

ABOUT THE COURSE

The concept of health care in our country is gradually shifting from mortality care to morbidity care. The health service sector faces many drawbacks in a country like India, with its growing population. With the advent of newer strategies in the field of science and technology, cardiac medical practice has shifted considerably from clinical cardiology to laboratory oriented cardiology. This has resulted in newest investigatory techniques and procedures for diagnostic and therapeutic purposes. The risk of heart disease increases nowadays due to the change in life style and social set up. In these circumstances, ECG and other cardiovascular measurement techniques included in the curriculum are essential for proper diagnosis. The purpose of this course is to create skilled technicians to meet the health need of society

Hearing is one of the most important senses possessed by man. Hearing disability affects one's communicative, educational, social and emotional abilities. Audiology is the science of hearing, balance and related disorders. Early detection of hearing loss is very important for the proper management of the loss. The aim of the curriculum is to provide skill in clinical Audiological procedures like pure tone audiometry. Rehabilitation of hearing impaired is also included. The syllabus offers fundamentals to students who pursue Diploma in Cardiovascular Technology, Bachelor of Cardiovascular Technology, BSc Audiology and Speech Therapy courses.

JOB ROLES (CAREER PATH)

Govt./Private Sector	Self employment
<ul style="list-style-type: none"> • ECG Technician • Assistant in Audiology Lab • Assistant in TMT lab • Assistant in Echo lab • Receptionist in Cardiology and Audiology lab • Lab technical assistant in VHSE 	<ul style="list-style-type: none"> • Private ECG units associated with clinical labs • Marketing of hearing aids • Health educator

SUBJECT APPROACH

Electrocardiography and Audiometric technology is one of the allied health courses included in the science group of VHSE. The curriculum emphasizes two important diagnostic measures ECG and Audiometry.

The risk of heart disease increases nowadays due to the change in life style and social set up. In these circumstances ECG & other cardiovascular measurement techniques included in the curriculum are essential for proper diagnosis. The purpose of this course is to create skilled technicians in cardiology.

Despite the appearance over the last decades of the large number of novel instrumental techniques for the diagnosis of cardiovascular disease, electrocardiography remains the most important and commonly used single diagnosis procedure. In this field Millions of ECGs are recorded annually and they often help the physicians to make the correct diagnosis, evaluate myocardial infraction and monitor the efficiency of treatment. It has been demonstrated by the many authorities that the adequate clinical diagnosis is nowadays virtually impossible without ECG. As a result electrocardiography found widespread application not only in cardiology but also in pulmonology, endocrinology, haematology, survey sports medicine, regular check up and for screening purposes.

Audiology is a scientific subject which is continually developing and changing. A thorough knowledge on audiology is essential for the diagnosis and rehabilitation of hearing impaired pupils. The aim of the course curriculum is to create awareness about clinical audiological procedures.

OBJECTIVES

- To create skilled ECG Technicians.
- To assist the Cardiologist in TMT lab
- To assist the Cardiologist in Echo lab
- To conduct a survey on heart disease
- To acquire self employment.
- To assist the Audiologist in Hearing evaluation and rehabilitation procedures
- To undergo higher education

The Kerala School Curriculum has been revised in the year 2013- 14 in tune with the recommendations in Children's Right to Free and Compulsory Education- Kerala Rules and Provisions-2011. The

characteristics of Kerala School Curriculum -2013 can be summarized as it is child centered, process related, activity oriented and value based. It lays stress on the learning outcomes at the cognitive, process, attitudinal and value domains. The teacher has the freedom to apply a variety of learning strategies during the transaction process. It gives importance to ensuring the learning outcomes to all learners. Based on these learning outcomes continuous and comprehensive evaluation is recommended. The curriculum also lays emphasis on the code of professional ethics for teachers.

With regard to learning process the following points are given importance.

1. The learners relate their previous knowledge to the knowledge they newly construct.
2. The differential needs of the learners are to be addressed by selecting and adapting learning activities.
3. Learning and assessment are complimentary to each other.
4. Learning process should aim at the all round development of the learner.

