# MALLA REDDY VISHWAVIDYAPEETH

## SCHOOL OF ALLIED HEALTH CARE SCIENCES AND TECHNOLOGY

Suraram X Roads, Jeedimetla, Hyderabad-500055
Web: https://mrvv.edu.in/

## Program

## BACHELOR OF SCIENCE (B.Sc.)

## Bachelor of Cardiovascular Technology

## (Cath Lab)

### COURSE STRUCTURE

2025

**Vision**

To produce skilled cardiovascular technologists who contribute to quality cardiac care through clinical excellence, research, and ethical healthcare practice.

**Mission**

- Provide advanced knowledge and practical training in cardiovascular technology.
- Develop clinical, technical, and research skills for effective patient care.
- Promote ethical values, professionalism, and lifelong learning.
- Prepare students to support diagnosis and management of cardiovascular diseases using modern healthcare technologies.

**Program Educational Objectives (PEOs)**

Graduates will:

- Apply cardiovascular technology knowledge effectively in clinical practice.
- Assist in diagnostic and interventional cardiac procedures with competence.
- Demonstrate professional ethics, communication, and teamwork in healthcare settings.
- Participate in research and continuous professional development.
- Contribute to community health and cardiac care awareness.

**Program Outcomes (POs)**

Students will:

- Understand fundamental and advanced concepts of cardiovascular technology.
- Perform and assist in ECG, echocardiography, cath lab, and cardiac monitoring procedures.
- Analyze clinical data and support patient diagnosis and treatment.
- Apply knowledge of anatomy, physiology, pathology, and cardiac instrumentation.
- Follow infection control, patient safety, and ethical healthcare practices.
- Communicate effectively with patients, doctors, and healthcare teams.
- Utilize modern medical equipment and technologies efficiently.
- Demonstrate critical thinking and problem-solving abilities in clinical settings.
- Participate in research activities and evidence-based practice.
- Engage in lifelong learning and professional growth.

**Program Specific Outcomes (PSOs)**

Students can:

- Perform cardiovascular diagnostic procedures including ECG, Holter monitoring, echocardiography, and stress testing.
- Assist in cardiac catheterization, angiography, and interventional procedures.
- Operate and maintain cardiovascular equipment and monitoring systems.
- Recognize and manage cardiac emergencies with appropriate technical support.
- Apply clinical and technical skills in cardiac care units, cath labs, and related healthcare settings.

**Course Outcomes (COs)**

Students will:

- Understand basic and advanced cardiovascular science concepts.
- Assess cardiovascular parameters and interpret diagnostic findings.

- Apply knowledge in patient preparation, monitoring, and cardiac procedures.
- Interpret ECG, echocardiography, and related cardiovascular investigations.
- Follow safety standards, biomedical ethics, and infection control measures.
- Develop practical, technical, and professional skills required in cardiovascular technology.
- Support healthcare teams in delivering effective cardiac patient care.
- Demonstrate research aptitude and analytical skills in cardiovascular healthcare.

**MALLA REDDY VISHWAVIDYAPEETH**

**SCHOOL OF ALLIED HEALTH CARE SCIENCES AND TECHNOLOGY**

**Bachelor of Cardiovascular Technology - Cath Lab**

**COURSE STRUCTURE**

**I year I semester**

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | Max. Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT | TOTAL |
| 1 | | Human Anatomy - I | 4 | - | - | 4 | 30 | 70 | 100 |
| 2 | | Human Physiology - I | 4 | - | - | 4 | 30 | 70 | 100 |
| 3 | | Medical Bio-chemistry- I | 4 | - | - | 4 | 30 | 70 | 100 |
| 4 | | Sociology | 2 | - | - | 2 | 30 | 70 | 100 |
| 5 | | English and Communication Skills | 1 | - | 2 | 2 | 30 | 70 | 100 |
| 6 | | Basic Computers | 1 | - | 2 | 2 | 30 | 70 | 100 |
| 7 | | Human Anatomy - I Practical | - | - | 4 | 2 | 30 | 70 | 100 |
| 8 | | Human Physiology - I Practical | - | - | 4 | 2 | 30 | 70 | 100 |
| TOTAL | | | 16 | - | 12 | 22 | 240 | 560 | 800 |

**I year II semester**

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | Max. Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT | TOTAL |
| 1 | | Human Anatomy - II | 4 | - | - | 4 | 30 | 70 | 100 |
| 2 | | Human Physiology - II | 4 | - | - | 4 | 30 | 70 | 100 |
| 3 | | Health Psychology | 3 | - | - | 3 | 30 | 70 | 100 |
| 4 | | Cardiac Instrumentation | 3 | - | 2 | 4 | 30 | 70 | 100 |
| 5 | | Human Anatomy – II Practical | - | - | 3 | 1.5 | 30 | 70 | 100 |
| 6 | | Human Physiology – II Practical | - | - | 3 | 1.5 | 30 | 70 | 100 |
| 7 | VAC | Professionalism in the Workplace | 1 | - | - | 1 | 100 | - | 100 |
| 8 | VAC | Stress Management | 1 | - | - | 1 | 100 | - | 100 |
| **TOTAL** | | | **16** | **-** | **8** | **20** | **380** | **420** | **800** |

**II year III semester**

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | Max. Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT | TOTAL |
| 1 | | Cardiac Anatomy and Physiology | 4 | - | 2 | 5 | 30 | 70 | 100 |
| 2 | | ECG and Holter Monitoring | 4 | - | 2 | 5 | 30 | 70 | 100 |
| 3 | | Medical Microbiology | 3 | - | 2 | 4 | 30 | 70 | 100 |
| 4 | | Pathology | 3 | - | - | 3 | 30 | 70 | 100 |
| 5 | | Clinical Assessment - I | 2 | - | 4 | 4 | 30 | 70 | 100 |
| 6 | VAC | Health and Well-being | 1 | - | - | 1 | 100 | - | 100 |
| **TOTAL** | | | **17** | | **10** | **22** | **250** | **350** | **600** |

**II year IV semester**

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | Max. Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT | TOTAL |
| 1 | | Ultrasound physics and Doppler Principles | 3 | - | 2 | 4 | 30 | 70 | 100 |
| 2 | | Congenital Heart Disease I | 3 | - | 2 | 4 | 30 | 70 | 100 |
| 3 | | Basics of Echocardiography and cardiac pacemakers | 4 | - | 2 | 5 | 30 | 70 | 100 |
| 4 | | Medical ethics and legal aspects | 2 | - | 2 | 3 | 30 | 70 | 100 |
| 5 | | Clinical assessment II | 2 | - | 4 | 4 | 30 | 70 | 100 |
| 6 | VAC | Environment awareness | 1 | - | - | 1 | 100 | - | 100 |
| **TOTAL** | | | **16** | **-** | **12** | **21** | **250** | **350** | **600** |

**III year – V semester**

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | Max. Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT | TOTAL |
| 1 | | Clinical applications of Echo | 4 | - | 2 | 5 | 30 | 70 | 100 |
| 2 | | Myocardial, pericardial, Valvular and Ischemic Heart Diseases | 4 | - | 2 | 5 | 30 | 70 | 100 |
| 3 | | Congenital heart disease - II | 4 | - | 2 | 5 | **30** | **70** | 100 |
| 4 | | Clinical Assessment I | 3 | - | 4 | 5 | 30 | 70 | 100 |
| 5 | VAC | Interpersonal communication | 1 | - | - | 1 | 100 | - | 100 |
| **TOTAL** | | | **16** | | **10** | **21** | **220** | **280** | **500** |

**III year – VI semester**

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | Max. Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT | TOTAL |
| 1 | | Community Medicine | 2 | - | 2 | 3 | 30 | 70 | 100 |
| 2 | | Cardiac Cath and Intervention | 4 | - | 2 | 5 | 30 | 70 | 100 |
| 3 | | Arrhythmia Management | 3 | - | 2 | 4 | 30 | 70 | 100 |
| 4 | | Clinical Assessment - I | 2 | - | 4 | 4 | 30 | 70 | 100 |
| 5 | | Clinical Assessment - II | 2 | - | 4 | 4 | 30 | 70 | 100 |
| 6 | VAC | Soft skills development | 1 | - | - | 1 | 100 | | 100 |
| **TOTAL** | | | **14** | | **14** | **21** | **250** | **350** | **600** |

**IV year – VII semester**

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | Max. Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT | TOTAL |
| 1 | | Internship-I | - | - | 40 | 20 | 30 | 70 | 100 |
| 2 | VAC | Healthy Eating for Healthy Living | 1 | - | - | 1 | 100 | - | 100 |
| **TOTAL** | | | **1** | | **40** | **21** | **130** | **70** | **200** |

**IV year – VIII semester**

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | Max. Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT | TOTAL |
| 1 | | Internship-II | - | - | 20 | 10 | 30 | 70 | 100 |
| 2 | | Project | - | - | 20 | 10 | 30 | 70 | 100 |
| 8 | VAC | Art of Being a Better Person | 1 | - | - | 1 | 100 | - | 100 |
| **TOTAL** | | | **1** | | **40** | **21** | **160** | **140** | **300** |

### 1.1 Under Graduate Programme

| Sl. No. | Course | Duration | Eligibility for admission |
|---|---|---|---|
| 1 | Bachelor of Cardiovascular Technology | 4 years | Intermediate BiPC, vocational Physiotherapy (with bridge course), 10+2 with Physics, Chemistry and Biology or equivalent |

### 1.2. Medium of Instruction:

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

### 1.3. Duration of the Course

Duration details are mentioned under clause no. 1.1 of this booklet.

### 1.4 Examination Regulations

**1.4.1 Attendance: 75% of attendance (physical presence) is mandatory.**
Medical leave or other types of sanctioned leaves will not be counted as physical presence. Attendance will be counted from the date of commencement of the session to the last day of the final examination in each subject

**1.4.2 Internal Assessments**:

a) Regular periodic assessment shall be conducted throughout the course. In each semester there will be **two one hour internal assessments (10 marks each)** and a continuous assessment **(10 marks).** Thus a total of 30 marks for the internal exam. (i.e. weightage for internal assessment shall be 30% of the total marks in each subject).

b) **Exam pattern for internal assessment** in each semester will be

(a) Short questions 3 nos. out of which the student should write two questions each carrying 5 marks (i.e. 2 x 5 = 10 marks) . Two such internal examinations will be conducted.

(b) Continuous assessment of the student will be done. Students overall attendance, performance in class, behaviour of the student, extra-curricular activities etc will be assessed. Continuous assessment carries 10 marks.

(d) Thus a total of 30 marks for the internal examination. (10 + 10 + 10 = 30 marks). A candidate should secure a minimum of 40% marks in the internal assessment in each subject to be eligible to appear for the University examination

(e) For value added courses, only internal examination will be conducted. The assessment comprised of five assignments/presentations/case presentations each carrying 10 (i.e. 5 x 10 = 50 marks). Final examination will be for 50 marks with 5 questions each carrying 10 marks (5 x 10 = 50 marks). The minimum pass is 40% marks.

**1.4.3 University Examinations:**

a) University Examination shall be conducted at the end of every semester.

b) A candidate who satisfies the requirement of attendance and internal assessment marks, as stipulated by the University shall be eligible to appear for the University Examination.

c) Examination will be of 3 hours duration (for theory). The question pattern for those subjects without practical examination (70 marks) will be (a) Three essay questions out of which the student should answer 2 questions each carrying 10 marks (i.e. 2 x 10 = 20 marks) (b) Eight short note questions out of which the student should attempt six questions, each carrying 5 marks (6 x 5 = 30 marks). (c) Ten very short questions each carrying 2 marks (i.e. 10 x 2 = 20 marks). Thus a total of 70 marks.

d) Examination will be of 3 hours duration (for theory). The question pattern for those subjects with practical examination (70 marks) will be (a) Three essay questions out of which the students should answer two questions each carrying 10 marks (i.e. 2 x 10 = 20 marks) (b) Eight short note questions out of which the student should attempt six questions, each carrying 5 marks (6 x 5 = 30 marks). (c) Spotters/major practical/minor practical/Viva/practical record carries 20 marks. Thus a total of 70 marks.

e) The question pattern for practical examination (a) Spotters/major practical/minor practical/Viva/practical record.

The minimum pass for internal assessment is 40% and for the University Examination is 50% . i.e. a student should score a total of 50% (adding the internal and external examination) to pass in each subject.

# FIRST YEAR

## Semester- I

1. Human Anatomy – I
2. Human Physiology - I
3. Medical Biochemistry
4. Sociology
5. English and Communication Skills
6. Basic computers
7. Human Anatomy - I Practical
8. Human Physiology - I Practical

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | Max. Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT | TOTAL |
| 1 | | Human Anatomy - I | 4 | - | - | 4 | 30 | 70 | 100 |
| 2 | | Human Physiology - I | 4 | - | - | 4 | 30 | 70 | 100 |
| 3 | | Medical Bio-chemistry- I | 4 | - | - | 4 | 30 | 70 | 100 |
| 4 | | Sociology | 2 | - | - | 2 | 30 | 70 | 100 |
| 5 | | English and Communication Skills | 1 | - | 2 | 2 | 30 | 70 | 100 |
| 6 | | Basic Computers | 1 | - | 2 | 2 | 30 | 70 | 100 |
| 7 | | Human Anatomy - I Practical | - | - | 4 | 2 | 30 | 70 | 100 |
| 8 | | Human Physiology - I Practical | - | - | 4 | 2 | 30 | 70 | 100 |
| TOTAL | | | 16 | - | 12 | 22 | 240 | 560 | 800 |

# HUMAN ANATOMY-I

**( 60 hours)**

**L/T/P/C**
**4/-/-/4**

**Learning Objectives**

At the end of the course, the student will be able to:

- Understand the basic concepts of general anatomy and histology.
- Describe the structure and functions of bones, muscles, joints, nerves, and blood vessels.
- Identify anatomical features of the upper extremity, thorax, and systemic organs.
- Explain the anatomy of the cardiovascular and respiratory systems.
- Understand the arrangement and relations of major organs in the digestive, urinary, endocrine, and reproductive systems.
- Correlate anatomical knowledge with clinical and diagnostic applications.
- Develop skills in identifying anatomical structures using cadavers, models, charts, and radiographs.
- Apply anatomical concepts in cardiovascular technology and allied health sciences.

**Learning Outcomes**

After successful completion of the course, the student will be able to:

- Identify and describe major anatomical structures of the human body.
- Demonstrate understanding of musculoskeletal anatomy and movements.
- Explain the anatomy of the heart, lungs, thoracic cavity, and major blood vessels.
- Recognize anatomical relationships relevant to clinical and cardiovascular procedures.
- Interpret basic anatomical features in radiological and clinical images.

- Apply anatomical knowledge in patient assessment and healthcare practice.
- Demonstrate competency in locating and identifying organs, muscles, nerves, and vessels during practical sessions.
- Integrate anatomical concepts with physiology and clinical cardiovascular technology applications.

## COURSE DESCRIPTION:

The focus of this course is an in-depth study and analysis of the regional and systemic organization of the body. Emphasis is placed upon structure and function of human movement. A comprehensive study of human anatomy with emphasis on the nervous, musculoskeletal and circulatory systems is incorporated. Introduction to general anatomy laysthe foundation of the course. Dissection and identification of structures in the cadaver supplemented with the study of charts, models, prosected material and radiographs are utilized to identify anatomical landmarks and configurations.

## OBJECTIVES:

- The student should be able to identify & describe Anatomical aspects of muscles, bones,joints, their attachments & to understand and analyze movements.
- Application of knowledge of anatomy on the living (living anatomy).
- To identify and describe the course of peripheral nerves.
- To identify & describe various structures of the Cardio Vascular &Respiratory system andthe course of blood vessels
- Identify and describe various structures of Thoracic cage and mechanisms of Respiration
- Be able to apply knowledge of Living anatomy with respect to Cardio Vascular &Respiratory system
- To Obtain Knowledge of other systems & sensory organs

# SYLLABUS

## UNIT-I

**GENERAL ANATOMYAND HISTOLOGY** 12hrs

**General Anatomy:**

1. Fascia
2. Muscles
3. Bones
4. Joints
5. Vessels
6. Nerve

**General Histology:**

1. Epithelial
2. Connective tissue
3. Muscle
4. Bone and cartilage
5. Nerve and vessels
6. Embryology

## UNIT-II 12hrs

**UPPER EXTREMITY:**

1. Osteology: Clavicle, Scapula, Humerus, Radius, Ulna, Carpals, Metacarpals, Phalanges.
2. Muscles: Origin, insertion, nerve supply and actions.

