC LEARNING OUTCOME(SLO):**

To gain knowledge on anatomical structures, physiological functions and pharmacological actions related to the cardiovascular system.

# **Pathology related to Cardiac and Perfusion Technology – Theory (UE)**

## **Course description:**

This course will provide an outline of Pathological disease conditions to improve the students understanding of the technical and diagnostic procedures used with special emphasis on applied aspects.

## **Objectives:**

At the end of the course the students should be able to:

To describe the pathological disease conditions related to the cardiovascular system.

To understand the diagnostic procedures and treatmental procedures relevant to the pathological disease condition.

## **Learning objective skills:**

Learn to correlate the physiological functions and disease conditions

## **UNIT-I:**

Congenital heart disease

a). cyanotic congenital heart disease

Tetralogy of Fallot

Transposition of great arteries

Total anomalous pulmonary venous connection.

Truncus arteriosus

Tricuspid atresia

b). Acyanotic heart disease

Atrial septal defect

Ventricular septal defects

Congenital valvular disease

Patent ductus arteriosus

Coarctation of aorta

## **UNIT-II:**

Valvular heart disease

Congenital valvular heart disease

Rheumatic valvulities

Aortic stenosis

Aortic regurgitation

Mitral stenosis

Mitral regurgitation ; mitral valve

prolapsed Combined valvular disease

## **UNIT-III:**

Coronary artery disease

Pathophysiology and clinical recognition

Angina pectoris

Symptomatic and asymptomatic myocardial ischaemia  
Types and location of myocardial infarction  
Surgical treatment; other treatment modalities.

**UNIT-IV:**

Hypertension  
Heart failure

**UNIT-V:**

Myocardial diseases  
Dilated cardiomyopathy  
Hypertrophic cardiomyopathy  
Restrictive cardiomyopathy  
Myocarditis  
  
Pericardial effusion  
Constrictive pericarditis  
Cardiac tamponade  
Tumours of the heart.

**RECOMMENDED BOOKS:**

Cardiology, Desmond G. Julian, J. Campbell Cowan, James M. McLenachan.

## **Pathology related to Cardiac and Perfusion Technology – Practical (UE)**

### **Learning objective:**

To know the pathological disease conditions related to the cardiovascular system.

### **Charts and Spotters:**

To give demonstration on pathological disease conditions related to cardiovascular system.

Congenital heart disease

Valvular heart disease

Coronary artery disease

Myocardial disease

Pericardial disease

### **SPECIFIC LEARNING OUTCOME:**

To gain knowledge on pathological disease conditions and treatment related to cardiovascular system.

# **Psychology (IE)**

## **UNIT 1 :Basic concepts of Psychology**

Definition of Psychology, Origin of Psychology - Philosophical roots of psychology, Schools of Psychology –Behaviorist – Gestalt – Psychoanalysis – Humanistic. Fields of Psychology

## **UNIT 2: Social Psychology**

Definition, Nature, Subject Matter and Scope Of Social Psychology-Applications and Importance of Social Psychology, Groups: Definition and Type- Primary And Secondary Groups Social Interaction, Social and Inter Personal Relations. Crowd Audience and Rumor, Definition Characteristics and Classification of Crowd and Audience Leadership: Definition of leader and leadership and characteristics, Types and Emergence of Leadership in a Group Attitude: Meaning, Types and Formation of Attitude Concept of adjustment and maladjustment, Defense Mechanisms, frustration and conflict, sources of frustration and conflict, types of conflicts.

## **UNIT 3 : Hereditary and environment**

Erikson's stages of psychosocial development Lawrence Kohlberg's stages of moral development Freud's Stages of Psychosexual Development Physiological basis of behaviour – The brain and nervous system –The sensory process , Some general characteristic of senses – Five senses ,Perception: Organization – The role of learning in perception – Perception and attention – Perceptual process.

## **UNIT 4: Learning principles and methods**

Meaning and Definition, Factors In The Process of Learning Classical conditioning Operant Conditioning – The principle of reinforcement Cognitive learning – Optimizing learning: Programmed learning and automated instruction – Transfer of learning Role of Reward and punishment in learning.

## **UNIT 5: Motivation , Emotion, Memory and forgetting**

Physiological basis of motivation – Current status of motivational concepts Theories of motivation – Motivational factors in aggression Emotion – Emotional expression –Theories of emotions. Kinds of remembering – Retrieval processes – The nature of forgetting – Two process theories of memory – Improving memory –Language and thought – Symbols and concepts – Structure – Forms of thought - Thinking and reasoning – Concept formation.