With all the above ends in view, the learning strategies are so designed and to be implemented. The learning activities proposed are diversified in their nature but is ensured to engage all learners both the gifted as well as the slow pace learners. Projects, experiments, discussions, panel discussions, survey, assignments, seminars, interviews, exhibitions, multimedia presentations, constructions and so on are the strategies proposed for transacting the learning outcomes in a learner centered experiential manner. The teacher has the freedom to employ any suitable strategy to transact a particular content area, provided he/she should ensure that the prescribed learning outcome is achieved by all the learners. Each learning activity should be designed in such a way that there is provision for continuous assessment to promote better learning. There should be slots for assessment as learning and assessment for learning. The learning evidences or learning products should be clearly specified while framing the activities. Teacher should have a thorough planning to explore the maximum possibilities of learning resources especially ICT materials for making the learning more effective. There should also be provision for catering the academic needs of all children (gifted as well as CWSN). The parents and society have a crucial role in promoting the level of learning of all children. For this, the teacher should explore all possibilities for utilizing the resources of the community for enhancing better learning of all children.

INFRASTRUCTURE

The revised VHSE curriculum requires following infrastructures to transact the curriculum effectively

- Interactive multimedia smart class rooms
- Sufficient number of laptops and accessories should be made available for teachers as well as students.
- Facilities for online referencing for students should be ensured.
- A well equipped lab for conducting the ECG & Audiometric practicals
- Production cum service centers (PTC) should be established in each school
- A well equipped library with journals and leaflets should be made available
- The course must have a link with nearest hospitals to utilize the availability of local resources

ASSESSMENT

The course exclusively focus on assessment as learning, assessment for learning, assessment of learning as envisaged in the school curriculum. Continuous Assessment is given due importance as it promotes learning and ensures the achievement of the prescribed learning outcomes by all the students.

SYLLABUS

Module 1 : BASICS OF CARDIOLOGY AND ELECTRONICS PRINCIPLES (340 Periods)

1.1 Human anatomy overview

- Anatomy, Physiology, Anatomical Position, Anatomical terms

1.2 Cell

- Structure of a cell and its functions

1.3 Skeletal system

- 1.3.1 Familiarization of human skeleton
- 1.3.2 Classification of bones
- 1.3.3 Thoracic cage
 - Sternum, ribs, vertebrae
- 1.3.4 Mediastinum

1.4 Bioelectricity

1.5 Respiratory system

- Structure, functions and mechanism of respiration

1.6 Cardiovascular system

- 1.6.1 Position and relations of heart
- 1.6.2 Layers of heart
- 1.6.3 Pericardium
- 1.6.4 Cardiac muscles
- 1.6.5 Chambers of heart and associated blood vessels
- 1.6.6 Valves of heart
- 1.6.7 Circulation of blood
- 1.6.8 Coronary arteries
- 1.6.9 Conduction system of heart
- 1.6.10 Cardiac cycle
- 1.6.11 Heart sound
- 1.6.12 Physiological variables associated with cardiac cycle

1.7 Heart disease (Brief awareness only)

- Coronary heart disease
- Cardiac arrhythmias
 - Tachyarrhythmia
 - Bradyarrhythmia
 - Conduction abnormalities
- Structural heart disease
 - disease of the
 - Myocardium, Pericardium,
 - Valvular heart disease,
 - Septal defects
- Abnormalities in cardiac position
 - Dextrocardia (Situs inversus dextrocardia,
 - Isolated dextrocardia, Mesocardia)
- Miscellaneous
 - Rheumatic fever,
 - Cardiac tumour,
 - Infections of the heart

1.8 Electronics Principles and Practice

- 1.8.1 Ohms law-resistance, resistivity
- 1.8.2 Colour coding of resistors
- 1.8.3 Kirchoff's laws-wheatstones bridge, meterbridge
- 1.8.4 Active and passive transducers
- 1.8.5 Electrodes used for ECG recording
- 1.8.6 Biological amplifiers

Module 2 : CARDIOVASULAR DIAGNOSIS (340 Periods)