## UNIT-III 12hrs

**UPPER EXTREMITY:**

1. Joints: Shoulder girdle, shoulder joint, elbow joints, radio ulnar joint, wrist joint and joints of the hand.
2. Breast, pectoral region, axilla, cubital fossa, Arches of hand
3. Brachial plexus, nerves of upper extremity
4. Blood vessels and lymphatic drainage

## UNIT-IV 14hrs

**CARDIO VASCULAR & RESPIRATORY ANATOMY**

1. Thoracic wall
2. Mediastinum

3. Heart: Anatomy of heart, blood Supply, nerve supply, conducting System and major blood vessels
4. Lungs: Anatomy of lungs, bronchial tree, pleura, Broncho pulmonary segments, blood Supply and nerve supply
5. Diaphragm: Origin, insertion, nerve supply and action, openings in the diaphragm.
6. Intercostal muscles: and Accessory muscles of Respiration: Origin, insertion, nerve supply and action
7. Ribs and sternum

## UNIT-V 10hrs

**SYSTEMIC ANATOMY**

1. **Digestive system:**
   - List the parts of the digestive system
   - Anatomy of stomach, liver, gall bladder, spleen, pancreas, intestines.
2. **Urinary system:**
   - Anatomy of kidney, urinary bladder
3. **Endocrine system:**
   - Position and hormones secreted by each organ
4. **Genital system:**
   - Male organs and female organs

### *RECOMMEMDED TEXT BOOKS*

1. Human Anatomy – Snell
2. Anatomy- Chaurasia, Volume- I,II & III
3. Neuro anatomy -- Inderbir Singh
4. Human Anatomy – Kadasne, Volume- I,II & III
5. Neuroanatomy -- Vishrsam Singh
6. Human Anatomy – Datta

# HUMAN PHYSIOLOGY-I

**( 60 hours)**

**L/T/P/C**
**4/-/-/4**

## Learning Objectives

At the end of the course, the student will be able to:

1. Understand the basic physiological mechanisms of the human body and maintenance of homeostasis.
2. Describe the structure and functions of blood, nerve, muscle, cardiovascular, and respiratory systems.
3. Explain the physiological principles involved in muscle contraction and neural transmission.
4. Understand the regulation of cardiac output, blood pressure, and respiration.
5. Analyze physiological responses to exercise, stress, and environmental changes.
6. Develop basic clinical skills related to physiological assessment and interpretation.

## Learning Outcomes

After successful completion of the course, the student will be able to:

1. Explain normal physiological functions of major body systems.
2. Demonstrate understanding of cardiovascular and respiratory physiology in clinical practice.
3. Interpret basic physiological parameters such as pulse, blood pressure, and respiratory rate.
4. Apply physiological concepts in understanding exercise and body responses.
5. Correlate physiological mechanisms with common clinical conditions.
6. Perform and interpret basic physiology practical procedures with accuracy.

## COURSE DESCRIPTION:

The course is designed to study the function of the human body at the molecular, cellular, tissue and systems levels. The major underlying themes are; the mechanisms for promoting homeostasis, cellular processes of the metabolism, membrane function and cellular signaling; the mechanisms that match supply of nutrients to tissue demands at different activity levels; the mechanisms that match the rate of excretion of waste products to their rate of production; the mechanisms that defend the body against injury and promote healing.

These topics address the consideration of nervous and endocrine regulation of the cardiovascular, hematopoietic, pulmonary, renal, gastro-intestinal and musculoskeletal systems including the control of cellular metabolism. The course stresses on the integrative nature of physiological responses in normal function and disease. This course will serve as a pre-requisite/foundation for the furthercourses i.e. Exercise physiology or Pathology

**OBJECTIVES:**

At the end of the course, the candidate will:

- Acquire the knowledge of the relative contribution of each organ system in maintenance of the Milieu Interior (Homeostasis)
- Be able to describe physiological functions of various systems, with special reference to Musculo-skeletal, Cardio-respiratory,
- Analyze physiological response & adaptation to environmental stresses- with specialemphasis on physical activity, altitude, temperature
- Acquire the skill of basic clinical examination, with special emphasis to Peripheral & Central Nervous system, Cardiovascular & Respiratory system, & Exercise tolerance / Ergography

## SYLLABUS

## UNIT – I

14 hrs

**GENERAL PHYSIOLOGY**

**Cell:**

**1. Structure of cell membrane**

a) Fluid mosaic model
b) Lipid bi-layer
c) Functions of cell membrane

**2. Transport across cell membrane**

Basic mechanism of transport

a) Channel proteins
b) Carrier proteins

B. Methods of transport

a) Passive transport
b) Active transport

**3. Body fluids**

a) Intracellular fluid
b) Extracellular fluid
c) Body electrolytes
d) Regulation of body fluid volume

**4. Homeostasis**

a) Regulation of body function
b) Homeostatic regulatory mechanism **BLOOD:**

**1. Composition of blood & it's volume**
**2. Plasma**
**3. Hemopoiesis**

a) Composition
b) Plasma protein

**4. Erythrocytes**

a) Normal count
b) Structure of RBC (shape & size)
c) Functions of RBC
d) Hemoglobin (Normal Value, Fate, Function)
e) Anemia & polycythemia
f) ESR & PCV

**5. Leukocytes**

a) Classification
b) Functions of leukocytes

**6. Platelets**

a) Normal count
b) Functions of thrombocytes
c) Blood Coagulation

d) Bleeding time & clotting time

**7. Blood group**

a) ABO system

b) Landsteiner's law

c) ABO incompatibility

d) Rh system

e) Rh incompatibility & erythroblastosis fetalis

**8. Blood transfusion**

a) Collection & storage of blood

b) Precautions

c) Cross matching

d) Hazards of blood transfusion **Nerve:**

**1. Structure of a neuron**
**2. Classification of neurons**

**3. Electrical activity of neuron**

a) Resting membrane potential

b) Action potential

**4. Propagation of nerve impulse**

**5. Properties of nerve fibers**

**6. Neuroglia - Types & functions**

**7. Nerve injury**

a) Types of nerve injury

b) Effect of nerve injury

c) Regeneration of damaged nerve fiber

## UNIT – II

10 Hours

**MUSCLE PHYSIOLOGY**

**1. Classification**

**2. Properties of skeletal muscle**

**3. Structure of skeletal muscle**

a) Sarcomere

b) Sarcotubular system

c) Neuromuscular junction & disease affecting it

4. **Excitation-Contraction coupling**
5. **Mechanism of muscle contraction**
6. **Functions of skeletal muscle**
7. **Types of muscle contractions**
8. **Red & white muscles**
9. **Rigor mortis, muscular dystrophy, altered muscle tone, muscle cramp, atrophy, EMG**

## UNIT – III

12 Hours

**CARDIOVASCULAR SYSTEM**

1. **Structure of heart & blood vessels**
2. **Properties of cardiac muscle**
3. **Origin & spread of cardiac impulse**
4. **Cardiac cycle & heart sounds**
5. **Cardiac output**
    a) Related terms
    b) Regulation of cardiac output
    c) Circulatory shock
6. **Pulse & Heart rate and it's regulation**
7. **Blood pressure**
    a) Definitions
    b) Factors controlling & influencing BP
    c) Regulation of BP
8. **Regional circulation**
    a) Coronary circulation
    b) Cerebral circulation
9. **Normal ECG.**

## UNIT – IV

12 Hours

**RESPIRATORY SYSTEM**

1. **Introduction, structure & function of RS**
    a) Upper respiratory tract
    b) Lower respiratory tract
    c) Respiratory membrane
2. **Mechanism of breathing**
    a) Mechanics of breathing

b) Respirstory pressure change
c) Compliance
d) Surfactant

**3. Respiratory volumes & capacities**

**4. Pulmonary ventilation & Dead space**

**5. Transport of respiratory gases**

**6. Nervous & chemical regulation of respiration**

**7. Pulmonary function test - direct & indirect method**

**8. Physiological changes with altitude & acclimatization**

## UNIT – V

12 Hours

**EXERCISE PHYSIOLOGY**

1. Basal Metabolic Rate & Respiratory Quotient
2. Energy metabolism
3. Fatigue
4. Oxygen debt
5. Acute cardiovascular changes during exercise; difference between mild, moderate & severe exercise.
6. Concept of endurance
7. Acute respiratory changes during exercise
8. Concept of training/conditioning; effects of long-term exercise/training on the CVS & RS
9. Body temperature regulation during exercise
10. Hormonal & metabolic effects during exercise
11. Exercise for muscle strength, power, endurance and there effects on it. Physical fitness & its components

### *RECOMMENDED TEXT BOOKS*

1. Textbook on Medical Physiology –Guyton
2. Textbook of Physiology –A K Jain (for MBBS students)
3. Human Physiology - C.C. Chatterjee
4. Essentials of Medical Physiology - Sembulingam, K.
5. Comprehensive Textbook of Medical Physiology : Vol - 1 & 2 - Pal, Gopal Krushna
6. Physiology : Prep Manual For Undergraduates - Joshi, Vijaya D.
7. Practical Physiology - Joshi, Vijaya D.

# BIOCHEMISTRY

**(60 hours)**

**L/T/P/C**

**4/-/-/4**

**Learning Objectives**

At the end of the course, the student will be able to:

1. Understand the structure, classification, and functions of carbohydrates, lipids, proteins, and nucleic acids.
2. Explain the role of enzymes, vitamins, and minerals in normal body metabolism.
3. Describe the biochemical pathways involved in carbohydrate, lipid, and protein metabolism.
4. Understand the composition and functions of blood and urine constituents in clinical biochemistry.
5. Correlate biochemical processes with normal physiology and disease conditions.
6. Develop basic knowledge of laboratory biochemical investigations and their clinical significance.

**Learning Outcomes**

After successful completion of the course, the student will be able to:

1. Classify and explain the biochemical importance of biomolecules in the human body.
2. Describe metabolic pathways and their role in energy production and utilization.
3. Interpret the clinical significance of enzymes, vitamins, and mineral deficiencies.
4. Analyze normal and abnormal biochemical constituents in blood and urine.
5. Correlate biochemical alterations with common clinical disorders.
6. Apply biochemical knowledge in laboratory diagnosis and healthcare practice.

## UNIT- I

12 Hours

### CARBOHYDRATE CHEMISTRY

- Definition, general classification with examples
- Composition and functions of Monosaccharides, Disaccharides and Polysaccharides
- Anomers, Epimers, Enantiomers, Mutarotation
- Glycosaminoglycans (mucopolysaccharides)

### LIPID CHEMISTRY

- Definition, classification with examples.
- Classification and Functions of Fatty acids, Phospholipids, Lipoproteins
- Structure and functions of Cholesterol
- Sources and functions of Ketone bodies

## UNIT-II

12 Hours

**AMINO ACID CHEMISTRY**

- Definition, Classification of amino acids with examples.
- Definition, Classification of proteins with examples
- Structural organization of proteins
- Biologically important peptides

**NUCLEIC ACIDS AND NUCLEOTIDE CHEMISTRY**

- Composition and Functions of Nitrogen bases, Nucleosides, Nucleotides
- Structure and Functions of DNA
- Structure, Types and Functions of RNA
- Differences between DNA and RNA

## UNIT-III

12 Hours

**ENZYMES**

- Definition, Classification of enzymes with examples
- Active site, Enzyme specificity.
- Factors affecting enzyme activity
- Enzyme inhibition
- Isoenzymes and their clinical significance - LDH, Creatine kinase, ALP

**VITAMINS**

- Definition, Classification
- Fat soluble Vitamins- Sources, RDA, Functions and Deficiency.
- Water soluble Vitamins - Sources, RDA, Functions and Deficiency.

## UNIT-IV

12 Hours

**INTERMEDIARY METABOILISM**

- Glycolysis
- TCA cycle
- β-oxidation of fatty acids (Palmitic acid)
- Ketone body formation and utilization
- Urea cycle

## UNIT-V

12 Hours

**MINERAL METABOLISM**

- Definition, Classification. Sources, RDA, Functions and Deficiency of Calcium, Phosphorous, Iron, Sodium,Potassium

**CLINICAL BIOCHEMISTRY**

Normal and abnormal constituents of Urine and Blood and their clinical significance:

**Normal constituents:**

Organic: Urea, Uric acid, Creatinine

Inorganic: Ca, phosphate, chloride, electrolytes

**Abnormal constituents:**

Glucose, Ketone bodies, Protein, Blood, Bile salts, Bile pigments

## *RECOMMENDED BOOKS*

1. Essentials of Biochemistry by U.Satyanarayana.
2. Text book of Biochemistry for Medical students. DM Vasudevan
3. Integrated textbook of Biochemistry Volume –I and II. Indumathi.
4. Text book of Biochemistry for Medical students. M N Chatterjee and Rana Shinde.
5. Harper's Illustrated Biochemistry.
6. Essentials of Biochemistry. Pankaja Naik

# SOCIOLOGY

**(30 hours)**

**L/T/P/C**
**2/-/-/2**

**Learning Objectives**

At the end of the course, the student will be able to:

1. Understand the basic concepts, principles, and scope of sociology.
2. Explain the role of social factors in health, illness, and healthcare delivery.
3. Describe the structure and functions of family, community, and social groups.
4. Understand the influence of culture, socialization, and social change on health behavior.
5. Identify major social problems affecting individuals and communities.
6. Develop communication and interpersonal understanding required for healthcare practice.

**Learning Outcomes**

After successful completion of the course, the student will be able to:

1. Explain sociological concepts related to health and society.
2. Analyze the impact of social and cultural factors on health and disease.
3. Demonstrate understanding of family and community roles in healthcare.
4. Identify social problems and their influence on public health.
5. Apply sociological knowledge in patient care and healthcare communication.
6. Exhibit professional and socially responsible behavior in healthcare settings.

**SUBJECT DISCRIPTION** Sociology will introduce student to the basic sociology concepts, principles and social process, social institutions in relation to the individual, family and

community and the various social factors affecting the family in rural and urban communities in India will be studied.

**UNIT 1** 6 Hours

**1. Introduction:**

a. Meaning- Definition, Nature and Scope of Sociology
b. Methods of Sociological Investigations, Case Study, Social Survey, Questionnaire and Interview methods.
c. Importance of its study with special reference to Health Care Professionals.

**2. Social Factors in health and disease situations:**

a. Role of Social factors in health
b. Role of social factor in illness
c. Decision making in taking treatment

**UNIT-2** 6 Hours

**1. Socialization:**

a. Definition and Meaning of Socialisation
b. Primary, Secondary and Anticipatory socialisation
c. Agencies of Socialisation

**2. Social Groups:**

a. Definition and Features of Social Group
b. Primary Social Group
c. Secondary Social Group
d. The role of Primary and Secondary Groups in Hospitals.

**UNIT-3** 6 Hours

**1. Family:**

a. The family, meaning and definition
b. Functions of family
c. Changing family patterns
d. Influence of Family on the individuals health, the effects of sickness in the family.

**2. Community:**

a. Rural community: meaning and features- Health problems of rural community.
b. Urban community: meaning and features – Health problems in urbanities.

**UNIT-4** 6 Hours

**1. Culture and Health:**

a. Concept of Health
b. Concept of Culture
c. Cultural factors affecting Health and diseases

**2. Social Change:**

a. Meaning of social change
b. Factors of social change
c. Human adaptation and social change
d. Social planning and Health

**UNIT-5** 6 Hours

**1. Social Problems:**

a. Population explosion
b. Juvenile delinquency
c. Alcoholism
d. Unemployment
e. Poverty
f. Problems of women

**2. Social Security:**

Social security and social legislation

**Recommended Books:**

1. Principles of sociology ----------C.N. Shankar Rao
2. Sociology for physiotherapy students ------- K.P Neeraja

# ENGLISH AND COMMUNICATION SKILLS

**(30 hours)**

**L/T/P/C**
**1/-/2/2**

**Learning Objectives**

At the end of the course, the student will be able to:

1. Develop effective reading, writing, listening, and speaking skills in English.
2. Improve grammatical accuracy and vocabulary related to healthcare communication.
3. Enhance professional communication skills required in clinical and academic settings.
4. Learn techniques for formal writing including letters, emails, reports, and essays.
5. Develop confidence in interpersonal communication and public speaking.
6. Understand the importance of empathy, listening, and professional behavior in healthcare communication.

**Learning Outcomes**

After successful completion of the course, the student will be able to:

1. Communicate effectively in academic, professional, and healthcare environments.
2. Use appropriate grammar, vocabulary, and medical terminology in communication.
3. Draft formal letters, emails, reports, and professional documents accurately.
4. Demonstrate effective listening and speaking skills during patient and team interactions.
5. Participate confidently in discussions, presentations, and role plays.
6. Apply interpersonal and communication skills in patient care and healthcare teamwork.

## Course Objectives:

- To enhance the lexical and grammatical skills of the learners.
- To develop reading competencies for academic and professional requirements.
- To write effectively to meet professional needs.
- To hone speaking and listening skills.
- To enhance empathy and other vital interpersonal skills of the learners

| **UNIT 1: Sympathy (Poem) by Charles Mackay** | 6 Hours |
|---|---|
| Reading - Reading and its importance, techniques of effective reading.<br>Writing - Paragraph Writing (Topic sentence, Supporting sentences, and Conclusion)<br>Grammar - Parts of Speech (Parsing), Articles<br>Vocabulary - Pain and Symptoms, and Common Illness<br><br>**ELCS LAB**<br>CALL LAB: Phonetics - Vowel Sounds (Monophthongs and Diphthongs)<br>Listening - Introduction to listening, Purpose of Listening, and Barriers to effective listening<br>ICS LAB: Speaking - Self-introduction and Introducing others, JAM | |

| UNIT 2: A Birthday Letter by Jawaharlal Nehru | 6 Hours |
|---|---|
| Reading - Skimming and Scanning<br>Writing - Letter writing (Requests, Leave applications, Purchase letters, Letters in correspondence with medicalinsurance companies)<br>Grammar - Phrase, Clause and Sentence; Prepositions<br>Vocabulary - Body parts and diseases, Definitions / One-word substitutes<br><br>**ELCS LAB**<br>CALL LAB: Phonetics - Consonant Sounds<br>Listening - Listening for gist and specific information ICS LAB:<br>Speaking - Small talk, Narration of anecdotes | |
| UNIT 3: The secret of work by Swami Vivekananda | 6 Hours |

Reading - Making inferences and predictions
Writing - E-mail writing
Grammar - Tenses, Reported speech
Vocabulary - Food and lifestyle, Instruments and Equipment

**ELCS LAB**

CALL LAB: Intonation
Listening - Listening and identifying facts and opinions
ICS LAB: Speaking - Role Plays (OET) (Giving and taking instructions, Interacting with and explaining processes, conditions and instructions to the patients and their attenders,

| UNIT 4: All the world's a stage (Poem) by William Shakespeare | 6 Hours |
|---|---|

Reading - Reading for explicit and implicit meaning
Writing - Short essays: 2-Paragraph Essay, Thesis Statement
Grammar - Subject-Verb agreement, Degrees of Comparison
Vocabulary - Caring and Emotions, Medical Abbreviations and Acronyms

**ELCS LAB**

CALL LAB: Consonant Clusters
Listening - Listen- Comprehend - Speak , Health Care
ICS LAB: Speaking - Formal Discussions, Physical Description/Personality

| **UNIT 5: Sister Nivedita: Calcutta's Angel of Mercy (Article/Essay) by Monidipa Dey** | 6 Hours |
|---|---|

Reading - Intensive and Extensive Reading, Reading comprehension passages from OET and IELTS
Writing - Report writing (Analyzing tests and Reporting patient condition)
Grammar – Voice, If conditionals
Vocabulary - Health, Hygiene and Wellness, Medical Vocabulary/Terminology

**ELCS LAB**

CALL LAB: Past Tense Markers and Plural Markers
Listening - Listening tasks from OET and IELTS
ICS LAB: Speaking - Conversation practice, Short oral presentations specifying the condition of the patient

**COURSE OUTCOMES:**

- Construct grammatically correct sentences with appropriate vocabulary.
- Analyze, interpret and synthesize a diverse range of profession-specific concepts through better comprehension of the text.
- Draft various types of written communication pieces useful to their professional lives.