## **UNIT 6: Intelligence & Personality**

Theories of intelligence – Measuring Intelligence – Kinds of intelligence tests – Ability – Formation of aptitude and attitude – Aptitude tests – Creativity and its tests Personality – Definition of Personality – Theories of Personality – Assessment of Personality. Social Factors Influencing Personality, Factors Affecting Personality

## **UNIT 7: Health Psychology**

Meaning of Health Psychology -Relating Health Psychology to other fields Clinical Health Psychology, Public Health Psychology, Community Health Psychology, Critical Health Psychology

Abnormal Psychology: Concepts of normality and abnormality, causation of mental illness, neuroses, psychoses, psychosomatic disorders, measures to promote mental health. **Stress** - Definitions- Models of Stress – Theories of Stress - Stress reactions – Coping and Stress Management techniques, Pain and its management - Psychological reactions of a patient to loss – Stages of Acceptance by Kubler-Ross.

## **REFERENCES:**

1. Clifford T. Morgan, Richard a. King, John R. Weis and John Schopler, “Introduction to Psychology” – 7th Edition. Tata McGraw Hill Book Co. New Delhi, 1993.
2. Baron.A. Robert, Psychology, Pearson Education Vth Ed.,2002
3. David Krech And Richard S Crutehfield And Egerton L Ballachey: Individual And Society
4. KuppuswamyB :Elements Of Social Psychology
5. Cooper B Joseph And James L Mc Gaugh: Integrating Principles Of Social Psychology
6. Shelley E. Taylor. Health Psychology Third Edition. McGraw Hill International Editions, 1995.
7. Swaminathan, V.D, LathaSathish, Psychology for Effective Living, Department of Psychology, University of Madras.
8. Coleman, James. 1980. Abnormal Psychology and modern life. New Delhi: Tata McGraw Hill Ltd.

## **MEDICAL ETHICS AND BIOSTATICS (IE)**

### **UNIT-I**

Definition and key Concepts; philosophical considerations; epistemology of science; ethical terms; principles and theories; relevance to health care; ethics and the law issues: genetic engineering, stem cells, cloning, medical techniques, trans-humanism, bio-weapons.

### **UNIT-II**

Define negligence, malpractice & liability; iatrogenic harm; Influence of ethics in general practice; Describe primary and secondary ethical principles; Hippocrates' oath; Professional codes of ethics; Describe the moral basis of informed consent and advance directives; research ethics – animal rights, ethics of human cloning, and stem cell research; ICMR guidelines.

### **UNIT-III**

Genetic testing, genetic screening, Fertility and birth control, sex determination and sex selection, Reproductive control: assisted reproduction and ethics, pre-natal genetic counseling, pre-implantation genetic diagnosis, Ethical issues in applied medicine; Workers compensation.

### **UNIT-IV**

Euthanasia and physician-assisted dying; end-of-life care; Physicians, patients and other: autonomy, truth telling & confidentiality; emerging issues: impact of medical advances on society; Use of genetic evidence in civil and criminal court cases; Challenges to public policy – to regulate or not to regulate; improving public understanding to correct misconceptions.

### **UNIT-V**

Introduction to Biosafety; biological safety cabinets; containment of biohazard; precautions for medical workers; precautions in patient care; Biosafety levels of microorganisms; mitigation of antibiotic resistance; radiological safety; measurement of radiation; guidelines for limiting radiation exposure; maximum reasonable dose; precautions against contamination; Institutional Biosafety committee.

**SEMESTER – IV**

<b>S.NO</b>	<b>SUBJECT</b>
1.	Electrocardiogram(ECG) – Theory(UE)
2.	Electrocardiogram(ECG) – Practical(UE)
3.	Principles of perfusion technology – Theory(UE)
4.	Principles of perfusion technology – Practical(UE)
5.	Medical Sociology(IE)
6.	Basic and Advanced Life support(IE)



**B.Sc. CARDIAC AND PERFUSION TECHNOLOGY**

**SEMESTER – IV**

**Electrocardiogram (ECG) – Theory (UE)**

**Course description:**

This course will provide an outline of electrocardiogram (ECG)

**Objectives:**

At the end of the course the students should be able to:

To develop a knowledge about the diagnostic techniques for various conduction abnormalities.

To develop exhaustive ideology of the interpretation of the imaging techniques for cardiac rhythm and conduction abnormalities

**Learning objective skills:**

Learn to diagnosis the abnormalities with interpretation of the imaging techniques.