- 2.1 Electrocardiography
 - 2.1.1 History of Electrocardiography
 - 2.1.2 Basic Principle of ECG
 - 2.1.3 Lead system
 - 2.1.4 Standardization
 - 2.1.5 Damping
 - 2.1.6 ECG Paper
 - 2.1.7 ECG Machine
 - 2.1.8 Procedure of ECG recording
 - 2.1.9 Normal ECG waveform
 - 2.1.10 Parameters of ECG
 - 2.1.11 Artifacts in ECG
 - 2.1.12 Common ECG abnormalities
 - 2.1.13 ECG Technician
 - Role in recognition of life threatening conditions
 - Non cardiac conditions which can make ECG look abnormal
- 2.2 Exercise ECG
 - 2.2.1 Types of Exercise ECGs
 - 2.2.2 Treadmill Test
 - Principle
 - Procedure
 - Uses
- 2.3 Holter Monitoring / Ambulatory ECG
 - Principles of Holter
 - Utility and indications
- 2.4 Cardiac Monitors
 - Instrumentation
- 2.5 Echocardiography
 - 2.5.1 Principle of echocardiography
 - 2.5.2 Instrument, techniques, types and uses
- 2.6 Cardiac Catheterization
(Basic awareness)
- 2.7 Defibrillators
 - 2.7.1 Principle, parts, types, precautions
Implantable Cardioverter Defibrillator(ICD)
- 2.8 Pacemakers
 - 2.8.1 Parts, Classification

- 2.9 Cardiopulmonary resuscitation (CPR)
 - 2.9.1 Basic life support
 - 2.9.2 Advanced life support
- 2.10 Screening of heart disease
 - 2.10.1 Risk factors of heart disease and its management
 - Calculation of body mass index
 - Body composition monitor
 - Automated digital B.P apparatus
 - ECG
- 1.11 Medical Ethics

LEARNING OUTCOMES

The learner will be able to :

Module 1 : BASICS OF CARDIOLOGY AND ELECTRONICS PRINCIPLES

Unit No. 1 : Human Anatomy Overview

- 1.1.1 Define anatomy and physiology
- 1.1.2 Classify the organ systems of the body
- 1.1.3 Identify different organ systems of the body
- 1.1.4 Choose the different anatomical terms
- 1.1.5 Compare different anatomical terms
- 1.1.6 Locate different organs in their anatomical position

Unit No 1.2 : Cell

- 1.2.1 Identify the different parts of a cell
- 1.2.2 Explain the functions of cell organelles

Unit No 1.3 : Skeletal system

- 1.3.1. Identify the different bones of the skeleton
- 1.3.2. Locate the bones according to the anatomical position
- 1.3.3. Compare different bones
- 1.3.4. Define skeleton and explain the functions of skeleton
- 1.3.5. Categorize bones of the skeleton according to the position , size and shape
- 1.3.6. Identify the bones of thoracic cage with their anatomical position
- 1.3.7. Locate different bones of thoracic cage
- 1.3.8. Describe the position of mediastinum
- 1.3.9. Identify the divisions and contents of mediastinum

Unit No 1.4 : Bioelectricity

- 1.4.1. Compare the different phases of the electrical activities of the cell

Unit No 1.5 : Respiratory system

- 1.5.1. Identify the parts and functions of Respiratory system
- 1.5.2 . Describe the relation between heart and respiratory system

Unit No 1.6 : Cardiovascular system

- 1.6.1. Locate the position of heart
- 1.6.2. Identify the relations of heart
- 1.6.3. Explain the features of the heart
- 1.6.4. Compare the different layers of the heart
- 1.6.5. Identify the structure of pericardium
- 1.6.6. Draw the layers of the heart
- 1.6.7. Describe the function of pericardium
- 1.6.8. Identify the properties, structure and function of cardiac muscle
- 1.6.9 Describe the structure of chambers of heart
- 1.6.10. Locate the position of cardiac valves
- 1.6.11. Distinguish atrioventricular and semilunar valves
- 1.6.12. Identify the structure and action of valves
- 1.6.13. Locate the flow of blood across the heart
- 1.6.14. Differentiate the pulmonary and systemic circulation
- 1.6.15. Identify the right and left coronary arteries
- 1.6.16. Locate the origin of coronary arteries
- 1.6.17. Identify the areas of distribution of right and left coronary arteries
- 1.6.18. Explain the coronary artery diseases.
- 1.6.19. Locate the different parts of conductive system
- 1.6.20. Analyse the impulse conduction pathway
- 1.6.21. Explain and differentiate different phases of cardiac cycle
- 1.6.22. Identify the heart sounds and its significance
- 1.6.23. Explain the various parameters associated with the cardiac cycle
- 1.6.24. Expertise in recording blood pressure