- Understand and apply norms of scientific communication, soft skills and positive interpersonal communication.
- Listen effectively and speak fluently in formal and informal situations, especially in their workplace.

**TEXTBOOK:**

1. English for nurses by Vijaya Laxmi Naidu. Nirali Prakashan. 2008.

**REFERENCE BOOKS:**

1. Practical English Usage by Michael Swan. OUP. 1995.
2. On Writing Well by William Zinsser, Harper Resource Book. 2001.
3. Cambridge English for nursing by Virginia Allum and Patricia Mc Garr. CUP. 2010.
4. English for nursing by Ross Wright and Bethany Cagnol. Pearson. 2001.
5. English for nursing-2 by Maris Spada Symonds and Ross Wright. Pearson. 2001.
6. Everyday English for International nurses by Joy Parkinson and Chris Brooker. Elsevier. 2004.
7. Oxford English for career Nurses by Tony Grice. Oxford University Press. 2007.

# BASICS OF COMPUTERS

**( 30 hours )**

**L/T/P/C**
**1/-/2/2**

**Learning Objectives**

At the end of the course, the student will be able to:

1. Understand the basic concepts, components, and functions of computers.
2. Learn the use of MS Word, MS Excel, and MS PowerPoint for academic and professional purposes.
3. Understand computer networks, internet applications, and email communication.
4. Develop skills in data entry, document preparation, and presentation creation.
5. Gain basic knowledge of artificial intelligence and machine learning applications in healthcare.
6. Apply computer knowledge for efficient management of healthcare and clinical information.

**Learning Outcomes**

After successful completion of the course, the student will be able to:

1. Identify and explain the basic hardware and software components of computers.
2. Create and manage professional documents, spreadsheets, and presentations using MS Office tools.
3. Utilize internet resources, email services, and search engines effectively.
4. Apply computer applications in data organization and healthcare documentation.
5. Demonstrate understanding of computer networking and digital communication systems.
6. Explain the role of artificial intelligence and machine learning in modern healthcare systems.

## COURSE OBJECTIVES:

1. To understand all components of computer, different working environments and operations ofcomputer.
2. To learn creating different types of word documents, MS Excel manipulations, Power pointdocuments.
3. To understand basic requirements of computer network hardware, software and itsnetwork architecture.

## UNIT – I

6 Hours

**Introduction to computers**--Definition of Computer-Characteristics of computer-Components of Computer Hardware – Input & Output devices- Memories– RAM and ROM– MB, GB their conversions – Software : Application Software and Systems software- Data and Information –Different computer languages- Number systems- Binary and decimal conversions.

## UNIT – II

6 Hours

**MS WORD:** Typing text in MS Word– Manipulating text¬– formatting text–using different font sizes, bold, italic– bullets and numbering –Pictures, Aligning the text and justify– choosing paper size– adjusting margins– header and footer, inserting page no's in a doc– printing a file with options– using spell check and grammar– find and replace– mail merge – insert tables in a document.

## UNIT – III

6 Hours

**MS EXCEL:** Creating MS Excel-Cell editing, using formulas and functions, manipulating data with excel– using sort function to sort numbers and alphabets– drawing graphs and charts using data in excel.

**MS POWERPOINT:** Slide transition and animation-slides with sounds– inserting clip arts– Pictures, tablesand graphs.

## UNIT – IV

6 Hours

**Introduction to Computer Networks**: Introduction, Computer Network Devices(Hubs, Switches, Routers, Gateway, Bridge, Modems, Wireless Access Points, Firewalls & NIC), Types of computer Networks (LAN, MAN & WAN), Network Topologies (Star, Ring, Mesh, Tree, Hybrid Topologies), Internet Based Applications, Advantages & Disadvantages of Computer Networks, E-Mail, Components of E-Mail, Attaching Files in E-mail, Different Search Engines.

## UNIT – V

6 Hours

**Introduction to Artificial Intelligence & ML:** History of AI, Sub Areas of AI, Applications of AI in Healthcare, Benefits of AI in Health Care, Challenges of AI in Healthcare, Introduction to MachineLearning, Applications of Machine Learning, Machine Learning Algorithms, Real world Machine Learning Use Cases.

## COURSE OUTCOMES:

At the end of the course the student will be able

1. To understand peripherals of the computer how it works and understand various languages ofthe computer.
2. To create any kind of presentations for presenting their knowledge anywhere in the form ofdocument or ppt.
3. To create excel sheets to save data and process the data efficiently.
4. To understand basic requirements of computer network hardware, software and itsnetwork architecture.

**REFERENCES:**


1. Computer Fundamentals by Goel, Anita Pearson
2. Computer Fundamentals : Concepts, Systems & Applications- 8th Edition by Priti Sinha, PradeepK., Sinha
3. MS-Office 2010 Training Guide by Prof. Satish Jain, M. Geetha
4. Computer Networks, Andrews S Tanenbaum, 5th Edition, Pearson Education
5. Artificial Intelligence : A modern Approach, Stuart J. Russell and Peter Norvig, Third Edition, PearsonEducation
6. Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow, Aurelien Geron-Oreilly, 2ndEdition.

# HUMAN ANATOMY - I Practical

**L/T/P/C**
**-/-/4/2**

Human anatomy practicals for physiotherapy students are essential for understanding the structure of the human body, its systems, and their functional relationships. These practicals focus on giving students hands-on experience in identifying anatomical structures, learning dissection techniques, and understanding the musculoskeletal, nervous, and cardiovascular systems, all of which are vital for effective physiotherapy practice.

## GROSS SPECIMENS/SPOTTERS

**Upper Extremity**

1. Identify the **spotter-** (Cross section of shoulder Joint, Elbow Joint, Wrist complex,Hand)
2. Identify the bone- UPPER EXTREMITY BONES (Scapula, Clavicle, Humerus, Radius and Ulna, Carpals, Metacarpals and Phalanges) Including side determination
3. **Surface Anatomy of the Upper Extremity** – UPPER EXTREMITY BONES AND MUSCLES

4. Myology- **(cadaveric spotter)** Spotters of the upper extremity muscles including the origin, insertion, blood and nerve supply
5. Spotters of Blood vessels (Profunda Brachii, Brachial, Radial, Ulnar)
6. Spotter of Nerves (Axillary, Musculocutaneous, Radial, Median, Ulnar)

**Structure and Parts of the Breast- Spotter**

**Cardio-vascular and Respiratory Anatomy**

1. Gross Specimen of Heart, Lung
2. Spotters of Bronchial tree, Bronchopulmonary segments
3. Myology- (Diaphragm, Intercoastal muscles and Accessory Muscles)

**Systemic Anatomy**

1. Gross Specimen/Spotter (Stomach, Liver, Gall Bladder, Spleen, Pancreas, Intestines,Kidney, Uterus)
2. Cross section of Kidney
3. Spotters of Glands- (Pituitary Gland, Thyroid gland, Adrenal gland, Parathyroid, Pineal Gland)

# HUMAN PHYSIOLOGY - I Practical

**L/T/P/C**
**-/-/4/2**

These practicals typically align with the theoretical aspects of physiology and help students apply concepts to real-world clinical scenarios. Key Areas Covered in Human Physiology for this semester includes the following.

1. Determination of blood group
2. Estimation of haemoglobin concentration
3. Peripheral pulse determination
4. Auscultation of Heart sounds
5. Determination of blood pressure
6. Auscultation of breathe sounds
7. Assessment of respiratory rate
8. Anthropometric assessment (BMI & WHR)

## Semester- II

1. Human Anatomy - II
2. Human Physiology - II
3. Health Psychology
4. Cardiac Instrumentation
5. Human Anatomy – II Practical
6. Human Physiology – II Practical
7. VAC 1. and VAC 2 (Interpersonal Communication and Stress Management)

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | Max. Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT | TOTAL |
| 1 | | Human Anatomy - II | 4 | - | - | 4 | 30 | 70 | 100 |
| 2 | | Human Physiology - II | 4 | - | - | 4 | 30 | 70 | 100 |
| 3 | | Health Psychology | 3 | - | - | 3 | 30 | 70 | 100 |
| 4 | | Cardiac Instrumentation | 3 | - | 2 | 4 | 30 | 70 | 100 |
| 5 | | Human Anatomy – II Practical | - | - | 3 | 1.5 | 30 | 70 | 100 |
| 6 | | Human Physiology – II Practical | - | - | 3 | 1.5 | 30 | 70 | 100 |
| 7 | VAC | Professionalism in the Workplace | 1 | - | - | 1 | 100 | - | 100 |
| 8 | VAC | Stress Management | 1 | - | - | 1 | 100 | - | 100 |
| **TOTAL** | | | **16** | **-** | **8** | **20** | **380** | **420** | **800** |

# HUMAN ANATOMY – II

**(60 hours)**

**L/T/P/C**
**4/-/-/4**

**Learning Objectives**

1. Understand the anatomy of the lower extremity, vertebral column, pelvis, head, neck, and nervous system.
2. Describe the structure and functions of bones, muscles, joints, nerves, and blood vessels of the lower limb.
3. Explain the anatomy of the vertebral column and pelvic girdle with clinical relevance.
4. Understand the gross anatomy of the brain, spinal cord, cranial nerves, and sensory organs.
5. Correlate neuroanatomy with functional and clinical applications.
6. Develop practical skills in identifying anatomical structures using cadavers, models, and radiographs.

**Learning Outcomes**

1. Identify and describe anatomical structures of the lower extremity and vertebral column.
2. Explain the organization and functions of the nervous system and cranial nerves.
3. Correlate anatomical knowledge with movement, posture, and clinical conditions.
4. Interpret anatomical structures in radiological and clinical images.
5. Demonstrate competency in identifying neuroanatomical and musculoskeletal structures during practical sessions.
6. Apply anatomical knowledge in clinical and cardiovascular technology practice.

## COURSE DESCRIPTION:

The focus of this course is an in-depth study and analysis of the regional and systemic organization of the body. Emphasis is placed upon structure and function of human movement. A comprehensive study of human anatomy with emphasis on the nervous, musculoskeletal and circulatory systems is incorporated. Introduction to general anatomy laysthe foundation of the course. Dissection and identification of structures in the cadaver supplemented with the study of charts, models, prosected material and radiographs are utilized to identify anatomical landmarks and configurations.

## Objectives:

*At the end of the course, the student will be able to*

- Identify & describe Anatomical aspects of muscles, bones,joints, their attachments & to understand and analyze movements.
- Apply the knowledge of anatomy on the living (living anatomy).
- Identify and describe the course of peripheral nerves and blood vessels
- Obtain Knowledge of other systems & sensory organs

## SYLLABUS

### UNIT-I 12 Hours

**LOWER EXTREMITY:**

1. Osteology including features, side determination, muscular attachment, clinical and applied anatomy of the following lower extremity bones

   Innominate bone, femur, tibia, fibula, patella, tarsals, metatarsals and phalanges.

2. Myology: Origin, insertion, nerve supply, action, function, clinical and applied anatomy
   - Anterior compartment of thigh, Medial compartment and Posterior compartment
   - Gluteal Region
   - Anterior aspect of leg, medial and lateral aspect, Posterior aspect of leg
   - Dorsum of foot

### UNIT-II 12 Hours

**LOWER EXTREMITY:**

1. Arthrology: Joint structure, articulating components, relations, joint actions, Clinical and Applied Anatomy including Radiography
2. Hip Joint, Knee joint, Ankle joint, joints of the foot.
3. Femoral triangle, femoral canal and inguinal canal, Adductor canal, popliteal fossa, arches of foot
4. Lumbar plexus, Sacral plexus, Nerves of the Lower Extremity including cutaneous Nerves
5. Blood vessels and lymphatic drainage

## UNIT-III

12 Hours

**VERTEBRAL COLUMN AND PELVIC GIRDLE:**

1. Atypical and typical vertebra
2. Structure and features of Cervical, thoracic, lumbar, sacral and coccygeal vertebrae
3. Origin, insertion, nerve supply and actions of pre and para vertebral muscles
4. Muscles of Trunk and Abdomen
5. Core muscle Anatomy
6. Joints of vertebral column, structure and composition of intervertebral disc including the Radiography Evaluation
7. Joint structure, articulating components, relations, joint actions, Clinical and Applied Anatomy including Radiography of Sacro- Iliac joint
8. Structure of Innominate bone Pelvic girdle and muscles of the pelvic floor including Applied Anatomy

## UNIT-IV

10 Hours

**HEAD AND NECK:**

1. Bones of the skull and face
2. Muscles of the face and neck
3. Triangles of the neck
4. Gross anatomy of eyeball, nose, ears and tongue

## UNIT-V

14 Hours

**NEURO ANATOMY:**

1. General organization of Nervous System
2. Central Nervous System-Gross structure of Brain and Spinal Cord
3. Diencephalon- Gross structure of Thalamus, Hypothalamus and Basal Ganglia
4. Meninges and Coverings of spinal cord
5. Cerebro-Spinal Fluid and ventricles of brain
6. Spinal Cord- Segmental features, Laminae, Nuclei, Tracks of spinal cord
7. Spinal nerves, nerve root ganglia
8. Blood supply to brain and spinal cord with clinical and applied anatomy
9. Peripheral Nervous system
10. Cranial nerves- Course and applied AnatomNeuromuscular junction

***RECOMMEMDED TEXT BOOKS***

1. Human Anatomy – Snell
2. Anatomy- Chaurasia, Volume- I,II & III
3. Neuro anatomy -- Inderbir Singh
4. Human Anatomy – Kadasne, Volume- I,II & III
5. Neuroanatomy -- Vishrsam Singh
6. Human Anatomy – Datta

# HUMAN PHYSIOLOGY-II

**( 60 hours)**

**L/T/P/C**
**4/-/-/4**

**Learning Objectives**

1. Understand the physiology of the nervous, endocrine, reproductive, gastrointestinal, and excretory systems.
2. Explain the mechanisms of sensory and motor functions in the nervous system.
3. Describe the physiology of special senses including vision, hearing, taste, and smell.
4. Understand hormonal regulation and functions of endocrine glands.
5. Explain reproductive physiology, pregnancy, and lactation.
6. Develop understanding of renal physiology, digestion, and fluid-electrolyte balance.

**Learning Outcomes**

1. Explain physiological functions of the nervous and endocrine systems.
2. Interpret mechanisms involved in sensory perception and motor control.
3. Describe hormonal regulation and reproductive physiology.
4. Apply physiological concepts to understand gastrointestinal and renal functions.
5. Correlate physiological mechanisms with common clinical disorders.
6. Perform and interpret basic physiology practical examinations accurately.

## COURSE DESCRIPTION

The course in Physiology over the first year is designed to give the student an in-depth knowledge of fundamental reactions in the human body. The major topics covered include the following: Nervous system, special senses, reproductive system, endocrine system, gastro-intestinal and excretory.

### Objectives:

At the end of the course, the candidate will be able to

- Describe physiological functions of various systems, with special reference to nervous system
- Acquire the skill of basic clinical examination, with special emphasis to Peripheral & Central Nervous system, special senses.