**UNIT-I:**

Basic principles

The electrocardiographic paper,

The electrical field of heart,

The leads; standard limb leads; precordial leads; V lead;

aVleads, Basic ECG deflections,

Normal ECG

- ❖ The P wave,
- ❖ The QRS complex,
- ❖ The genesis of the QRS complex,
- ❖ T wave;
- ❖ the ST segment
- ❖ The Q wave,
- ❖ Rate and rhythm,

- ❖ Rotation of the heart,
- ❖ The Q-T interval, electrical axis

## **UNIT-II:**

ECG in Coronary artery disease-Myocardial infarction QRS changes

- ❖ Evolution of electrocardiographic changes
- ❖ Localization of ischemia or infarction
- ❖ Non-infarction Q waves

Primary and secondary T wave

change Coronary insufficiency

## **UNIT-III:**

Chamber enlargement

Left ventricular hypertrophy, Right ventricular hypertrophy

## **UNIT-IV:**

Arrhythmias

- ❖ Sinus rhythm,
- ❖ Sinus arrhythmia
- ❖ Sinus tachycardia and bradycardia,
- ❖ Ectopic atrial rhythm
- ❖ Atrial extra systoles,
- ❖ Paroxysmal atrial tachycardia,

## **UNIT-V:**

Atrial fibrillation and flutter,

Atria ventricular (AV) Nodal

rhythm, Ventricular rhythm,

Ventricular extra systoles,

Ventricular tachycardia,

Ventricular flutter / fibrillation

**UNIT-VI:**

Intraventricular conduction delays  
Left anterior fascicular block  
Left posterior fascicular block  
Left bundle branch block  
Right bundle branch block  
Complete heart block

**RECOMMENDED BOOKS:**

Hand Book of Clinical Electrocardiography, Tapas Kumar Koley, 1st edition, New Central Book Agency (P) LTD

An Introduction to Electrocardiography LeoSchamroth, , eighth adapted edition, WileyIndiaPv.Ltd

**REFERENCE BOOKS:**

The ECG made easy, John R. Hampton, eighth edition, Churchill Livingstone

## **Electrocardiogram (ECG) – Practical (UE)**

### **Learning objective:**

To develop a knowledge about the diagnostic techniques for various conduction abnormalities.

To develop exhaustive ideology of the interpretation of the imaging techniques for cardiac rhythm and conduction abnormalities

### **Practicals / Demonstration:**

ECG spotters of all cardiac disease conditions

Protocols ,criteria's of TMT, ST segment depression chart

### **Specific learning outcomes (SLO):**

Will be able to identify and explain the different cardiac rhythms and conduction defects from the given ECG

Will be able to explain ECG at the risk of cardiovascular emergencies

Can bring out the mechanism of ECG deflections in pathological situations

Can easily identify myocardial infarction / ischemia / arrhythmias from the given ECG

## Principle of Perfusion Technology – Theory (UE)

### Course description:

This course will provide an outline of equipments handling during cardiopulmonary bypass(CPB)

### Objectives:

At the end of the course the students should be able to:

Assemble & prime the adult circuits.

Handling Heart-lung machine and equipments during cardiopulmonary bypass(CPB)

### Learning objective skills:

Learn to handle the equipments.

### UNIT-I:

1. Introduction & history of extra-corporeal circulations
2. Basic principles of
  - Extra-corporeal circulation
  - Materials used
  - Extra-corporeal gas exchange
3. Cross- circulation

### UNIT-II:

1. Pumps
  - History of pumps
  - Ideal characteristics of pumps for extra-corporeal circuit
2. Design and functioning of roller pumps
  - Flow & calibration
  - Occlusion
  - Tubing guides
3. Design and functioning of centrifugal pumps

### UNIT-III:

1. History of oxygenators
  - History of oxygenators
  - Design and function of disc- oxygenator
  - Design and function of bubble -oxygenators
  - Design and function of membrane –oxygenators

2. Hematological effects of membrane oxygenator to bubble oxygenator design including
  - Materials
  - Blood gas interface

#### **UNIT-IV:**

1. Tubings
  - Tubing materials
  - Resiliences and bio- compatibility
  - Heparin-coated surfaces
2. Filters
  - Arterial line filters
  - Cardiotomy filters
  - Gas line filters
  - Leukocyte depletion & significance
3. Heat exchangers
  - Materials
  - Principle and methods of heat exchange
  - Designs and functioning

#### **RECOMMENDED BOOKS:**

Cardiopulmonary Bypass: Principles and Techniques of Extracorporeal circulation,  
Christina T. Mora

Cardiopulmonary bypass principles and practice, Glenn P. Gravlee, Richard E. Davis,  
Alfred H. Stammers, Ross M. Ungerleider

## **Principle of Perfusion Technology – Practical (UE)**

### **Learning objective:**

At the end of the course the students should be able to:

Assemble & prime the adult circuits.