Unit No 1.7 : Heart disease

- 1.7.1. Identify and explain the heart disease , symptoms and risk factors

Unit No 1.8 : Electronics Principles and Practices

- 1.8.1. Perform experiments related to ohm's law

- 1.8.2. Explain colour coding techniques
- 1.8.3. Perform experiments related to Kirchoff's law
- 1.8.4. Describe the applications of transducers in biomedical field
- 1.8.5. Differentiate the merits and demerits of electrode
- 1.8.6. Explain the concept of different amplifier configurations.
- 1.8.7. Identify the principle and working of isolation amplifiers

Module 2 : CARDIOVASCULAR DIAGNOSIS

Unit No. 2.1 : UNIT NAME ELECTROCARDIOGRAPHY

- 2.1.1 Explain the historical background behind the invention of ECG
- 2.1.2. Describe the contribution of William Einthoven in the invention of ECG
- 2.1.3. Imagine the method of ECG recording in its earlier stages
- 2.1.4. Identify different lead systems
- 2.1.5. Identify the need of using multiple leads
- 2.1.6. Locate the arrangement of different leads
- 2.1.7. Locate various chest lead positions
- 2.1.8. Sketch the lead configurations
- 2.1.9. Explain the need of standardization
- 2.1.10. Compare normal, half and double standardization
- 2.1.11. Describe the technique of standardization
- 2.1.12. Describe the definition of damping
- 2.1.13. Differentiate the damping conditions
- 2.1.14. Analyse the effect of damping in ECG Recording
- 2.1.15. Identify the peculiarity and divisions of ECG paper
- 2.1.16. Identify the parts and functions of ECG Machine
- 2.1.17. Prepare the patient for ECG Recording
- 2.1.18. Recognise the importance of electrode gel
- 2.1.19. Locate the placement of electrodes
- 2.1.20. Decide to handle a patient (amputated)
- 2.1.21. To record ECG
- 2.1.22. Label and mount the rhythm strips
- 2.1.23. Analyse the amplitude and duration of each wave forms
- 2.1.24. Explain the size and shape of each wave form
- 2.1.25. Analyse the calculation of heart rate
- 2.1.26. Compare the variation in heart rate

- 2.1.27. Identify the different artifact in ECG recording
- 2.1.28. Explain the cause of artifacts and its elimination
- 2.1.29. Describe the common ECG abnormalities

Unit No. 2.2 : Exercise ECG

- 2.2.1 Explain the different types of exercise ECG
- 2.2.2 Describe the method of TMT test
- 2.2.3 Explain the instrument used to perform TMT test
- 2.2.4 Identify the uses of TMT test
- 2.2.5 Describe the protocol used in TMT testing
- 2.2.6 Compare TMT test with resting ECG

Unit No. 2.3 : Ambulatory ECG recording

- 2.3.1 Identify the need of Holter Monitoring
- 2.3.2 Describe the method of Holter Monitoring
- 2.3.3 Compare the merits and demerits of the technique

Unit No. 2.4 : Cardiac monitors

- 2.4.1.1 List the need of cardiac monitors
- 2.4.1.2 Identify the leads used in cardiac monitors
- 2.4.3 Sketch the parts of cardiac monitors

Unit No. 2.5 : Echocardiography

- 2.5.1 Explain the principle of Echocardiography
- 2.5.2 Identify the standard echo windows and the frequency used
- 2.5.3 Identify the different modalities of Echo and their uses

Unit No. 2.6 : Cardiac catheterization

- 2.6.1 Describe the need of Catheterization
- 2.6.2 Explain the applications of Cardiac Catheterization
- 2.6.2 Differentiate Coronary angiogram and angioplasty

Unit No. 2.7 : Defibrillators

- 2.7.1 Describe the principle of defibrillation
- 2.7.2 Compare atrial and ventricular fibrillation
- 2.7.3 Identify and the parts and types of defibrillators
- 2.7.4 Explain the electrode position and precautions during defibrillations.
- 2.7.5 Explain the use of ICD

Unit No. 2.8 : Pacemakers

- 2.8.1 Explain the need of pacing
- 2.8.2 Identify the parts of pacemakers
- 2.8.3 Compare the different types of pacemakers

Unit No. 2.9 : Cardiopulmonary Resuscitation

2.9.1 Perform CPR in emergency situations

Unit No. 2.10 : Screening of Heart disease

2.10.1 List the risk factors and its management

2.10.2 Record and analyse the parameters like BMI, Body Fat, BP, ECG

Unit No. 2.11 : Medical ethics

2.10.11 Recognize the rules and regulations to be followed by a technician in medical field

SCHEME OF WORK (MODULE 1 AND 2)