# SYLLABUS

## UNIT-I

12 Hours

### NERVOUS SYSTEM-I

1. Introduction to nervous system - CNS, PNS and ANS
2. Neurotransmitters - Definition, fate of neurotransmitter, types
3. Synapse - Definition, type, structure, transmission of impulse across a synapse, properties.
4. Receptors and Sensation - Types of sensations, Classification of receptors, properties
5. Sensory System - Organization of the sensory system, sensory Homunculus
6. Ascending Tracts - Definitions, Neuronal composition of ascending tracts, dorsal column, anterolateral tract
7. Pathophysiology of pain - Definitions, hyperalgesia and allodynia, deep pain, referred pain and it's theories, management of chronic pain, endogenous opioid analgesic system
8. Motor Cortex - Cerebrum, cortical areas of brain, motor homunculus, cerebral dominance, connections, mapping the functional areas of brain
9. Descending Tracts - Pyramidal system, extrapyramidal system

## UNIT-II

12 Hours

### NERVOUS SYSTEM-II

1. Spinal cord - Introduction, effects of complete transection of the spinal cord, effects of hemisection of the spinal cord(Brown-Sequard Syndrome)
2. Reflexes - Reflex action, reflex arc, classification, properties, types - conditioned reflex, stretch reflex, inverse stretch reflex, withdrawal reflex, crossed extensor reflex, superficial reflexes(Plantar & Abdominal)
3. Connections, Functions and applied aspect of thalamus, hypothalamus, cerebellum, basal ganglia
4. Regulation of tone, Posture and it's reflexes, Equilibrium and vestibular apparatus
5. Limbic system, Reticular Activating System, Sleep and it's types, sleep disorders, Electroencephalogram (EEG)
6. Higher Functions - Learning, Memory,Speech
7. Autonomic Nervous System - Sympathetic division, Parasympathetic division, control of autonomic functions

8. Cerebrospinal fluid - Formation and circulation, composition and properties, functions, applied aspect - Hydrocephalus, lumbar puncture

## UNIT-III

12 Hours

**SPECIAL SENSES:**

1. Vision - Anatomy of eye, visual pathway, pupillary reflexes, dark adaptation, light adaptation, photosensitivity
2. Hearing - Anatomy of ear, auditory pathway, tests for hearing - Watch test, Rinne's test, Weber's test, deafness, Audiometry
3. Taste and Smell: Taste sensations, taste pathway, olfactory pathway

**ENDOCRINOLOGY:**

1. Hormones - Definition, types, hormonal chemistry, regulation, hormone receptor, mechanism of action
2. Secretion, regulation, function and applied aspect of Hypothalamus, Pituitary Gland, Thyroid Gland, Parathyroid Gland, Pancreas, Adrenal Gland.

## UNIT-IV

12 Hours

**REPRODUCTIVE SYSTEM:**

1. Sex determination and differentiation & it's abnormalities, puberty, importance of sex hormones
2. Female reproductive system - Internal & external genital organs, Oogenesis, Structure of egg, Follicle development, ovulation, menstrual cycle, menopause
3. Male reproductive system - Testes, accessory sex organs, Spermatogenesis, structure of sperm
4. Physiology of pregnancy - Fertilization, Implantation, Placenta(formation, function, hormones), maternal changes during pregnancy, pregnancy tests, infertility 5. Childbirth Physiology - Parturition, Lactation

## UNIT-V

12 Hours

**GASTROINTESTINAL SYSTEM:**

1. Physiological stages of digestion
2. Liver function

**EXCRETORY SYSTEM:**

1. Kidneys-structure & function
2. Urine formation (to exclude concentration and dilution)
3. Juxtaglomerular apparatus
4. Fluid and electrolyte balance – Na, K, $H_2O$
5. Neural control of Micturition and diuresis
6. Applied physiology: Types of bladder

***RECOMMENDED TEXT BOOKS***

1. Text book on Medical Physiology – Guyton
2. Textbook of Physiology – A K Jain

# HEALTH PSYCHOLOGY

**( 45 hours)**

**L/T/P/C**
**3/-/-/3**

**Learning Objectives**

1. Understand the basic concepts, principles, and branches of psychology.
2. Explain human growth, development, motivation, emotions, and personality.
3. Understand the role of psychology in health and patient care.
4. Learn the concepts of learning, intelligence, perception, and behavior.
5. Identify stress, frustration, conflict, and coping mechanisms.
6. Develop interpersonal and communication skills required in healthcare settings.

**Learning Outcomes**

1. Explain psychological concepts related to human behavior and development.
2. Analyze the role of psychological factors in health and illness.
3. Apply learning and motivational theories in patient interaction and healthcare practice.
4. Identify emotional and personality factors affecting patient care.
5. Demonstrate effective communication and interpersonal skills.
6. Apply psychological principles in professional healthcare environments.

## SUBJECT DESCRIPTION

Human Psychology involves the study of various behavioural patterns of individuals, theories of development, normal and abnormal aspects of motor, social, emotional and language development, communication and interaction skills appropriate to various age groups. The study of these subjects will help the student to understand their clients while assessment and while planning appropriate treatment methods.

## Objectives:

At the end of the course, the candidate will be able to:

- Define the term Psychology & its importance in the Health delivery system, & will gain knowledge of Psychological maturation during human development & growth & alterationsduring aging process.
- Understand the importance of psychological status of the person in health & disease;environmental & emotional influence on the mind & personality.
- Have the knowledge and skills required for good interpersonal communication.

## SYLLABUS

## UNIT – I

9 Hours

### 1. Introduction to Psychology

a) Schools: Structuralism, functionalism, behaviourism, Psychoanalysis.
b) Methods: Introspection, observation, inventory and experimental method.
c) Branches: pure psychology and applied psychology
d) Psychology and physiotherapy

### 2. Growth and Development

a) Life span: Different stages of development (Infancy, childhood, adolescence, adulthood, middle age, old age).
b) Heredity and environment: role of heredity and environment in physical and psychological development, “Nature v/s Nurture controversy”.

## UNIT – II

9 Hours

**1. Sensation, attention and perception**

a) Sensation: Vision, Hearing, Olfactory, Gustatory and Cutaneous sensation, movement, equilibrium and visceral sense.

b) Attention: Types of attention, Determinants of attention (subjective determinants and objective determinants).

c) Perception: Gestalt principles of organization of perception (principle of figure ground and principles of grouping), factors influencing perception (past experience and context).

d) Illusion and hallucination: different types.

**2. Motivation**

a) Motivation cycle (need, drive, incentive, reward).

b) Classification of motives.

c) Abraham Maslow's theory of need hierarchy

## UNIT – III

9 Hours

**1. Frustration and conflict**

a) Frustration: sources of frustration.
b) Conflict: types of conflict.

c) Management of frustration and conflict

**2. Emotions**

a) Three levels of analysis of emotion (physiological level, subjective state, and overt behavior).

b) Theories of emotion

c) Stress and management of stress.

**3. Intelligence**

a) Theories of intelligence.

b) Distribution of intelligence.

c) Assessment of intelligence

## UNIT – IV

9 Hours

**1. Learning**

a) Factors effecting learning.
b) Theories of learning: trial and error learning, classical conditioning, Operant conditioning, insight learning, social learning theory.
c) The effective ways to learn: Massed/Spaced, Whole/Part, Recitation/Reading, Serial/Free recall, Incidental/Intentional learning, Knowledge of results, association, organization, and mnemonic methods.

**2. Thinking**

a) Reasoning: deductive and inductive reasoning
b) Problem solving: rules in problem solving (algorithm and heuristic)
c) Creative thinking: steps in creative thinking, traits of creative people

## UNIT – V

9 Hours

**1. Personality**

a) Approaches to personality: type & trait, behavioristic, psychoanalytic and humanistic approach.
b) Personality assessment: observation, situational test, questionnaire, rating scale, interview, and projective techniques.

c) Defence Mechanisms: denial of reality, rationalization, projection, reaction formation, identification, repression, regression, intellectualization, undoing, introjection, acting out.

## *Recommended books:*


1. Invitation to Psychology - Beena and Paremeshwaran.
2. General Psychology - S.K.Mangal.
3. Introduction to Health Psychology - Shelly E.Taylor.
4. Introduction to Psychology - Atkinson and Hilgard.
5. Introduction to Psychology - Morgan and king.
6. Psychology applied to modern life - Wayne Weiten Margareta L. Lord.
7. Psychology and Sociology for GNM and BPT student - Jacob Anthikad

# CARDIAC INSTRUMENTATION

**(45 hours)**

**L/T/P/C**
**3/-/2/4**

**Learning Objectives**

1. Understand the principles and working of biomedical instruments used in cardiology.
2. Explain the types and applications of transducers, electrodes, and amplifiers.
3. Learn the measurement and recording of physiological signals such as ECG and blood pressure.
4. Understand the principles and applications of pacemakers and defibrillators.
5. Explain the basics of ultrasound, echocardiography, and heart-lung machines.
6. Develop basic technical knowledge of modern cardiovascular diagnostic equipment.

**Learning Outcomes**

1. Identify and explain the components and functions of cardiac instrumentation systems.
2. Demonstrate understanding of physiological signal acquisition and measurement techniques.
3. Explain the operation and applications of ECG, pacemakers, and defibrillators.
4. Apply knowledge of ultrasound and echocardiography in cardiovascular diagnostics.
5. Interpret the basic functioning of heart-lung machines and imaging modalities.
6. Utilize cardiac instrumentation knowledge in clinical and healthcare technology practice.

**UNIT I:** 9 Hours

TRANSDUCERS: Classification & Selection of transducers, Types: Pressure transducers: Resistive strain gauge, capacitance, Inductance and piezoelectric transducers; Photoelectric transducers: Photoconductive transducers

**UNIT II:** 9 Hours

ELECTRODES & AMPLIFIERS: Principles of working and their characteristics, Half-cell potential, Types of electrodes: Surface electrodes, needle electrodes & microelectrodes; Amplifiers for biomedical instrumentation.

**UNIT III:** 9 Hours

PHYSIOLOGICAL SIGNALS & MEASUREMENTS: Basics of ECG, PCG and Instrumentation for measuring these signals, Measurement of blood pressure, Measurement of blood flow by Electromagnetic & Doppler methods.

**UNIT IV:** 9 Hours

CARDIAC PACEMAKERS: External and Implantable pacemakers, Types oftriggering: Asynchronous and Synchronous, Pacemaker Electrodes.

**Defibrillators:** AC and DC defibrillators, Types of electrodes and their features, cardioverters.

**UNIT V:** 9 Hours

ULTRASOUND: Basic principles of Ultrasound, Principles of echocardiography.
Heart-Lung Machine: Principle of working, Functional details of bubble, thin film& Membrane oxygenators. Principles of X-rays, CT & MRI.

**Reference books:**

Biomedical instrumentation, technology and application. R.S Chandpur

# HUMAN ANATOMY PRACTICAL – II

**L/T/P/C**
**-/-/3/1.5**

**GROSS SPECIMENS/SPOTTERS**
**SPINE, PELVIS AND LOWER EXTREMITY**

7. Identify the **spotter**- Osteology- Identify the bone, LOWER EXTREMITY BONES (Innominate bone, femur, tibia, fibula, patella, tarsals, metatarsals and phalanges.) Including side determination, Spinal Segments, Vertebrae (Cervical, Thoracic, Lumbar,
   Sacral and Coccyx), Pelvis and Innominate Bones
8. **Surface Anatomy of the Spine and Lower Extremity** –Atlas, Axis, C-7 vertebrae, Spinous and Transverse process of vertebra, Locate the Innominate bone, ASIS and PSIS, Coccyx, Sacrum, Greater Trochanter, Condyles of femur, Patella, Tibial Tubercles and condyles, Shin Bone, Tarsal bones, Malleoli
9. Myology- **(cadaveric spotter)** Spotters of the lower extremity muscles including the origin, insertion, blood and nerve supply
10. Arthrology- (Cross section of Hip Joint, Knee Joint, Ankle Joint, Joints of Foot, Pelvic Joints, Joints of Spine, Intervertebral Joints, Facet Joints, Sacro-Iliac Joints)
11. Abdominal muscles, Pre and para vertebral muscles, pelvic floor muscles
12. Popliteal Fossa, Inguinal Canal, Arches of foot
13. Spotters of Blood vessels

**NEURO-ANATOMY**
**IDENTIFY THE SPOTTER**

1. Cross Section of the Skull, Sinuses of skull,
2. Muscles of the skull and face
3. Triangles of the neck

**SYSTEMIC ANATOMY**

1. Gross Specimen/Spotter (Brain and Spinal Cord)
2. Cross section of brain and spinal cord
3. Identify the spinal nerves
4. Cranial Nerve

## HUMAN PHYSIOLOGY PRACTICAL – II

L/T/P/C
-/-/3/1.5

1. Examination of superficial sensations
2. Examination of deep sensations
3. Examination of cortical sensations
4. Examination of reflexes
5. Cranial nerve examination
6. Examination of Balance and coordination

## PROFESSIONALISM IN THE WORKPLACE

L/T/P/C
1/-/-/1

## STRESS MANAGEMENT

L/T/P/C
1/-/-/1

# SECOND YEAR

## Semester – III

1. Cardiac Anatomy and Physiology
2. ECG and Holter Monitoring
3. Medical Microbiology
4. Pathology
5. Clinical Assessment-I
6. VAC (Soft Skills Development)

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | Max. Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT | TOTAL |
| 1 | | Cardiac Anatomy and Physiology | 4 | - | 2 | 5 | 30 | 70 | 100 |
| 2 | | ECG and Holter Monitoring | 4 | - | 2 | 5 | 30 | 70 | 100 |
| 3 | | Medical Microbiology | 3 | - | 2 | 4 | 30 | 70 | 100 |
| 4 | | Pathology | 3 | - | - | 3 | 30 | 70 | 100 |
| 5 | | Clinical Assessment - I | 2 | - | 4 | 4 | 30 | 70 | 100 |
| 6 | VAC | Health and Well-being | 1 | - | - | 1 | 100 | - | 100 |
| **TOTAL** | | | **17** | | **10** | **22** | **250** | **350** | **600** |

# CARDIAC ANATOMY AND PHYSIOLOGY

**(60 Hours)**

**L/T/P/C**
**4/-/2/5**

**Learning Objectives**

1. Understand the anatomy and physiology of the heart and circulatory system.
2. Describe the structure, blood supply, and innervation of the heart.
3. Explain cardiac cycle, cardiac output, and blood pressure regulation.
4. Understand fetal circulation and physiological changes in cardiac disorders.
5. Correlate anatomical and physiological concepts with cardiovascular diseases.
6. Develop basic clinical skills in cardiovascular assessment and interpretation.

**Learning Outcomes**

1. Identify and describe the anatomical structures of the heart and great vessels.
2. Explain physiological mechanisms involved in cardiac function and circulation.
3. Interpret cardiac cycle events, heart sounds, and blood pressure changes.
4. Correlate physiological abnormalities with common cardiovascular diseases.
5. Demonstrate competency in cardiovascular assessment procedures.
6. Apply cardiac anatomy and physiology knowledge in clinical cardiovascular technology practice.

**COURSE OBJECTIVES:**

1. To familiarize and introduce students to intense anatomical features of the heart and physiological changes during various pathological conditions.
2. To provide an understanding of certain conditions involving the dynamics of cardiac physiology.

## UNIT – I Anatomy of Heart

12 Hours

Structure of Pericardium – Layers of pericardium, blood supply, nerve supply.
External and Internal features of heart – surfaces and borders of heart, atria and ventricles, inter atrial septum and inter ventricular septum.

## UNIT – II Structures of Heart

12 Hours

Great vessels of heart Aorta and its branches, pulmonary trunk, Superior and Inferior Vena Cava
Atrioventricular valves and semilunar valves.
Musculature of heart – properties of cardiac muscle.
Systemic and pulmonary Circulation.

## UNIT – III

12 Hours

Blood supply of heart – coronary circulation
Venous drainage of heart
Fetal Circulation of Heart.
Innervation of heart – Parasympathetic and sympathetic nerve supply.

## UNIT – IV

12 Hours

Cardiac cycle – Heart sounds, Murmurs of Heart.
Conduction system of heart – Factors affecting Heart Rate
Cardiac output, factors influencing cardiac output, methods to calculate cardiac output

## UNIT – V

12 Hours

Circulatory shock.

Blood pressure – methods, factors affecting blood pressure.

Applied Anatomy and physiology – Myocardial infarction, hypertension, Bradycardia, tachycardia, Regurgitation of valves.

## PRACTICALS:

Blood pressure measurement with sphygmomanometer

Auscultation of heart sounds and interpretation

Demonstration of Coronary arteries using cadaver heart

Analysis and interpretation of physiological condition fluctuation during cardiac pathologies

## REFERENCES:

1. BD Chaurasia's Handbook of General Anatomy, B.D.Chaurasia, 2009, fourth edition.

2. Ross and Wilson Anatomy and Physiology in Health and Illness, Anne Waugh, Allison Wynn Grant, 2015, 12th edition

3. Basics of Medical Physiology D Venkatesh, H.H. Sudhakar, Third Edition

# ECG AND HOLTER MONITORING

**(60 hours)**

**L/T/P/C**
**4 - 2 5**

**Learning Objectives**

1. Understand the basic principles and components of electrocardiography.
2. Learn ECG lead systems, waveforms, intervals, and electrical axis.
3. Understand ECG changes associated with cardiac diseases and arrhythmias.
4. Explain ECG interpretation in coronary artery disease and conduction abnormalities.
5. Understand the principles and indications of Holter monitoring.
6. Develop practical skills in ECG recording and interpretation.

**Learning Outcomes**

1. Identify normal ECG waveforms, intervals, and cardiac rhythms.
2. Interpret ECG findings in arrhythmias, myocardial infarction, and conduction defects.
3. Demonstrate proper ECG lead placement and patient preparation techniques.
4. Analyze ECG changes in various cardiovascular conditions.
5. Explain the role and interpretation of Holter monitoring.
6. Apply ECG knowledge in cardiovascular diagnostic procedures and patient care.

**COURSE OBJECTIVES:**

1. To familiarize and introduce students to intense anatomical features of the heart and physiological changes during various pathological conditions.
2. To provide an understanding of certain conditions involving the dynamics of cardiac physiology.