Handling Heart-lung machine and equipments during cardiopulmonary bypass(CPB)

### **Practicals / Demonstration:**

Assembling and priming the adult circuits

Cross circulation

Pumps

Oxygenators

Tubings

Filters

Heat exchanger

### **SPECIFIC LEARNING OUTCOME:**

To gain knowledge on operating heart-lung machine

Known to assemble the adult circuits

Known to prime the adult circuits

## **BASIC AND ADVANCED LIFE SUPPORT (IE)**

BLS

TRIAGE

Primary Survey

Secondary Survey

Airway & Ventilatory

management Shock

Central & peripheral venous access

Thoracic trauma – Tension pneumothorax

Other thoracic injuries

Abdominal trauma – Blunt injuries

Abdominal trauma – Penetrating injuries

Spine and spinal cord trauma

Head trauma

Musculoskeletal trauma

Electrical injuries

Thermal burns

Cold injury

Pediatric trauma

Trauma in pregnant women

Workshop BLS

Workshop cervical spine immobilization

Imaging studies in trauma

The universal algorithm for adult ECC

Ventricular fibrillation/Pulseless ventricular tachycardia

algorithm Pulseless electrical activity (PEA) / asystole algorithm

Bradycardia treatment algorithm

Tachycardia Treatment

algorithm Hypotension / Shock

Acute myocardial infarction

Pediatrics Advanced life support

Defibrillation

Drugs used in ACLS

Emergency cardiac

pacing AED

Techniques for oxygenation and ventilation



## **MEDICAL SOCIOLOGY (IE)**

### **Unit 1: NATURE AND SCOPE OF SOCIOLOGY**

Definition, Historical background, subject matter of sociology, Nature and scope, Importance, Sociology of India, Relationship of sociology with other social sciences

### **Unit 2: FUNDAMENTAL CONCEPTS OF SOCIOLOGY**

Society and Individual, Community, Social structure and functions of Institutions, Association, Organization, Social system, social order, Social control, social groups, Social Process, Social change,

### **Unit 3: CLASSICAL THINKERS AND THEIR CONTRIBUTIONS**

Auguste Comte, Emile Durkheim, Karl Marx, Max Weber, Herbert Spencer

### **Unit 4: SOCIOLOGY OF INDIA**

Characteristics of Indian society, Racial linguistic, Religious and demographic, Hindu social organization-ashramas, varnas, dharma and karma, purushartha, Caste system, Problems of SC&ST, Sanskritisation, Westernization and Modernization,

### **Unit 5: ANTHROPOLOGY AND CULTURAL ANTHROPOLOGY**

Definition of anthropology, Subfield of anthropology, Cultural Anthropology yesterday and today, Anthropological Perspectives, Early Anthropologist

Environment and culture, Kinship, Clan Ethno methodology, Gender, Subsistence and Exchange, Social Organization and evolution of political system.

**Reference:**

1. Bottomore.T.B., Sociology: A guide to problems and Literature,1971,Random House
2. Gisbert P. Fundamentals of sociology,3rd Edition,2004,Orient Longman publications
3. Neil J.Smelser,Handbook of sociology,1988.sage publication
4. Johnson R.M,Systematic Introduction to Sociology,1960,Allied Publishers
5. Cultural Anthropology,Barbara D.Miller,2006 Pearson/Allyn and Bacon Co
6. C.N.ShankarRao., Introduction to Sociology, 2008, S.CHAND & Company Publications.
- 7..C.N.ShankarRao., Sociology of India, S.CHAND & Company Publications

**SEMESTER – V**

<b>S.NO</b>	<b>SUBJECT</b>
1.	Perfusion technology part I– Theory(UE)
2.	Perfusion technology part I- Practical (UE)
3.	Advance ECG and treadmill testing and basics of echo cardiography- theory(UE)
4.	Advance ECG and treadmill testing and basics of echocardiography -Practical (UE)
5.	Environmental science and Community medicine (IE)

**B.Sc. CARDIAC AND PERFUSION TECHNOLOGY**  
**SEMESTER – V**

**Perfusion technology part I – Theory (UE)**

**Course description:**

- This course will provide an outline of clinical techniques during cardiopulmonary bypass(CPB)

**Objectives:**

- At the end of the course the students should be able to:
- Learn to know various routes of administration of cardioplegic solutions Learn to know cannulation techniques
- Learn to know coagulation management during CPB Learn to know ventricular assist devices
- Learn to triturate acid-base management during CPB

**Learning objective skills:**

- Learn to handle IABP machine
- Known to administer cardioplegic solutions learn to administer drugs used during CPB

**UNIT-I:**

1. Cannulation techniques
  - Venous cannulation
  - Complications of venous cannulation
2. Arterial cannulation
  - Ascending aortic cannulation & complications
  - Femoral cannulation, indications & complications
  - Sites for arterial cannulation

**UNIT-II:**

1. Hemodilution & priming solutions for CPB
2. Coagulation management during CPB

**UNIT-III:**

1. Cardio-plegic solutions
  - St Thomas solution
  - Delnido cardio-plegic solution
  - HTK solution

#### **UNIT-IV:**

1. Intra-aortic balloon pump
  - Indications
  - Principle of function
  - Complications
2. Ventricular assist devices

#### **UNIT-V:**

1. Acid-base balance
2. Pre-CPB check list

#### **RECOMMENDED BOOKS:**

1. Cardiopulmonary Bypass: Principles and Techniques of Extracorporeal circulation, Christina T. Mora
2. Cardiopulmonary bypass principles and practice, Glenn P. Gravlee, Richard E.Davis, Alfred H. Stammers, Ross M. Ungerleider.

## **Perfusion technology part I – Practicals (UE)**

### **Learning objective:**

- Learn to know various routes of administration of cardioplegic solutions Learn to know cannulation techniques
- Learn to know coagulation management during CPB Learn to triturate acid-base management during CPB

### **Practicals / Demonstration:**

- Assembling and priming the pediatric circuits  
Cannulation
- Cardioplegic drugs
- IABP initiation & maintaining procedures VAD
- Drugs used in CPB

### **SPECIFIC LEARNING OUTCOME:**

- To gain knowledge on cannulas used.  
Initiation of IABP machine

# **B.Sc. CARDIAC AND PERFUSION TECHNOLOGY**

## **SEMESTER – V**

### **Advance ECG and Threadmil testing and basics of echocardiography:**

#### **Course description:**

- This course will provide an outline of advanced ECG and treadmill stress test.

#### **Objectives:**

- At the end of the course the students should be able to:
- To develop a knowledge about the diagnostic techniques for various conduction abnormalities.
- To develop exhaustive ideology of the interpretation of the imaging techniques for cardiac rhythm and conduction abnormalities

#### **Learning objective skills:**

- Learn to diagnosis the abnormalities with interpretation of the imaging techniques

#### **UNIT-I:**

##### ADVANCED ELECTRO CARDIOGRAPHY (ECG)

Basics of Holter Test/HUTT-

Connections of the Holter recorder

❖ Holter Analysis

❖ Guidelines for ambulatory electrocardiography

Indications and interpretation

#### **UNIT-II:**

Exercise stress testing- Exercise physiology, Exercise protocols, patient preparation ST segment displacement – types and measurement

Exercise test indications, contra-indications and precautions

#### **UNIT-III:**

Direct Current (DC)

shock Defibrillator

Monophasic and biphasic shock

Technique of cardioversion

Indications for cardioverion

#### **UNIT-IV:**

M- mode and 2D transthoracic echocardiography Views used in transthoracic echocardiography  
Doppler echocardiography: pulsed, continuous wave and colour Measurement of cardiac dimensions

#### **UNIT-V:**

Evaluation of systolic and diastolic left ventricular function Regional wall motion abnormalities  
Stroke volume and cardiac output assessment Orifice area  
Continuity equation

#### **RECOMMENDED BOOKS:**

1. Hand Book of Clinical Electrocardiography, Tapas Kumar Koley, 1st edition, New Central Book Agency (P) LTD
2. An Introduction to Electrocardiography LeoSchamroth, , eighth adapted edition, WileyIndiaPv.Ltd

#### **REFERENCE BOOKS:**

1. The ECG made easy, John R. Hampton, eighth edition, Churchill Livingstone



## **Advance ECG and Threadmil exercise stress testing and basics of echocardiography**

### **Learning objective:**

To develop a knowledge about the diagnostic techniques for various conduction abnormalities.