**UNIT I:** 12 Hours

**ECG-** Basic principles –The electrocardiographic paper; amplitude, frequency, rate & rhythm , the electrical field of heart, the leads; standard limb leads ; precordial leads , the basic ECG deflections; the normal P wave , QRS complex, the genesis of QRS complex, transition zone, T wave , U wave, Segments and intervals of waves, rotation of heart , electrical Axis

**ECG in CAD** – Myocardial infarction, types of MI, STEMI, NSTEMI, ischemic Acuteness score, Localisation of MI, wellen’s syndrome

**UNIT II:** 12 Hours

**ECG in Angina** -angina syndromes- stable angina, unstable angina, prinzmetal angina.
**ECG in Bundle branch blocks-** Right bundle branch blocks, left bundle branch blocks, fascicular blocks.

**UNIT III:** 12 Hours

**Chamber enlargement –** left atrial Enlargement, Right atrial enlargement **Hypertrophy-** Right ventricular hypertrophy, Left ventricular hypertrophy

**UNIT IV:** 12 Hours

Arrhythmias: Atrial arrhythmia- Atrial fibrillation, Atrial flutter, Atrial Premature complex, atrial Tachycardia and Supraventricular tachycardia.
Ventricular Arrhythmias- Atrial fibrillation, Atrial flutter, Atrial Premature complex, atrial Tachycardia, Brugada criteria.
AV nodal arrhythmias, Pacemaker rhythm

**UNIT V:** 12 Hours

ECG in miscellaneous conditions: cardiomyopathies, Pericarditis, Myocarditis, pulmonary thromboembolism, ECG in electrolyte imbalance
Brugada syndrome, Basics of Holter test- indications and interpretation.

**PRACTICALS:**

Machine setting and patient positioning
ECG lead placement
ECG interpretation (identifying deflection, heart rate, rhythm, electrical axis deviation)
ECG in coronary artery disease
ECG in chamber abnormalities (bundle branch blocks, ventricular hypertrophy, atrial enlargement)
ECG in conduction abnormalities **References:**

1. 2. An introduction to electrocardiography – Leoschamroth, 8th edition The
ECG made easy John R Hampton 8th edition

# MEDICAL MICROBIOLOGY

**( 45 hours)**

**L/T/P/C**
**3/-/2/4**

**Learning Objectives**

1. Understand the basic concepts and principles of microbiology and immunology.
2. Describe the morphology, growth, and classification of microorganisms.
3. Explain host-pathogen interactions and mechanisms of infection transmission.
4. Understand common microbial diseases affecting different body systems.
5. Learn infection control practices, sterilization, and biomedical waste management.
6. Develop knowledge of antimicrobial agents and diagnostic microbiological techniques.

**Learning Outcomes**

1. Identify common microorganisms and their clinical significance.
2. Explain mechanisms of infection, immunity, and disease transmission.
3. Apply microbiological principles in infection prevention and control.
4. Interpret the role of microorganisms in respiratory, cardiovascular, gastrointestinal, and systemic infections.
5. Demonstrate understanding of sterilization and hospital infection control measures.
6. Apply microbiology knowledge in healthcare and cardiovascular technology practice.

**UNIT I:** 9 Hours

GENERAL MICROBIOLOGY

Introduction and History of Microbiology, Microscopy, Morphology of Bacteria, Bacterial Growth

Curve and Multiplication, Culture Media & Culture Methods, Sterilization and Disinfection,

UNIT II: 9 Hours

HOST- PATHOGEN - INFECTION

Normal Human Microbiota, Infection & related terminology, Host-Parasitic Relationship,

Source of Infection, Vehicles and Vectors, the transmission of infection, microbial

pathogenicity & Predisposing factors , factors responsible for the multiplication of

pathogens.

HOSPITAL INFECTION & PREVENTION

Hospital infection & Microbial surveillance: Personal Protective Equipment, Biomedical Waste

Management, Central Sterile Supply Department, Infection Control & its policy, Antibiotic

stewardship in health care centre; Needle stick injury, Post exposure prophylaxis.

UNIT III: 9 Hours

RESPIRATORY INFECTIONS

Bacterial : Streptococcal Pharyngitis, Diphtheria, Tuberculosis
Viral infections: Influenza, Covid-19.

Fungal infections: Zygomycosis, Aspergillosis

UROGENITAL &SEXUALLY TRANSMITTED DISEASES

Syphilis,

Gonorrhea HIV.

**UNIT IV:** 9 Hours

Classification of Viruses,
Identification of viruses and lab, diagnosis, antiviral agents, Pox Viruses,
Herpes,
Arbo Viruses, Hepatitis Viruses.
Retro virus – HIV,

**UNIT V:** 9 Hours

BLOOD & CARDIOVASCULAR INFECTIONS

Infective endocarditis, Acute rheumatic fever

Malaria, Dengue, Enteric fever.

Bacterial Meningitis, Tetanus

Rabies

**REFERENCE**

1. 2. 3. 4. 5. 6. Ananthanarayana & Paniker Medical Microbiology- University Press
Essentials of Medical Microbiology, Apurba Shankar Sastry.
CP Baveja, Textbook of Microbiology,
Chatterjee- Parasitology- Interpretation to Clinical Medicine Jagdish
Chandra, Textbook of Mycology.
Betty Forbes, Daniel Sahm, Alice Weinfield, Bailey-Scott's Diagnostic Microbiology, 12th Edition, Mosby. 2007.
7. Gerald Collee J, Andrew G Fraser, Barrie P Marmion, Mackie and McCartney's Practical Medical Microbiology, Elsevier.2006.
8. Elmer W Koneman etal. Koneman's Color Atlas and Text-Book of Diagnostic Microbiology 6thEdition, Lippincott Williams and Wilkins,2005

# PATHOLOGY

**(45 hours)**

**L/T/P/C**
**3/-/-/3**

**Learning Objectives**

1. Understand the basic mechanisms of disease and cellular responses to injury.
2. Describe inflammation, hemodynamic disorders, infections, and neoplasia.
3. Explain pathological changes affecting major organ systems.
4. Understand hematological disorders and blood transfusion principles.
5. Learn the basics of clinical pathology and laboratory diagnostic techniques.
6. Correlate pathological findings with clinical conditions and disease progression.

**Learning Outcomes**

1. Explain pathological processes involved in disease development.
2. Identify pathological changes in cardiovascular, respiratory, gastrointestinal, and other systems.
3. Interpret basic hematological and clinical pathology investigations.
4. Demonstrate understanding of blood banking and transfusion procedures.
5. Apply pathology knowledge in disease diagnosis and patient care.
6. Correlate laboratory findings with clinical and cardiovascular disorders.

## Unit-I (Basics in general pathology) 9 Hours

**Cell injury**: agents causing cell injury, cellular adaptations (hypertrophy, atrophy, hyperplasia, metaplasia) reversible and irreversible injury.

**Inflammation**: cardinal signs of inflammation, acute and chronic inflammation. Laboratory tests in inflammation.

**Hemodynamics**: edema, thromboembolism, shock

**Neoplasia:** definition of neoplasm, differences between benign and malignant tumors, carcinogenesis

**Infections:** tuberculosis, leprosy

## Unit-II (Basics in systemic pathology) 9 Hours

**CVS**: Atherosclerosis and its complication, Myocardial infarction.

**Respiratory system;** pneumonia, Lung cancer

**GIT:** peptic ulcer, gastric cancer

**Liver:** viral hepatitis, Gall stones

**Kidney:** UTI, Urinary stones

**CNS:** meningitis

**Breast:** Fibro adenoma, breast carcinoma

**Unit-III (Basics in Hematology and blood banking)** 9 Hours

Hematopoiesis

**RBC's**: Definition of anemia, Classification and diagnosis of anemia.

Brief concept about Iron deficiency anemia, Sickle cell anemia.

Leukocyte disorder-briefly leukemia, leukocytosis, and agranulocytosis.

Bleeding disorder- definition, classification and Brief concept about Immune

**Blood Transfusion:** Blood groups, Cross matching, types of Blood components & Indications, Blood Transfusion reactions.

**Unit-IV (Clinical Pathology)** 9 Hours

**Examination of Urine**- Collection and Preservation, Physical, Chemical and microscopic examination for abnormal constituents.

Examination of CSF

Sputum examination

**Unit-V (Techniques in Pathology)** 9 Hours

Blood collection, Hemoglobin estimation, ESR & PT/APTT.

RBC Count, WBC Count and Differential Leucocyte count

Basics in tissue processing.

FNAC, staining techniques (H&E stain and Pap stain).

**Reference textbooks**

1. Textbook of Pathology by Harsh Mohan
2. Text and practical of Haematology for mbbs by Tejinder Singh
3. Essentials of Clinical pathology by Shirish M Kawthalkar 4. Textbook of practical pathology by Harsh Mohan

## CLINICAL ASSESSMENT - I

**L/T/P/C**
**2/-/4/4**

**Theory and Practicals**

Demonstration of anatomical features through cadaver heart

Demonstration of coronary arteries and their location

Demonstration of Auscultation in heart sounds

Physiology of Cardiovascular system.

Introduction and interpretation of ECG

ECG in Coronary artery disease

ECG in electrolyte imbalance

ECG in arrhythmia

Case seminars

Hands On practice on ECG

## HEALTH AND WELL-BEING

L/T/P/C
1/-/-/

## Semester – IV

1. Ultrasound physics and Doppler Principles
2. Congenital Heart Disease I
3. Basics of Echocardiography and cardiac pacemakers
4. Medical ethics and legal aspects
5. Clinical Assessment-II
6. VAC (Health and Well Being)

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | Max. Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT | TOTAL |
| 1 | | Ultrasound physics and Doppler Principles | 3 | - | 2 | 4 | 30 | 70 | 100 |
| 2 | | Congenital Heart Disease I | 3 | - | 2 | 4 | 30 | 70 | 100 |
| 3 | | Basics of Echocardiography and cardiac pacemakers | 4 | - | 2 | 5 | 30 | 70 | 100 |
| 4 | | Medical ethics and legal aspects | 2 | - | 2 | 3 | 30 | 70 | 100 |
| 5 | | Clinical assessment II | 2 | - | 4 | 4 | 30 | 70 | 100 |
| 6 | VAC | Environment awareness | 1 | - | - | 1 | 100 | - | 100 |
| **TOTAL** | | | **16** | **-** | **12** | **21** | **250** | **350** | **600** |

# ULTRASOUND PHYSICS AND DOPPLER PRINCIPLES

**(45 hours )**

L/T/P/C
3/-/2/4

**Learning Objectives**

1. Understand the basic principles and physics of ultrasound and echocardiography.
2. Learn different echocardiographic modalities including M-mode, 2D, Doppler, and color Doppler.
3. Understand normal cardiac anatomy and function through echocardiographic imaging.
4. Explain echocardiographic findings in valvular, congenital, and ischemic heart diseases.
5. Develop knowledge of transesophageal and stress echocardiography techniques.
6. Develop practical skills in patient preparation and echocardiographic image acquisition.

**Learning Outcomes**

1. Explain the principles and applications of echocardiography in cardiac diagnosis.
2. Identify normal and abnormal cardiac structures using echocardiographic techniques.
3. Interpret basic echocardiographic findings in common cardiovascular diseases.
4. Demonstrate competency in echocardiography patient preparation and assistance.
5. Apply Doppler and color flow imaging concepts in cardiovascular assessment.
6. Utilize echocardiography knowledge in clinical cardiovascular technology practice.

**COURSE OBJECTIVES:**

1. To understand the Physics and working principle under Ultrasound Instrument for better operation.
2. To make students analyze the working of the Ultrasound and troubleshoot on demand.

**UNIT I:** 9 hours

Basics of Ultrasound & sound waves, propagation of ultrasound wave, properties of ultrasound, and interaction of Ultrasound with tissue: reflection, refraction, attenuation, scattering, acoustic impedances of media, specular and scattered echoes, image properties in ultrasound: Hyperechoic, hypoechoic, Anechoic, Clinical applications and Limitations of ultrasound imaging.

**UNIT II:** 9 hours

Transducers and the Production of Ultrasound Beams: Transducer design, types of transducers, high and low frequency transducers, piezoelectric effect, acoustic absorber, matching layer, pulse characteristics: resonant and non-resonant transducers, focal zone grating lobes and side lobes. Frensel and Fraunhofer zone, Q-factor, Pulse Repetition Frequency (PRF). Phased array transducer and linear array transducer

**UNIT III:** 9 hours

Display modes: A-mode, B- mode, TM- mode and grey scale imaging. Principles of M-mode and Two-dimensional Echocardiography Components of echo machine, their controls and the protocols for maintaining the equipment.

Image quality in Ultrasound. Artefacts and its types in ultrasound.

**UNIT IV:** 9 hours

Doppler instrumentation- doppler effect, doppler shift frequency, doppler equation, doppler angle. Continuous and pulsed wave doppler: Applications and limitations Colour Flow Imaging: Applications and limitations, aliasing, Nyquist limit

Assessing severity of regurgitations, limitations of color flow, 'billiard ball effect', Proximal Isovelocity Surface Area (PISA), Tissue Doppler imaging and 3D echocardiography

**UNIT V:** 9 hours

The role of ultrasound in Transesophageal Echocardiography, Cardiac dysynchrony and Dobutamine Stress Echocardiography, Contrast Enhanced Ultrasound imaging, Ultrasound-guided interventions & procedures.

**PRACTICALS:**

Ultrasound machine and its components

Types of Transducers and its key features

Protocol for maintenance and upkeep of the equipment

Machine settings, controls and parameters

Role of echocardiography in Transesophageal Echocardiography and Dobutamine stress Echo

**REFERENCES:**

1. The physics of Radiology and imaging- K Thayalan, first edition:2014, Jaypee Brothers medical publishers (P) LTD.

2. The Washington manual of echocardiography- Wolters Kluwer, Lippincott Williams & Wilkins

# CONGENITAL HEART DISEASE I

**( 45 hours)**

L/T/P/C
3/-/2/4

**Learning Objectives**

1. Understand embryology and development of the cardiovascular system.
2. Learn the classification and pathophysiology of congenital heart diseases.
3. Explain acyanotic congenital heart defects and their hemodynamic effects.
4. Understand cyanotic congenital heart diseases and clinical manifestations.
5. Correlate diagnostic investigations with congenital cardiac abnormalities.
6. Develop knowledge of clinical management and interventional approaches in congenital heart disease.

**Learning Outcomes**

1. Explain embryological development and congenital abnormalities of the heart.
2. Identify common acyanotic and cyanotic congenital heart diseases.
3. Interpret hemodynamic and clinical features of congenital cardiac defects.
4. Correlate echocardiographic and diagnostic findings with congenital heart diseases.
5. Apply knowledge of congenital heart diseases in cardiovascular assessment and patient care.
6. Demonstrate understanding of management strategies for congenital cardiac disorders.

**COURSE OBJECTIVES:**

1. To acquire basic knowledge about embryology and formation of Heart tube.
2. To understand and interpret the occurrence of each congenital heart disease and their pathogenesis.

**UNIT 1:** 9 hours

Embryology of heart

Vasculogenesis, angiogenesis, Formation of heart tube, cardiac looping, fate of venous sinosus, formation of cardiac septum, formation of pulmonary veins, formation of great vessels, embryology of conducting system.

**UNIT 2:** 9 hours

Monozygotic and dizygotic twins, teratogens and birth defects

Fetal circulation, postnatal changes in circulation and congenital heart diseases.

Respiration, Classification of congenital heart diseases.

**UNIT 3:** 9 hours

Atrial septal defect- types, causes, management- pharmacological and surgical Other acyanotic diseases

Acyanotic congenital heart disease – Ventricular septal defect, types, management, pharmacological and surgical.

**UNIT 4:** 9 hours

Acyanotic heart diseases

PDA – Embryology, pathophysiology, hemodynamic classification, krichenko Classification

**UNIT 5:** 9 hours

Co- A – types based on location, associated 60nomalies, management and surgical procedures. AVSD – types of AVSD, Associated 60nomalies, down syndrome, Management and surgical procedures

**Reference books:**

1. A Comprehensive Approach to Congenital Heart Diseases, 2nd edition, IB vijyalakshmi
2. Clinical management of congenital heart diseases, Douglas S Moodie
3. Inderbir singh's , Human embryology, 11th edition

# BASICS OF ECHOCARDIOGRAPHY AND CARDIAC PACEMAKERS

**(60 hours)**

L/T/P/C
4/-/2/5

**Learning Objectives**

1. Understand the principles and instrumentation of echocardiography.
2. Learn basic echocardiographic views and cardiac measurements.
3. Explain Doppler echocardiography and assessment of cardiac function.
4. Understand the principles, indications, and types of cardiac pacemakers.
5. Learn pacemaker components, programming, and troubleshooting basics.
6. Develop practical knowledge in echocardiography assistance and pacemaker monitoring.

**Learning Outcomes**

1. Explain the basic principles and applications of echocardiography.
2. Identify standard echocardiographic views and cardiac structures.
3. Interpret basic Doppler and echocardiographic findings.
4. Describe types, functions, and indications of cardiac pacemakers.
5. Demonstrate understanding of pacemaker monitoring and troubleshooting principles.
6. Apply echocardiography and pacemaker knowledge in cardiovascular technology practice.

**COURSE OBJECTIVES:**

1. To acquire basic knowledge about the components and working of Cardiac pacemakers.
2. To introduce the concepts of basic echocardiographic views.