To develop exhaustive ideology of the interpretation of the imaging techniques for cardiac rhythm and conduction abnormalities

### **Practicals / Demonstration:**

Disease conditions diagnosed by Echocardiogram Contrast and dobutamine stress testing

### **Specific learning outcomes (slo):**

Will be able to identify abnormal conditions in echocardiography

Will be able to prove the pathological conditions by performing echo Capable of assisting in non-invasive / invasive procedures

Will be able to perform Echocardiography at cardiovascular emergencies

Will be able to use the diagnostic strategies by available proven methods in echocardiography

# **ENVIRONMENTAL SCIENCE AND COMMUNITY MEDICINE**

## **Natural Resources:**

Introduction, Multi-disciplinary nature of environmental studies, Earth Resources and Man, Renewable And Non-Renewable Resources, Water Resources, Mineral Resources: Food Resources: Effects of modern agriculture, Fertilizer/ pesticide problems, Water logging, and salinity, Energy Resources.

## **Ecosystems:**

Concept of an Ecosystem, Structure And Functions of an Ecosystem, Producers, Consumers and Decomposers, Cycles in The Ecosystem

## **Biodiversity:**

Introduction, Definition: Genetic, Species, Ecosystem Diversity, India as a Mega Diversity Nation, Hotspots of Biodiversity Threats to Biodiversity. Poaching of Wildlife, Man-Wildlife Conflicts, Endangered and Endemic

## **Pollution:**

Definition, Causes, Effects and Control Measures of Air Pollution, Water Pollution, Marine Pollution, Noise Pollution, Thermal Pollution, Nuclear hazards, Solid Waste Management role of Individuals in Pollution Prevention.

## **Social Issues Human, Population and Environment:**

From Unsustainable To Sustainable Development, Urban Problems Related to Energy, Water Conservation, Rain Water Harvesting, global warming, acid rain, ozone layer depletion, nuclear accidents and nuclear holocaust

## **Concept of health & disease**

Concept of health, Definition of health, Philosophy of health- Dimension of health - Concept of well being, Spectrum of health, Responsibility of health - Determinates of health & Indicators of health - Concepts of disease & Concepts of cessation - Determinates of health & Indicators of health - Concepts of disease & Concepts of cessation - Determinates of health & Indicators of health - Concepts of disease & Concepts of cessation - Modes of Intervention, Changing pattern of disease.

## **Epidemiology:**

Definition & Explanation, Aims, Epidemiologic approach, Basic measurement in epidemiology & tools of measurement – of Mortality , Epidemiologic methods – Descriptive epidemiology – Analytical epidemiology -Cohort study – Experimental epidemiology – RCT- Association & Causation Uses of epidemiology

(Criteria for judging causality) – Infection disease epidemiology Definitions Dynamic of disease transmission & Mode of Transmission – Disinfection – Definitions Types Agents used Recommended disinfection procedures – Investigation of an epidemic.

### **Environmental & health:**

Definition & Components (environment sanitation environmental sanitation) Water : Safe & Whole some water Requirements Uses source of water supply (sanitary well ) – Purification (1).Large scale purification, (2). Small scale purification – Water quality – Special treatment of water Air: Composition the air of occupied room discomfort.

Air pollution & its effects. Prevention & Control of air pollution

Ventilation : Definition Standards of ventilation Types of Ventilation. Light, Noise & Radiation, Meterological environment, Housing, Disposal of waste Excreta disposal

**SEMESTER VI**

<b>S.NO</b>	<b>SUBJECT</b>
1.	Perfusion Technology part II - Theory (UE)
2.	Perfusion Technology part II - Practical (UE)
3.	Echocardiography and cardiac catheterization - Theory (UE)
4.	Echocardiography and cardiac catheterization - Practical (UE)
5.	Health care and basic principles (IE)

**B.Sc. CARDIAC AND PERFUSION TECHNOLOGY**  
**SEMESTER – VI**

**Perfusion technology part II – Theory (UE)**

**Course description:**

This course will provide an outline of clinical techniques during cardiopulmonary bypass(CPB)

**Objectives:**

- At the end of the course the students should be able to:
  - To know the concepts of hypothermia
  - To know the effects of CPB on various organ system
  - To know the blood conservation techniques.
  - To know the extracorporeal membrane oxygenation(ECMO)
  - To know the ultra filtration techniques

**Learning objective skills:**

- Learn to know about cooling and rewarming strategies during CPB Learn to know about blood gas management
- Learn to know about the effects of CPB on various system Learn to know about ultra filtration & its types
- Learn to know about extracorporeal membrane oxygenation(ECMO)
- Learn to know about the Safety & management of perturbations during CPB