**UNIT 1:** 12 hours

**Basic concepts of pacemaker**

Introduction over-view

Pacemaker circuits, mode

Pacing leads, electrical aspects of pacing, Power source, connections, Ohms law applications

PG circuits

**UNIT 2:** 12 hours

**Temporary pacemakers**: Indication**,** components**,** modes, Procedures**,** pacing methods**,** lead testing, trouble-shootings**,** Complication

**Permanent Pacemakers**: Introduction, Cardiac hemodynamics, Basic components, Classifications (NBG code), Indications, Physiology of cardiac pacing, Lead thresholds, Factors affecting threshold

**UNIT 3**: 12 hours

Implantable cardioverter Defibrillators Introduction: Sudden cardiac death,

Indications

Contraindications

System components and functions

Implantation and testing procedures

Device programming for arrhythmia recognition

Management and follow-up

**UNIT 4**: 12 hours

**Echo cardiographic views and modalities**

Acquisition techniques of Trans -Thoracic views, Acquisition techniques of Aortic arch view, Acquisition techniques of subcoastal view

**Modalities of Echo**

Conventional echo, Doppler echo, Basics of stress echo, epicardial imaging, intracardiac echocardiography- indications and contraindications.

**UNIT 5**: 12 hours

- Quantification of Right atrium, left atrium, Right ventricle, Left ventricle, Right ventricle.
- Assessment of temporary, permanent pacemaker in echo.

**PRACTICALS:**

Patient positioning and image viewing

Identifying segmental analysis

Advanced Cardiac Life support algorithm

Types of pacemaker, lead placements and modes.

Positioning and steps involved in Defibrillator operation

**Reference books:**

Cardiac catheterization: William Grossman, Eric Topols, Morten B Kern

The echo manual- jae K.Oh, James B. Seward, A.Jamil Tajik

# MEDICAL ETHICS AND LEGAL ASPECTS

**(30 hours)**

L/T/P/C
2/-/2/3

**Course Objectives:**

Medical ethics has developed into a well-based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice". Physicians are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum. Few of the important and relevant topics that need to be focused on are as follows:

## UNIT- I: 6 hours

Medical ethics – Definition, Goal & Scope, Importance of medical ethics, Goals of medical interventions.

Introduction to Codes of conduct: Athreya Anushasana, Charaka Samhita, Sushruta Samhita, Hippocratic Oath, Helsinki declaration, International code of medical ethics, Nuremberg code, Declaration of Geneva.

Basic Principles of Medical ethics – Autonomy, Beneficence, Confidentiality, Nonmaleficence, Equity.

## UNIT – II 6 hours

Rights and responsibilities of patients

Informed consent – Definition, Types, need for informed consent, conditions need to obtain informed consent.

Rational & irrational drug therapy – Definitions of Rational & irrational drugs, Factors responsible for rational & irrational drug usage, Standard treatment guidelines.

Medical records – Definition, components of medical record & advantages of medical records

**UNIT – III** 6 hours

Care of the terminally ill

Euthanasia - Definition, Types of euthanasia

Organ transplantation – Definition, Types of organ transplants, Ethical issues in organ transplantation.

Professional indemnity insurance policy

**UNIT -IV** 6 hours

Medical law – Definition, Types of medical law – civil & criminal law Medico legal cases – Definition of medico legal case, examination of medico legal case, documents related to MLC, ownership and retention of medico legal cases, confidentiality privilege communication

Malpractice & medical negligence – Definition, causes of medical negligence, classification of medical negligence based on court of law & liability, measures to avoid medical negligence.

**UNIT – V** 6 hours

Development of standardized protocol to avoid near miss or sentinel events

Prenatal diagnosis – Definition, Indications, Brief on PCPND Tact

Human experimentation – Definition, Important requisites, Institutional ethical committee-Responsibilities

**Recommended Books**

1. Medical Ethics &Law, The CorCurriculum – Tony HopeAtla

## CLINICAL ASSESSMENT - II

L/T/P/C
2/-/4/4

**Theory and Practicals**

Instrumentation handling and sterilization techniques.

Cardiac pacemaker- types

Machine settings & patient positioning

Clinical practice and observation of critically ill cardiac patients

Echo handling of post PTCA patients in ICCU

Observation and recording of Log and patient details

Hands on practice of echo views.

Case presentations

## ENVIRONMENTAL AWARENESS

L/T/P/C
1/-/-/1

# THIRD YEAR

## Semester – V

1. Clinical applications of Echo
2. Myocardial, pericardial, Valvular and Ischemic Heart Diseases
3. Congenital heart disease – II
4. Clinical Assessment I
5. VAC (Environmental Awareness)

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | Max. Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT | TOTAL |
| 1 | | Clinical applications of Echo | 4 | - | 2 | 5 | 30 | 70 | 100 |
| 2 | | Myocardial, pericardial, Valvular and Ischemic Heart Diseases | 4 | - | 2 | 5 | 30 | 70 | 100 |
| 3 | | Congenital heart disease - II | 4 | - | 2 | 5 | **30** | **70** | 100 |
| 4 | | Clinical Assessment I | 3 | - | 4 | 5 | 30 | 70 | 100 |
| 5 | VAC | Interpersonal communication | 1 | - | - | 1 | 100 | - | 100 |
| **TOTAL** | | | **16** | | **10** | **21** | **220** | **280** | **500** |

# CLINICAL APPLICATIONS OF ECHO

**( 60 hours )**

L/T/P/C
4/-/2/5

**Learning Objectives**

1. Understand the clinical applications of echocardiography in cardiovascular diseases.
2. Learn echocardiographic evaluation of cardiac chambers, valves, and ventricular function.
3. Explain the role of echocardiography in ischemic, valvular, congenital, and pericardial diseases.
4. Understand stress echocardiography and transesophageal echocardiography applications.
5. Develop knowledge of Doppler and hemodynamic assessment in clinical practice.
6. Develop practical skills in echocardiographic image interpretation and reporting.

**Learning Outcomes**

1. Explain the clinical applications of echocardiography in cardiovascular diagnosis.
2. Interpret echocardiographic findings in common cardiac diseases.
3. Assess ventricular function, valvular lesions, and hemodynamic abnormalities.
4. Demonstrate understanding of stress and transesophageal echocardiography.
5. Apply echocardiographic knowledge in cardiovascular patient assessment.
6. Utilize echocardiographic findings in clinical decision-making and patient care

**COURSE OBJECTIVE:**

1. Understanding Basic Principles and the different modes of echocardiography.

2. Develop skills in interpreting echocardiographic images and data.

**UNIT 1** 12 hours

Chamber quantification – RA, RV LA, LV

Assessment of ECHO in ischemic cardiomyopathy and non ischemic cardiomyopathy

Assessment of pericardial disease in echocardiography.

**UNIT II** 12 hours

Assessment of ECHO in CAD – systolic and diastolic function

Echo in rheumatic heart disease –Echo in mitral stenosis, mitral regurgitation, aortic stenosis, aortic regurgitation, pulmonary hypertension.

Prosthetic valves and its functional assessment in echo.

**UNIT III** 12 hours

Introduction of 3D Echocardiogram and its application, Transesophageal echocardiography- indication, procedure, usefulness and complications and its management. Tissue doppler, strain, strain rate and velocity vector imaging, studying

**UNIT IV** 12 hours

Stress echocardiography – indications, contraindications, mechanism of diagnosis, applications and complications,

Chemically induced Dobutamine stress test – indications, contraindications, mechanism of diagnosis, applications and complications. Vasodilator (dipyridamole or Adenosine) Stress test – indications, contraindications, mechanism of diagnosis, applications and complication.

**UNIT V** 12 hours

Dobutamine stress echocardiogram in aortic stenosis - indications, contraindications, mechanism of diagnosis, applications and complication.

Myocardial contrast study, bubble saline contrast – indications, contraindications, mechanism of diagnosis, applications and complications.

**PRACTICAL**

1. Analysis of Echocardiographic views
2. Basic views virtual representation
3. Techniques for Echo view placement and handling of probe
4. Case scenarios for Pathological assessment

**REFERENCE BOOKS**

1. 7th South Asian edition of feigenbaum's echocardiography
2. 2nd edition Washington manual of echo cardiography

## MYOCARDIAL, PERICARDIAL, VALVULAR AND ISCHEMIC HEART DISEASES

**( 60 hours )**

L/T/P/C
4/-/2/5

**Learning Objectives**

1. Understand the etiology and pathophysiology of myocardial and pericardial diseases.
2. Explain valvular heart diseases and ischemic heart disease mechanisms.
3. Learn clinical features, diagnostic investigations, and complications of cardiac diseases.
4. Understand hemodynamic changes associated with various cardiac disorders.
5. Correlate echocardiographic and ECG findings with cardiovascular diseases.
6. Develop knowledge of medical and interventional management strategies.

**Learning Outcomes**

1. Explain pathological and clinical features of myocardial and pericardial diseases.
2. Identify valvular and ischemic heart diseases using diagnostic findings.
3. Interpret clinical and imaging features of cardiovascular disorders.
4. Correlate disease mechanisms with cardiac function abnormalities.
5. Apply cardiovascular disease knowledge in clinical assessment and patient care.
6. Demonstrate understanding of management approaches for cardiac diseases.

**COURSE OBJECTIVES:**

1. Develop a detailed understanding of the pathophysiology, clinical presentation, and diagnostic techniques
2. Learn the principles of medical, interventional, and surgical management for the cardiac Conditions

**UNIT I** 12 hours

Coronary Artery Diseases-Causes, Pathophysiology and clinical prevention, Angina, unstable angina and Prinzmetal angina, Myocardial Infarction - Types and locations of Infarction, Treatment of Acute Infarction -Thrombolytic therapy, Complications of Myocardial Infarction and their Management.

Rheumatic Heart Diseases- Etiology, Pathophysiology, diagnosis & management, Structure of Valves and its function.

**UNIT II** 12 hours

Myocardial Diseases-Myocarditis- Acute and Chronic, Dilated Cardiomyopathy, Restrictive Cardiomyopathy, Hypertrophic Cardiomyopathy, Masses and tumors of the heart; Constrictive Pericarditis, Pericardial effusion, Cardiac tamponade

**UNIT III** 12 hours

Infective Endocarditis, Pulmonary Artery Hypertension, Aortic Diseases - Aneurysm, dissection, debakey and standford classification; Types of Heart failure & general Management, Acute circulatory failure (shock) and its types.

**UNIT IV** 12 hours

Mitral Stenosis – anatomy, pathophysiology, Treatment, other diagnosis
Mitral Regurgitation – pathophysiology, Treatment & diagnosis
Tricuspid Stenosis- anatomy, pathophysiology, Treatment, other diagnosis
Tricuspid Regurgitation– pathophysiology, Treatment & diagnosis.

**UNIT V** 12 hours

Aortic Stenosis– Anatomy, BAV, Classification, Pathophysiology, Treatment, Other Diagnosis Aortic Regurgitation – Pathophysiology, Treatment, Other Diagnosis
Pulmonary Stenosis–Anatomy, Classification, Pathophysiology, Treatment, Other Diagnosis, Pulmonary Regurgitation– Pathophysiology, Treatment & Diagnosis

.

**PRACTICAL:**

SPOTTERS & CASE SCENARIOS:

1. Ischemic Heart Diseases
2. Myo-Pericardial Diseases
3. Diseases of Aorta 4. Valvular Heart Diseases.
5. Basic Echo assessment.

**REFERENCE BOOKS:**

1. Textbook of Pathology, Harsh Mohan, Sixth edition, Jaypee Brothers medical Publishers (P) Ltd, Puducherry, 2010
2. Textbook of Pathology, B N Dutta, Second edition, Jaypee Brothers medical Publishers (P) Ltd, Puducherry, 2004
3. Comprehensive Cardiology, S Uma Devi, First Edition, Jaypee Brothers medical publishers.

# CONGENITAL HEART DISEASE – II

**( 60 hours)**

L/T/P/C
4/-/2/5

**Learning Objectives**

1. Understand complex congenital heart diseases and their pathophysiology.
2. Learn diagnostic evaluation and imaging techniques for congenital cardiac disorders.
3. Explain postoperative assessment and complications in congenital heart diseases.
4. Understand interventional and surgical management of congenital heart defects.
5. Correlate hemodynamic findings with congenital cardiovascular abnormalities.
6. Develop practical knowledge in congenital heart disease assessment and care.

**Learning Outcomes**

1. Explain complex congenital heart diseases and their clinical manifestations.
2. Interpret echocardiographic and diagnostic findings in congenital cardiac disorders.
3. Assess postoperative and interventional outcomes in congenital heart disease patients.
4. Correlate congenital abnormalities with hemodynamic and physiological changes.
5. Apply congenital heart disease knowledge in cardiovascular patient care.
6. Demonstrate understanding of management strategies for congenital cardiac conditions.

**COURSE OBJECTIVES:**

1. Advanced knowledge of the pathophysiology, anatomy, and physiology of complex congenital heart diseases
2. Diagnostic techniques for evaluating congenital heart diseases, including echocardiography, cardiac MRI, CT angiography

## UNIT – I

12 hours

Acyanotic heart diseases - PDA – Pathophysiology, hemodynamic classification, krichenko classification, Treatment and surgical procedures.

Co- A - Types based on location, associated anomalies, Treatment and surgical procedures.

AVSD – Types of AVSD, Associated anomalies, down syndrome, Treatment and surgical procedures

## UNIT – II

12 hours

Tetralogy of fallot, Transposition of great arteries-TOF- Characteristics, etiology, developmental defect, absence of pulmonary valve, AP colletrals, associated anomalies, Treatment and surgical procedures

Transposition of the Great Arteries – Pathophysiology, DTGA, LTGA/ CC-TGA, associated malformation, Treatment and surgical procedures.

**UNIT – III** 12 hours

Double outlet right ventricle, Total Anomalous Pulmonary Venous Connection (TAPVC), DORV- Classification, associated anomalies, Treatment and surgical procedures, TAPVC- Classification of TAPVC, pathophysiology, sites of obstruction, associated anomalies and views, Treatment & surgical procedures, complication of surgery.

**UNIT – IV** 12 hours

Congenital Valvular heart diseases, miscellaneous diseases-Hypoplastic left heart syndrome, Truncus arteriosus, AP window.

**UNIT – V** 12 hours

**Palliative procedures, Basic surgical treatments of cardiac diseases**

Aorta-pulmonary shunts, PA banding, ASD & VSD closure, TOF repair and arterial switch (jantene), rastelli operation, norwood operation, glen-shunt and hemi fontan & fontan procedures, pulmonary valvotomy, Co- A repair, LVOT obstruction repair.

**PRACTICALS:**

**SPOTTERS & CASE SCENARIOS:**

1. Transposition of great arteries.
2. Tetralogy of fallot.
3. Patent ductus arteriosus.
4. Coarctation of aorta.

**REFERENCE BOOKS :**

1. Perloff's clinical recognition of congenital heart diseases, Joseph k perloff, Ariane J. Marlli, 2012, 6 th edition.
2. Braunwald's heart diseases, A text book of cardiovascular medicine, Bonow, Mann, Zipes, Lippy, 2015, 10 th edition.
3. Comprehensive textbook of echocardiography , Navin C Nandha ,2015, 1 st edition 4. Moss and Adam's heart diseases in infants , children and Adolescents including the fetus and young adult, Hugh D. alien, David J Driscoll, Robert E. Shaddy , Timothy F Feltes , copyright 2015, 8 th edition.

## CLINICAL ASSESSMENT - I

L/T/P/C
3/-/4/5

**Practical Aspects**:

Echo: Chamber Assessment, Regional Wall Motion Abnormality (Rwma)

Left Ventricular Systolic Function, Left Ventricular Diastolic Function, Valve Pathology (Mitral, Tricuspid, Aortic, Pulmonary)

Congenital Heart Disease (Cyanotic, Acyanotic) Myopathies, Pericardial Effusion.

ECG-Myocardial Infraction, Disorders Of Cardiac Rhythm, Conduction Blocks, Drug and

Electrolyte Effects, Congenital Heart Disease, Cardiac – Implantable Electronic Devices.

ICU-Coronary Artery Disease, Valvular Heart Disease, Congenital Heart Disease

Ischemic Cardiomyopathies, Pericardial, Myocardial Disease

TMT- Hemodynamics, Protocol, Arrhythmias

Conduction Abnormalities, Myocardial Infraction

Cath- Coronary Angiogram, Coronary Angioplasty

Cardiac Pacemaker Implantation, Balloon Valvoplasty, TAVR, Pericardiocentasis

## INTERPERSONAL COMMUNICATION

L/T/P/C
1/-/-/1

## Semester – VI

1. Community Medicine
2. Cardiac Cath and Intervention
3. Arrhythmia Management
4. Clinical Assessment I
5. Clinical Assessment - II
6. VAC (Art of being a better person)

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | Max. Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT | TOTAL |
| 1 | | Community Medicine | 2 | - | 2 | 3 | 30 | 70 | 100 |
| 2 | | Cardiac Cath and Intervention | 4 | - | 2 | 5 | 30 | 70 | 100 |
| 3 | | Arrhythmia Management | 3 | - | 2 | 4 | 30 | 70 | 100 |
| 4 | | Clinical Assessment - I | 2 | - | 4 | 4 | 30 | 70 | 100 |
| 5 | | Clinical Assessment - II | 2 | - | 4 | 4 | 30 | 70 | 100 |
| 6 | VAC | Soft skills development | 1 | - | - | 1 | 100 | | 100 |
| **TOTAL** | | | **14** | | **14** | **21** | **250** | **350** | **600** |

# COMMUNITY MEDICINE

**(30 hours)**

L/T/P/C
2/-/2/3

**Learning Objectives:**

1. Understand the principles and concepts of community medicine and public health.
2. Learn epidemiology, disease prevention, and health promotion strategies.
3. Understand communicable and non-communicable diseases affecting the community.
4. Explain national health programs and primary healthcare services.
5. Understand environmental sanitation, nutrition, and occupational health.
6. Develop awareness regarding community participation and healthcare delivery systems.

**Learning Outcomes:**

1. Explain the principles of community medicine and public health.
2. Identify methods of disease prevention and health promotion.
3. Apply epidemiological concepts in community health assessment.
4. Demonstrate understanding of national health programs and healthcare services.
5. Correlate environmental and social factors with community health.
6. Apply community medicine principles in healthcare and patient education.

**COURSE OBJECTIVES:**

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

## Unit I

6 hours

Concepts & Dimensions of Health-Definition of health; Changing concepts of health-biomedical concept, ecological concept, psycho-social concept and holistic concept;

Dimensions of Health – Physical dimension, mental dimension, social dimension etc;

Spectrum of Health.Determinants of health & Concepts of Disease Causation-Determinants of Health – Biological determinants, Behavioural and socio-cultural conditions, Environmental & socio-economic conditions; Germ theory of disease; Epidemiological triad; Iceberg phenomenon of disease.

**Unit II** 6 hours

Concepts of Prevention of disease -Levels of prevention – Primary prevention, secondary prevention, Tertiary prevention; Modes of intervention – Health promotion, Specific protection, Early diagnosis & treatment, Disability limitation, Rehabilitation. Basic terminologies in healthcare-Definitions of Mortality, Morbidity, Disability, Incidence, Prevalence, Incubation period, Period of communicability, Communicable diseases, non-communicable diseases, Outbreak, Epidemic, Endemic, Sporadic, Pandemic, Zoonoses, Nosocomial infection, Opportunistic infection, Iatrogenic infection, Immunization.

Healthcare status in India-Common health problems in India – Communicable diseases, non-communicable diseases, MCH problems, Nutritional problems.

**Unit III:** 6 hours

Evolution of healthcare delivery systems in India, Health for all; National health policy Health care of the Community-Levels of health care – Primary health care, secondary health care, tertiary health care, Referral system; Primary health care- principles of primary health care, elements of primary health care. Health Care Systems-Structure of health care delivery system in India; Primary health care in India at village level – Village health guides scheme, Local dais, ICDS Scheme, ASHA scheme; MPHS male & female.

**Unit IV** 6 hours

National Health Programmes -Introduction; National Vector Borne Disease Control Programme; Revised National Tuberculosis Control Programme; National AIDS Control Programme; Universal Immunization Programme; National Rural Health Mission; Reproductive and Child Health Programme; National Nutritional Anemia Prophylaxis Programme; National Cancer Control Programme;

**Unit V** 6 hours

Indigenous system of Medicine in India-AYUSH & role of AYUSH in delivering health care in India;

First aid-Basic principles & 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.

**Reference Books:**

1. Park K. Park's Text book of Preventive and Social Medicine. 27th edition; Banarsidas Bhanot Publishers
2. AH Suryakantha. Textbook of Community Medicine with recent advances. 6th edition; Jaypee publishers
3. Community Medicine simplified – Sreejith P.S Paras publishers 2nd edition.
4. Community Medicine Preparation Manual for Undergraduates – Bhalwar Rajvir, 2nd Edition, Elsevier publishers

# CARDIAC CATH AND INTERVENTION

**( 60 hours)**

L/T/P/C
4/-/2/5

## Learning Objectives

1. Understand the principles and setup of cardiac catheterization laboratories.
2. Learn cardiac catheterization procedures and hemodynamic monitoring techniques.
3. Explain coronary angiography and interventional cardiology procedures.
4. Understand angioplasty, stenting, and structural heart interventions.
5. Learn radiation safety, sterile techniques, and emergency management in cath lab practice.
6. Develop technical skills in assisting diagnostic and interventional cardiac procedures.

## Learning Outcomes

1. Explain cardiac catheterization and coronary angiography procedures.
2. Demonstrate understanding of hemodynamic monitoring and pressure measurements.
3. Identify equipment and instruments used in cardiac interventions.
4. Assist in angioplasty, stenting, and other interventional procedures.
5. Apply radiation safety and infection control measures in cath lab practice.
6. Utilize cardiac cath and intervention knowledge in cardiovascular technology practice.

## COURSE OBJECTIVES:

1. Understanding Cardiac Catheterization and Diagnostic Techniques.

2. Learn the principles and different techniques of Interventional procedures.

## UNIT 1: 12 hours

Cath lab oriented machines-Generation of X- rays and basic physics – Cath lab equipment's Fluoroscopy, Movements of gantry and cath table Angiographic views and basic maintenance of equipment's Cardiac radiology and radiation safety measures Power injector – Principles- Defibrillators – Intra Aortic balloon pump – Console room techniques.

**UNIT 2:** 12 hours

Monitoring system in cathlab -Monitors-Transducers- ECG-Pulse – Oximetry – NIBP- Noninvasive Blood pressure – Temporary pacemaker- IAP waveforms and recording systems – fluid filled catheter systems, pressure transducers and basic invasive pressure monitoring.

**UNIT 3:** 12 hours

Cardiac catheterization Hardwares- Catheters- Used in diagnostic and intervention procedures- Guide wires- Used in various diagnostic and intervention procedures – Sheath indicator – hardware's cleaning and Packing-Techniques of sterilization – Advantages and Disadvantages of each setting up in the cardiac catheterization laboratory for a diagnostic study – Balloon and stents

**UNIT 4:** 12 hours

Right heart catheterization, left heart catheterization, Arterial and Venous Access – Radial Artery Catheterization – Femoral artery Catheterization – Venous access- Sheath removal RHC- procedure, cath position, oximetry at various levels, angio done & interpretation
LHC – procedure, cath position, oximetry at various levels, angio done & interpretation.

**UNIT 5:** 12 hours

Coronary Angiogram and Peripheral angiogram-CAG – Procedure, materials used, type and amount of dye used, indications, contraindication and complications, various pictures recorded in various angles and gross interpretation, Peripheral angiogram-procedure, indication and contraindication.

**PRACTICALS:**

1. Understanding patient selection criteria, including indications and contraindications for cardiac catheterization.
2. Understanding angiography techniques for visualizing coronary anatomy
3. Interpretation of imaging results to guide interventions.
4. Detailed overview of common interventions such as angioplasty, stent placement

**REFERENCES BOOKS:**

1. Grossman's cardiac Catheterization, Angiographic and interventions, Donald S Baim, 2006, Seventh edition

2. Invasive Cardiology, A Manual for Cath lab, personnel, Sandy Watson and kennath A Gorski, 2011, Third edition

3. Chistens physics of diagnostic radiology, Thomas S Curry III, Robert C Murry Jr, James E Dowdey, 1990, Fourth edition

# ARRHYTHMIA MANAGEMENT

**( 45 hours )**

L/T/P/C
3/-/2/4

**Learning Objectives:**

1. Understand the mechanisms and classification of cardiac arrhythmias.
2. Learn ECG interpretation related to arrhythmias and conduction abnormalities.
3. Explain pharmacological and non-pharmacological management of arrhythmias.
4. Understand pacemakers, defibrillators, and electrophysiological procedures.
5. Learn emergency management of life-threatening arrhythmias.
6. Develop practical skills in arrhythmia recognition and patient monitoring.

**Learning Outcomes:**

1. Identify and classify common cardiac arrhythmias using ECG findings.
2. Interpret conduction abnormalities and rhythm disturbances accurately.
3. Explain treatment modalities for arrhythmia management.
4. Demonstrate understanding of pacemaker and defibrillator functions.
5. Apply emergency management principles for critical arrhythmias.
6. Utilize arrhythmia management knowledge in cardiovascular patient care.

**COURSE OBJECTIVES :**

1. Understand the clinical significance of different types of arrhythmias
2. Develop Acute and chronic Arrhythmia Management Skill.

**UNIT-I:** 9 hours

Basic life support – Adult, pediatric, pregnancy CPR, Foreign body airway obstruction – Chocking – Adult, Pediatric, pregnancy, Automated electrical defibrillator.

**UNIT- II:** 9 hours

ACLS – Cardiac arrest algorithm, post cardiac algorithm, Airway management – OPA, NPA, LMA, Endotracheal Tube, combi tube, Difficult airway intubation.

UNIT –III: 9 hours

Patient history taking-Insertion techniques, contraindications & indications of Central venous access, intravenous, intramuscular, intraosseous, subcutaneous, defibrillator. Brady arrhythmia, heart block, tachyarrhythmia, stroke, MI.

**UNIT –IV:** 9 hours

Arterial blood gas; respiratory acidosis, respiratory alkalosis, metabolic acidosis, metabolic alkalosis, Compensated and uncompensated MUD PILES, Anion gap. Basic first aid – environmental, medical and traumatic emergencies

**UNIT –V:** 9 hours

Blood pressure, Pulse oximetry, Temperature, Capnography.

**PRACTICALS:**

1. Drug administration-[Intravenous, Intramuscular, Subcutaneous].
2. Intubation, CPR techniques in Adult, pediatric and pregnant women.
3. How to use AED, ECG interpretation, ABG interpretation.
4. Defibrillation vs cardioversion.

**REFERENCES BOOKS :**

1. Tintinalli's Emergency Medicine-A Comprehensive Study Guide, 9th Edition; Judith E. Tintinalli Publisher.
2. Nancy Caroline's Emergency Care in the Streets-Volume 1 ;Nancy L. Caroline publisher.
3. The Textbook of Emergency Cardiovascular Care and CPR ; John M. Field publisher.

## CLINICAL ASSESSMENT – I

L/T/P/C
2/-/4/4

**Practicals**

Defibrillators – Intra Aortic balloon pump –Console room techniques

Guide wires- Used in various diagnostic and intervention

Coronary Angiogram – Procedure, materials used
type and amount of dye used in Coronary Angiogram

Types of – Balloon and stents

Case presentation & seminar

## CLINICAL ASSESSMENT – II

L/T/P/C
2/-/4/4

**Practicals:**

Basic life support – Adult, pediatric, pregnancy CPR, Foreign body airway obstruction – Chocking – Adult, Pediatric, pregnancy, Automated electrical defibrillator, ACLS – Cardiac arrest algorithm, post cardiac algorithm

Airway management – OPA, NPA, LMA, Endotracheal Tube, combi tube, Difficult airway intubation, Patient history taking, Insertion techniques, contraindications & indications of Central venous access, intravenous, intramuscular, intraosseous, subcutaneous, defibrillator. Brady arrhythmia, heart block, tachyarrhythmia, stroke, MI Arterial blood gas; respiratory acidosis, respiratory alkalosis, metabolic acidosis, metabolic alkalosis, Compensated and uncompensated MUD PILES, Anion gap. Basic first aid – environmental, medical and traumatic emergencies, Blood pressure, Pulse oximetry, Temperature, Capnography.

## SOFT SKILLS DEVELOPMENT

L/T/P/C
1/-/-/1

# FOURTH YEAR

## Semester – VII

1. Intership - I
2. VAC (Healthy Eating for Healthy Living)

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | Max. Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT | TOTAL |
| 1 | | Internship-I | - | - | 40 | 20 | 30 | 70 | 100 |
| 2 | VAC | Healthy Eating for Healthy Living | 1 | - | - | 1 | 100 | - | 100 |
| **TOTAL** | | | **1** | | **40** | **21** | **130** | **70** | **200** |

### INTERNSHIP-I

L/T/P/C
-/-/40/20

### HEALTHY EATING FOR HEALTHY LIVING

L/T/P/C
1/-/-/1

## Semester – VIII

1. Intership – II
2. Project
3. VAC (Professionalism in the workplace)

### INTERNSHIP-II

L/T/P/C
-/-/20/10

### PROJECT

L/T/P/C
-/-/20/10

### ART OF BEING A BETTER PERSON

L/T/P/C
1/-/-/1

# Value Added Courses

**L/T/P/C**
**1/-/-/1**

1. Professionalism in the Workplace
2. Stress Management
3. Health and Well-being
4. Environmental Awareness
5. Interpersonal communication
6. Soft Skills Development
7. Healthy Eating for Healthy Living
8. Art of Being a Better Person

## 1. Professionalism in the Workplace

**Course Description:**
This course is designed to provide students with the foundational knowledge and skills required to demonstrate professionalism in a variety of workplace settings. Topics will include communication, ethics, accountability, time management, problem-solving, conflict resolution, and maintaining a positive and effective work ethic. Students will engage in practical activities that promote personal and professional growth.

**Course Objectives:**
By the end of this course, students will:

1. Understand the key elements of professional behavior in the workplace.
2. Demonstrate effective communication, both verbal and non-verbal, in a professional environment.
3. Learn to manage time effectively and handle workplace challenges with a positive attitude.
4. Cultivate emotional intelligence and adaptability in professional settings.
5. Understand workplace ethics, integrity, and how to make ethical decisions.
6. Develop skills for conflict resolution and teamwork in diverse work environments.

**Unit 1**

**Introduction to Professionalism**

What is professionalism?

Characteristics of a professional: Appearance, behaviour, and attitude

The importance of professional ethics and integrity

**Unit 2**

**Effective Communication in the Workplace**

Verbal and non-verbal communication

Active listening and responding

Communicating across cultures

**Unit 3**

**Workplace Etiquette and Networking**

Social etiquette in the workplace

Networking best practices

Building relationships with colleagues, managers, and clients

**Unit 4**

**Time Management and Organization**

Prioritizing tasks and setting goals

Managing deadlines and avoiding procrastination

Tools and techniques for effective time management

**Unit 5**

**Accountability and Reliability**

Taking responsibility for your actions

Being reliable and dependable in the workplace

How accountability affects professional reputation

**Unit 6**

**Problem Solving and Decision Making**

Approaches to critical thinking and decision-making

Strategies for solving workplace problems effectively

The role of creativity and innovation in problem-solving

**Unit 7**

**Teamwork and Collaboration**

Working with diverse teams

Building trust and collaboration in teams

Managing team conflicts and maintaining harmony

**Unit 8**

**Conflict Resolution and Handling Difficult Conversations**

Understanding conflict dynamics

Techniques for resolving conflicts professionally

Role-playing difficult conversations in the workplace

**Unit 9**
**Ethical Dilemmas in the Workplace**
Recognizing ethical challenges
Making decisions based on ethical principles
The role of transparency and honesty

**Unit 10**
**Building Emotional Intelligence and Adaptability**
What is emotional intelligence and why does it matter?
Developing self-awareness and self-regulation
Adapting to changing work environments

**Assessment and Evaluation:**
Class Participation :20
Assignments/ case study presentations: 30
Final: 50

**Reference Textbook**
1. Professionalism: Skills for Workplace Success" by Deborah C. Dillon
2. The Professional Workplace: The Skills You Need to Succeed" by Ronald W. Holmes

## 2. Stress Management

**Course Objectives:**

By the end of the course, students will:

1. Understand what stress is and how it affects the body and mind.
2. Learn how to recognize personal stressors and individual responses to stress.
3. Explore various coping strategies to manage stress effectively.
4. Understand how lifestyle changes can reduce overall stress.
5. Learn how to manage stress in academic and professional settings.
6. Equip students with tools to build long-term resilience against stress.

**Unit 1**
**Introduction to Stress and Its Effects**
Definition of stress: Eustress vs. Distress
Types of stress: Acute vs. Chronic
The biology of stress (fight-or-flight response, hormones)
Short-term and long-term effects on physical and mental health
The role of perception and coping mechanisms

**Unit 2**
**Identifying Stressors and Personal Stress Responses**

Internal vs. external stressors (work, relationships, environment)
Identifying stress patterns (thoughts, behaviours, physical reactions)
Emotional regulation and its role in stress management
The Stress Process: How stress develops and escalates

**Unit 3**
**Coping Strategies and Stress Relief Techniques**
Problem-focused vs. emotion-focused coping
Cognitive Behavioral Therapy (CBT) techniques for stress
Relaxation techniques (deep breathing, progressive muscle relaxation)
Time management and organization as stress-relief tools
Developing a personal coping plan

**Unit 4**
**Lifestyle Changes for Managing Stress**
The role of physical activity and exercise
Sleep hygiene and its connection to stress
Nutrition and its impact on mental health
Social support and healthy relationships
Mindfulness and meditation practices

**Unit 5**
**Stress Management at Work and School**
Managing work and school stress: Time management, prioritization
Dealing with high-pressure environments and deadlines
Building resilience and avoiding burnout
The importance of taking breaks and practicing self-care

**Unit 6**
**Building Long-Term Stress Resilience**
Resilience theory and how to bounce back from adversity
Developing a growth mindset to handle challenges
Building emotional intelligence to cope with stress
Integrating stress management into daily life

Assessment & Evaluation
**Participation**: 20 (Engagement in group discussions and exercises)
**Assignments: 30**
Final Exam (Internal) : 50 marks

**Reference Textbook**
Stress Management: From Basic Science to Best Practice" by C. L. Cooper and Philip L. Merritt

## 3. Health and Well-being

**Course Description:**
This course explores the holistic approach to health and well-being, focusing on physical, mental, and social aspects. Students will learn about health promotion strategies, the importance of physical activity, nutrition, mental health awareness, and stress management. The course also addresses the impact of lifestyle choices and societal factors on overall health.

**Course Objectives:**

By the end of the course, students will be able to:

1. Understand the physical, mental, and social determinants of health.
2. Apply strategies for improving and maintaining physical health.
3. Recognize the importance of mental well-being and stress management techniques.
4. Understand the relationship between nutrition and overall health.
5. Develop practical skills for managing time, stress, and emotions.
6. Cultivate a balanced approach to achieving long-term health and well-being.