**UNIT-I:**

Myocardial protection

- a) Concepts of myocardial protection
- b) Clinical systems of myocardial protection
- c) Cardio-plegia
  - i) Composition
  - ii) Methods of administration
  - iii) Advantages & disadvantages

**UNIT-II:**

1. Hypothermia
  - a) Concept of hypothermia
  - b) Techniques to induce hypothermia
  - c) Total circulatory arrest

- d) Low-flow CPB
- 2. Cooling & re-warming strategies
  - a) Temperature monitoring sites
  - b) Gradients for warming & cooling
- 3. Blood gas management
  - a) Alpha stat
  - b) pH stat
  - c) Comparison of alpha & pH stat

### **UNIT-III:**

Central nervous system – responses to  
CPB Effects of CPB on

- Respiratory
- Renal
- Hepatic system

### **UNIT-IV:**

Effects of CPB on immune system  
Effects of CPB on endocrine system

### **UNIT-V:**

Extracorporeal Membrane Oxygenation (ECMO)

### **UNIT-VI:**

Blood conservation techniques in cardiac surgery

### **UNIT-VII:**

Ultra filtration & types  
Management of conventional & modified ultra-filtration

### **UNIT-VIII:**

CPB for non-cardiac surgeries  
Safety & management of perturbations during CPB

### **RECOMMENDED BOOKS:**

1. Cardiopulmonary Bypass: Principles and Techniques of Extracorporeal circulation, Christina T. Mora
2. Cardiopulmonary bypass principles and practice, Glenn P. Gravlee, Richard E. Davis, Alfred H. Stammers, Ross M. Ungerleider.

## **Perfusion technology part II – Theory (UE)**

### **Learning objective:**

- Learn to know about cooling and rewarming strategies during CPB Learn to know about blood gas management
- Learn to know about the effects of CPB on various system Learn to know about ultra filtration & its types
- Learn to know about extracorporeal membrane oxygenation(ECMO)
- Learn to know about the Safety & management of perturbations during CPB

### **Practicals / Demonstration:**

1. Cannulation and circulating the circuit.  
Hypothermia
2. ABG analysis
3. ECMO circuit assembling and priming  
Ultrafiltration (CUF & CUF)
4. CPB for non-cardiac surgeries  
CPB in infants & children

### **SPECIFIC LEARNING OUTCOME:**

1. To gain knowledge on strategies of hypothermia  
ABG analysis
2. Ultra filtration
3. ECMO

# **Echocardiography and cardiac catheterization – Theory(UE)**

## **Course description:**

- This course will provide an outline of echocardiography and cardiac catheterization.

## **Objectives:**

- At the end of the course the students should be able to:
- To develop a knowledge about the diagnostic techniques for various conduction abnormalities.
- To develop exhaustive ideology of the interpretation of the imaging techniques for cardiac rhythm and conduction abnormalities

## **Learning objective skills:**

- Learn to diagnosis the abnormalities with interpretation of the imaging techniques

## **UNIT-I:**

- Echocardiography in Valvular heart disease:
- Mitral stenosis, Mitral regurgitation, Mitral valve prolapsed  
Tricuspid stenosis, Tricuspid regurgitation
- Aortic stenosis, Aortic regurgitation
- Pulmonary stenosis, Pulmonary regurgitation

## **UNIT-II:**

- Assessment of systolic and diastolic function

## **UNIT-III:**

Echocardiography in Cardiomyopathies:

- ❖ Dilated cardiomyopathy
- ❖ Restrictive cardiomyopathy
- ❖ Hypertrophic cardiomyopathy
- ❖ Apical cardiomyopathy

## **UNIT-IV:**

- Constrictive pericarditis
- Pericardial effusion and cardiac tamponade

## **UNIT-V:**

- Echocardiographic detection of congenital heart disease:
  - ❖ Atrial septal defect
  - ❖ Ventricular septal defect
  - ❖ Patent ductus arteriosus
  - ❖ Coarctation of aorta



#### **UNIT-VI:**

Tetralogy of Fallot  
Total anomalous pulmonary venous return  
Tricuspid atresia  
Transposition of great arteries  
Double outlet right ventricle

#### **UNIT-VII:**

Left atrial thrombus  
Left atrial myxoma  
Infective endocarditis

#### **UNIT-VIII:**

Transesophageal echocardiography

#### **UNIT-IX:**

Stress Echo Cardiography and Contrast Echo Cardiography

#### **CARDIAC CATHETERIZATION**

- Type of catheters
- Catheter cleaning and packing
- Thermo dilution method
- Oxygen dilution method
- Principles of oximetry