**Unit 1**
**Introduction to Health and Well-being**
Overview of health and well-being concepts
Dimensions of health: Physical, mental, social, and emotional
The impact of lifestyle choices on health

**Unit 2**
**Physical Health and Fitness**
Importance of physical activity for overall health
Types of exercise: Aerobic, strength, flexibility, and balance
Creating a personal fitness plan

**Unit 3**
**Nutrition and Healthy Eating**
Basics of nutrition: Macronutrients and micronutrients
Healthy eating habits and food groups
Impact of nutrition on physical and mental health

**Unit 4**
**Mental Health and Emotional Well-being**
Understanding mental health: Definitions, stigma, and myths
Key aspects of emotional well-being
Building emotional resilience

**Unit 5**
**Stress Management Techniques**
Understanding stress and its effects on health
Mindfulness and relaxation techniques

Time management for stress reduction

**Unit 6**
**Sleep and Recovery**
Importance of sleep for physical and mental health
Sleep hygiene and healthy sleep habits
Impact of sleep deprivation on overall well-being

**Unit 7**
**Social Health and Relationships**
The role of social connections in well-being
Healthy relationships: Communication, boundaries, and support
Community involvement and social well-being

**Unit 8**
**Substance Use and Addiction**
The impact of alcohol, tobacco, and drugs on health
Understanding addiction and treatment options
Preventive measures and harm reduction strategies

**Unit 9**
**Chronic Diseases and Prevention**
Common chronic diseases (e.g., diabetes, heart disease)
Risk factors and lifestyle modifications for prevention
Screening, early detection, and health monitoring

**Unit 10**
**Building Healthy Habits**
The psychology of habit formation
Strategies for adopting and maintaining healthy habits
Overcoming barriers to healthy behaviour changes

**Assessment and Evaluation:**
Class Participation :20
Assignments/ case study presentations: 30
Final: 50

**Reference Textbook**

Health and Wellness" by S. L. Kaskutas & K. A. A. Nielson

## 4. Environmental Awareness

**Course Description:**

This course introduces students to the fundamental concepts of environmental awareness, examining the relationship between humans and the environment. It emphasizes the impact of human activities on the planet and promotes sustainable practices. Students will explore key environmental issues, such as climate change, biodiversity, pollution, and resource conservation, and develop practical knowledge for contributing to environmental protection.

**Course Objectives:**

By the end of the course, students will be able to:

1. Understand the basic concepts of environmental science and sustainability.
2. Identify the major environmental challenges facing the world today.
3. Analyze the impact of human activities on ecosystems, biodiversity, and natural resources.
4. Explore global environmental policies and local solutions to environmental problems.
5. Implement sustainable practices in everyday life.

**Unit 1**
**Introduction to Environmental Awareness**
What is environmental awareness?
The importance of environmental education.
Key environmental concepts: ecosystems, biodiversity, sustainability. Historical perspective on environmental awareness.

**Unit 2**
**Earth's Ecosystems and Biodiversity**
What are ecosystems?
Types of ecosystems: forests, oceans, wetlands, etc.
Importance of biodiversity.
Threats to biodiversity: habitat loss, invasive species, climate change.

**Unit 3**
**Pollution and Its Impact**
Types of pollution: air, water, soil, noise, and light pollution.
Causes and effects of pollution on health and ecosystems. Case studies of major pollution events.

**Unit 4**

**Climate Change and Global Warming**

The science of climate change.

Greenhouse effect and human contributions.

Impacts of climate change: rising temperatures, sea levels, extreme weather. Mitigation and adaptation strategies.

**Unit 5**

**Resource Conservation**

Renewable vs. non-renewable resources.

The importance of conserving water, energy, and other resources.

Techniques for conservation: recycling, energy efficiency, and water-saving practices.

**Unit 6**

**Sustainable Agriculture and Food Systems**

Environmental impact of conventional farming practices.

Sustainable agriculture: organic farming, permaculture, and agroecology. The role of diet in environmental sustainability.

**Unit 7**

**Waste Management**

Types of waste: municipal, industrial, hazardous, electronic.

The 3 Rs: Reduce, Reuse, Recycle.

Landfills, incineration, and composting.

Zero waste lifestyle.

**Unit 8**

**Water Conservation and Management**

The global water crisis: causes and consequences.

Water management practices and policies.

The importance of clean water for all living organisms.

**Unit 9**

**Environmental Policy and Legislation**

Global environmental treaties: Paris Agreement, Kyoto Protocol.

National environmental policies and regulations.

Role of NGOs, governments, and individuals in policy development.

**Unit 10**

**Green Technologies and Innovations**

Introduction to renewable energy sources (solar, wind, hydro, etc.).

Electric vehicles and sustainable transportation.

Innovations in waste-to-energy and sustainable agriculture.

**The Role of Individuals in Environmental Protection**

How individual actions impact the environment.

Eco-friendly lifestyles: reducing waste, sustainable consumption, green travel. Community action and grassroots movements.

**Assessment and Evaluation:**
Class Participation :20
Assignments/ case study presentations: 30
Final: 50

**Reference Textbook**
Environmental Science: A Global Concern" by William P. Cunningham & Mary Ann Cunningham

## 5. Interpersonal Communication

**Course Description:**
This course explores the fundamental principles, theories, and techniques of interpersonal communication. Students will examine both verbal and non-verbal communication strategies and apply these skills to improve personal and professional interactions. Through class discussions, role-playing, and group activities, students will develop a better understanding of effective communication in various social contexts.

**Course Objectives:**
By the end of the course, students will:

1. Understand the theories and principles of interpersonal communication.
2. Develop effective verbal and non-verbal communication skills.
3. Analyse and enhance communication in various interpersonal relationships (e.g., friendships, family, workplace).
4. Improve listening, empathy, and conflict-resolution skills.
5. Understand cultural and gender influences on communication.
6. Apply communication skills in real-world scenarios.

**Unit 1**

**Introduction to Interpersonal Communication**
Overview of interpersonal communication theory.
Key principles: sender, message, receiver, feedback, noise.
Importance of communication in daily life.

**Unit 2**
**Verbal Communication**
The role of language in communication.
Choosing words carefully: Clarity, precision, and ambiguity.
Influence of culture and context on verbal communication.

**Unit 3**

**Non-Verbal Communication**

Body language, facial expressions, and gestures.
Space, posture, and touch in communication.
The role of non-verbal cues in conveying emotions

**Unit 4**

**Listening Skills**

Types of listening: Active, passive, reflective.
Barriers to effective listening.
Developing empathy through listening.

**Unit 5**

**Self-Disclosure and Relationship Development**

The importance of self-disclosure in relationships.
The Johari Window model.
How self-disclosure affects trust and intimacy.

**Unit 6**

**Conflict in Interpersonal Communication**

Types of conflict: Productive vs. destructive.
Conflict management styles.
Strategies for resolving conflict in healthy ways.

**Unit 7**

**Cultural and Gender Differences in Communication**

Cultural influences on communication styles.
Gender communication differences.
Strategies for effective cross-cultural communication.

**Unit 8**

**Communication in Close Relationships**

Communication patterns in romantic relationships, family, and friendships.
Managing expectations and maintaining healthy communication in intimate relationships.

**Unit 9**

**Communication in the Workplace**

Interpersonal communication in professional settings.
Navigating professional relationships and maintaining boundaries.
Communication and leadership.

**Unit 10**
**Digital Communication**
The role of technology in interpersonal communication.
The impact of social media on relationships.
Pros and cons of digital communication tools.

**The Ethics of Communication**
Ethical dilemmas in communication.
Honesty, transparency, and privacy in conversations.
Balancing openness with respect for others' boundaries.

**Evaluation and Grading:**
Assignments:50
Final exam (internal 50 marks)

**Reference Textbook:**

*"Interpersonal Communication: Everyday Encounters"* (Author: Julia T. Wood, 9th Edition)

## 6. Soft Skills Development

**Course Objectives:**

By the end of the course, students will:

1. Improve their communication and interpersonal skills.
2. Develop emotional intelligence (EQ) and conflict resolution strategies.
3. Enhance their ability to work in teams and exhibit leadership qualities.
4. Gain confidence in public speaking and professional writing.
5. Master time management and personal organization strategies.

**Week 1**
**Introduction to Soft Skills**
Definition of soft skills vs. hard skills
The importance of soft skills in the workplace
Key soft skills: communication, teamwork, adaptability, problem-solving, leadership, etc.

- **Activities:** Icebreakers, group discussions on soft skills in the workplace
- **Assignment:** Self-assessment on current soft skills

**Week 2**

**Communication Skills**
The communication process: sender, message, receiver, feedback
Active listening techniques
Body language and non-verbal cues
Effective speaking: tone, clarity, and pacing
Email and phone communication etiquette

- **Activities:** Role-playing scenarios (e.g., client interaction, conflict resolution)
- **Assignment:** Practice active listening and send an email incorporating effective communication principles.

**Week 3**
**Emotional Intelligence (EQ)**
What is emotional intelligence? (Self-awareness, self-regulation, motivation, empathy, and social skills)
Recognizing and managing your emotions
Understanding others' emotions and building empathy
Developing emotional resilience

- **Activities:** Emotional intelligence quizzes, group discussion on handling emotions in stressful situations
- **Assignment:** Journaling emotional responses and reflection on EQ practices.

**Week 4**
**Teamwork and Collaboration**
Roles and dynamics within teams
Effective communication in teams
Conflict resolution in teams
Building trust and fostering a collaborative environment

- **Activities:** Team exercises, problem-solving tasks, and brainstorming sessions •
  **Assignment:** Work on a team project or task, and present it in class.

**Week 5**
**Conflict Resolution**
Sources of conflict (miscommunication, differing priorities, etc.)
Conflict resolution strategies (e.g., negotiation, mediation, compromise)
The role of active listening in resolving conflicts
Managing personal emotions during conflict

- **Activities:** Case studies, role-playing conflict resolution scenarios
- **Assignment:** Reflect on a personal or professional conflict and propose a resolution strategy.

**Week 6**
**Time Management and Personal Organization**
The importance of time management in personal and professional success
Prioritization techniques (e.g., Eisenhower Matrix, ABCDE method)
Tools for time management (digital calendars, to-do lists, Pomodoro technique)
Setting SMART goals
Managing procrastination and avoiding distractions

- **Activities:** Time-blocking exercises, goal-setting workshop

- **Assignment:** Create a personal time management plan and track daily productivity for a week.

**Week 7**
**Leadership and Influence**
Types of leadership (e.g., transformational, transactional, servant leadership)
Leading by example: qualities of effective leaders
Building and maintaining team morale
The art of persuasion and influence

- **Activities:** Leadership style assessment, group discussions on leadership challenges
- **Assignment:** Write a reflection on a leader you admire and why.

**Week 8**
**Public Speaking and Presentation Skills**
Overcoming fear of public speaking
Structuring a presentation (opening, body, conclusion)
Effective use of visual aids (PowerPoint, etc.)
Engaging the audience through storytelling, eye contact, and body language

- **Activities:** Group presentations, peer feedback sessions, impromptu speaking exercises
- **Assignment:** Prepare and deliver a short presentation (5-7 minutes) on a topic of choice.

**Assessment and Evaluation:**
Class Participation :20
Assignments: 30
Final: 50

**Reference Textbook**
The 7 Habits of Highly Effective People" by Stephen R. Covey

## 7. Healthy Eating for Healthy Living

**Coure Description:**

This course is designed to teach students the foundational principles of nutrition, the relationship between food and health, and practical strategies for making sustainable, healthy eating choices. Students will learn how to create balanced meals, understand dietary guidelines, and navigate the modern food environment to support long-term health and well-being.

**Unit 1**
**Introduction to Nutrition and Healthy Eating**
What is nutrition?
Overview of macronutrients (carbohydrates, proteins, fats) and micronutrients (vitamins, minerals).
The importance of hydration.

Understanding energy balance: Calories in vs. Calories out. Introduction to MyPlate (or other dietary guidelines).

**Unit 2**

**Building a Balanced Plate** The principles of meal planning.
Portion control and serving sizes.
Healthy fats vs. unhealthy fats.
Carbohydrates: Simple vs. complex sugars.
Protein sources: Animal vs. plant-based.

**Unit 3**

**Reading Food Labels and Understanding Food Marketing**
How to read food labels (nutritional facts, ingredients list, serving sizes).
Decoding food claims (low-fat, organic, non-GMO).
Understanding food marketing and its impact on consumer choices. Navigating grocery stores and making informed decisions.

**Unit 4**

**The Role of Fruits and Vegetables in Healthy Eating**
The importance of fruits and vegetables in the diet.
Health benefits of fiber, antioxidants, and phytochemicals.
Incorporating more plant-based foods into your meals. Seasonal and local produce: Why it matters.

**Unit 5**

**Special Diets and Nutrition for Different Lifestyles**
Overview of popular diets (e.g., Mediterranean, vegetarian, vegan, paleo, ketogenic).
Nutrition for athletes and active individuals.
Special considerations for children, seniors, and pregnant women. Managing food allergies and intolerances (e.g., gluten, lactose).

**Unit 6**

**Mindful Eating and Emotional Health**
What is mindful eating?
The connection between emotions and eating habits.
Managing stress and emotional eating.
Developing a healthy relationship with food.

**Unit 7**

**Sustainable Eating and Environmental Impact**
The environmental impact of food choices (e.g., food miles, carbon footprint).
Sustainable eating practices: Local, seasonal, and organic foods.
Reducing food waste: Practical tips.
The role of plant-based eating in sustainability.

**Unit 8**
**Putting It All Together: Creating a Sustainable, Healthy Eating Plan**
Review of key concepts: Macronutrients, micronutrients, balanced eating, mindful eating.
Goal setting: How to set achievable health goals.
Meal prep and planning for a busy lifestyle.
Long-term strategies for maintaining a healthy diet.

**Assessment and Evaluation:**
Class Participation :20
Assignments/ case study presentations: 30
Final: 50

**Reference Textbook**

1. Nutrition and You" by Joan Salge Blake
2. Understanding Nutrition" by Eleanor Noss Whitney and Sharon Rady Rolfes

## 8. Art of Being a Better Person

**Course Description**:

This course explores what it means to live ethically, compassionately, and meaningfully as a human being. Students will engage in discussions about moral philosophy, empathy, self-awareness, and how to cultivate kindness, responsibility, and social engagement in everyday life.

**Course Objectives:**
By the end of the course, students will:

1. Understand foundational ethical principles that guide human behavior.
2. Cultivate emotional intelligence and empathy.
3. Learn practical strategies for self-improvement and kindness.
4. Understand their role in society and how to make a positive impact.
5. Reflect on personal actions, relationships, and contributions to the community.

**Unit 1**
**Introduction to Being a Good Human**
Defining "goodness" and ethical living
Overview of moral philosophies: Utilitarianism, Deontology, Virtue Ethics
The role of self-awareness in personal growth
**Activity**: Reflective journaling on what "being good" means to you.

**Unit 2**
**The Power of Empathy**

Understanding empathy vs. sympathy
The science behind empathy and its benefits for social connections
Techniques for cultivating empathy in everyday life
**Activity**: Empathy-building exercises and discussions.

**Unit 3**
**Emotional Intelligence (EQ)**
What is Emotional Intelligence? (Self-awareness, self-regulation, motivation, empathy, and social skills)
The role of EQ in personal and professional relationships
Strategies to improve emotional intelligence
**Activity**: Self-assessment of emotional intelligence and EQ development exercises.

**Unit 4**
**Compassion and Kindness**
The science of kindness: How kindness benefits us and others
Practicing kindness in small, everyday actions
Overcoming barriers to kindness (e.g., stress, biases, indifference) **Activity**:
"Random Acts of Kindness" challenge.

**Unit 5**
**Personal Integrity and Honesty**
The importance of integrity in personal and professional life
Consequences of dishonesty and lack of integrity
How to align actions with values
**Activity**: Case study discussion on ethical dilemmas and decision-making.
**Unit 6**
**Building Positive Relationships**
Communication skills for healthy relationships
Setting boundaries and respecting others' boundaries
Conflict resolution and forgiveness
**Activity**: Role-playing scenarios to practice healthy communication.

**Unit 7**
**Responsibility and Accountability**
The concept of personal responsibility in life
Accountability in both personal and community contexts How
to take ownership of mistakes and learn from them **Activity**:
Reflect on past mistakes and plan for growth.

**Unit 8**
**Contributing to the Community and Society**
The role of individuals in building strong communities
Volunteering, activism, and social responsibility
The impact of small, positive actions on a larger scale
**Activity**: Brainstorming session on potential ways to contribute to the local community.

**Unit 9**
**Practicing Gratitude and Contentment**

The psychological and emotional benefits of gratitude
Practicing contentment in a consumer-driven world
Techniques for cultivating a mindset of abundance **Activity**:
Gratitude journal and daily reflection.

**Unit 10**
**Living with Purpose and Meaning**
Discovering personal values and purpose
The intersection of passion, skills, and service
Creating a life plan that aligns with core values
**Activity**: Create a personal mission statement.

**Week 11**
**Overcoming Negative Traits: Greed, Anger, and Envy**
The psychology behind negative emotions and traits
How greed, anger, and envy affect our well-being
Strategies for managing and transforming negative emotions **Activity**:
Mindfulness meditation and reflection exercises.

**Bringing It All Together: A Life of Goodness**
Review of key learnings from the course
Creating a vision for continuous personal growth
How to maintain a positive and ethical life in a challenging world
**Activity**: Final reflection paper or presentation on how students will apply the course's principles to their life.

**Assessment and Evaluation:**
Class Participation :20
Assignments/ case study presentations: 30
Final: 50

**Reference Textbook**

1. How to Win Friends and Influence People" by Dale Carnegie
2. The Seven Habits of Highly Effective People" by Stephen R. Covey