Coronary angiography

Right heart catheterization and angiography

#### **RECOMMENDED BOOKS:**

The Echo Manual, Jae K Oh, third edition, Lippincott Williams and Wilkins  
Practice of Clinical Echocardiography Catherine M Otto, fourth print Rev edition  
, W.B.Saunders Company

#### **REFERENCE BOOKS:**

The Echo made easy, Sam Kaddoura, Churchill Livingstone, second edition  
Feigenbaum's echocardiography, William F Armstrong, Thomas Ryan seventh  
edition, Wolters Kluwer

## **Echocardiography and cardiac catheterization – Practical(UE)**

### **Learning objective:**

- To develop a knowledge about the diagnostic techniques for various conduction abnormalities.
- To develop exhaustive ideology of the interpretation of the imaging techniques for cardiac rhythm and conduction abnormalities

### **Practicals / Demonstration:**

- Disease conditions diagnosed by Echocardiogram  
Contrast and dobutamine stress testing

### **Specific learning outcomes (slo):**

- Will be able to identify abnormal conditions in echocardiography
- Will be able to prove the pathological conditions by performing echo  
Capable of assisting in non-invasive / invasive procedures
- Will be able to perform Echocardiography at cardiovascular emergencies
- Will be able to use the diagnostic strategies by available proven methods in echocardiography

# **HEALTH CARE MANAGEMENT & BASIC PRINCIPLES**

## **1. Concept of Health Care and Health Policy**

- Health in Medical Care
- Indigenous systems of Health Care & their relevance
- Framework for Health Policy Development

## **2. Health Organisation**

- Historical development of Health Care System in the third world & India
- Organization & Structure of Health Administration in India
- Type of Health Organization including International Organizations
- Private & Voluntary Health care provider
- Distribution of Health Care Services
- Health Care System in Public Sector Organization
- Health systems of Various Countries

## **3. Health Policy and National Health Programme**

- National Health Policy
- Drug Policy
- National Health Programs (Malaria, T.B., Blindness, AIDS etc.)
- Evaluation of Health Programs (Developing indicators for evaluation)
- Medical Education & Health Manpower Development

## **4. Health Economics**

### **Fundamentals of Economics**

- Scope & Coverage
- Demand for Health Services
- Health as an Investment
- Population, health of Economic Development

## **5. Methods & Techniques of Economic Evaluation of Health Program**

- Cost Benefit & Cost Effective Methods

## **6. Household & Health**

### Health Expenditure & Outcome

- Rationale for Government action
- Household capacity, income and schooling

## **7. Economics of Health**

- Population based health services
- Economics of Communicable and Non Communicable diseases

## **8. Health Insurance**

## **SEMESTER-VII**

<b>S.NO</b>	<b>SUBJECT</b>
1.	Project / Dissertation
2.	Statistics and research methodology

## **SEMESTER-VII**

### **STATISTICS & RESEARCH METHODOLOGY**

What is statistics – Importance of statistics in behavioural sciences – Descriptive statistics and inferential statistics – Usefulness of quantification in behavioural sciences.

Measurements – Scales of measurements – Nominal, Ordinal, Interval and Ratio scales.

Data collection – Classification of data – Class intervals – Continuous and discrete measurements – Drawing frequency polygon – types of frequency polygon – Histogram.

Cumulative frequency curve – Ogives – Drawing inference from graph.

Measures of central tendency – Need – types: Mean, Median, Mode – Working out these measures with illustrations.

Measures of variability – Need – Types: Range, Quartile deviation, Average deviation, Standard deviation, Variance – Interpretation.

Normal distribution – General properties of normal distribution – Theory of probability – Illustration of normal distribution – area under the normal probability curve.

Variants from the normal distribution – skewness – Quantitative measurement of skewness – kurtosis – measurement of kurtosis – factors contributing for non-normal distribution.

Correlation – historical contribution – meaning of correlation – types: Product, moment, content correlation, variation of product, movement correlation, rank correlation, Regression analysis.

Tests of significance need for – significance of the mean – sampling error – significance of differences between means – interpretation of probability levels – small samples – large samples.

**SEMESTER – VII (FOR ALL SPECIALITIES)**

**Project/ Dissertation**

**SEMESTER – VIII (FOR ALL SPECIALITIES)**

**Internship -1 year**