Module - 1 : Basics of Cardiology & Electronics Principles

Month	Unit No.	Unit Name	Periods
June	1.1	Human anatomy Overview	15
June	1.2	Structure of cell	10
July	1.3	Skeletal System	30
July - August	1.4	Bioelectricity	5
August	1.5	Respiratory System	10
August-September	1.6	Cardiovascular System	180
September-October	1.7	Heart disease	20
October	1.8	Electronics Principles and Practice	70
Module - 2 : Cardiovascular diagnosis			
November-December	2.1	Electrocardiography	200
December	2.2	Exercise ECG	30
December	2.3	Holter Monitoring	8
January	2.4	Cardiac Monitors	9
January	2.5	Echocardiography	15
January	2.6	Cardiac Catheterization	11
January	2.7	Defibrillators	10
January	2.8	Pacemakers	10
February	2.9	Cardiopulmonary Resuscitation	20
February	2.10 & 2.11	Screening of Heart Disease, Medical Ethics	27

COURSE STRUCTURE

This course consists of 4 modules such as,

Module 1	Basics of Cardiology and Electronics Principles	340 periods
Module 2	Cardiovascular diagnosis	340 periods
Module 3	Basics of Audiology	340 periods
Module 4	Hearing Evaluation and Rehabilitation Procedures	340 periods

CLASS ROOM ACTIVITIES

- Power Point presentation
- Charts
- Diagrams
- Models
- Animations
- Discussions
- Exhibitions
- Quiz
- Interview with experts
- Debate
- Video conference
- Assignment
- Seminar

PRACTICAL ACTIVITIES

1. Lab experiments
2. Surveys
3. Role play
4. Field study
5. Case study
6. Data collection

ON- THE-JOB TRAINING

As ECG & AMT course is in the group of Allied Health Sciences, the activities which has to be performed is not limited in the class room. To fulfill the learning outcomes the students must be exposed to on the job training.

OJT helps the students

- To develop vocational skill
- To develop personal qualities.
- To develop values, attitudes and interests.
- To apply their knowledge in real situations

- To develop a professional attitude

The OJT can be given at the end of the second and fourth module for 15 days each. It can be decided according to the facility and convenience of the school and OJT centers. The OJT centers can be

- Primary health centers with the facility of ECG recording
- Government and private hospital
- Recognized clinical labs

Certification of skills in each module

Skill Certificate in basics of Cardiology and Electronics Principles after completion of first module.

Skill Certificate in Cardiovascular diagnosis after completion of second module.

Skill certificate in Basics of Audiology after completion of third module

Skill certificate in Hearing evaluation and rehabilitation procedures after completion of fourth module

Overview of the Module 1

Before learning electrocardiography and other cardiovascular diagnostic methods it is essential to understand the basic structure and functions of the various systems of the human body. The first module introduces the anatomical terms, structure of cell, skeletal system, respiratory system and detailed study of cardiovascular system. The physiological variables associated with heart and a general awareness about heart disease also included. This module deals with various transducers and electrodes used to measure the physiological variables like temperature, pressure, blood flow, bioelectric potentials etc. After completing this module the learner will acquire the skill of Blood Pressure measurement and basic knowledge about the various systems of the body. By considering the importance of the chapter, necessary learning activities should be planned and introduced so as to reinforce the ideas and develop activity.

List of Expected skills

- Identify different organ systems of the body
- Identify the structure of a human cell
- Explain the different phases of electrical activities of a cell and the origin of ECG wave forms
- Identify the bones of human skeleton
- Identify the parts and functions of respiratory system
- Describe the structure and functions of the heart
- Measure the Blood pressure of a person
- Measuring the pulse of a person

- Explain the various heart disease
- Perform experiments related to ohm's law and Kirchoff's law
- Identify the various transducers used in biomedical field and their applications
- Choose the appropriate electrodes for ECG recording
- Identify the different amplifier configurations
- Identify the working of isolation amplifiers

Module 1

340 periods

BASICS OF CARDIOLOGY AND ELECTRONICS PRINCIPLES

Unit No.	Name of unit	Periods
1.1	Human anatomy overview	15
1.2	Cell	10
1.3	Skeletal system	30
1.4	Bioelectricity	5
1.5	Respiratory system	10
1.6	Cardiovascular system	180
1.7	Heart disease	20
1.8	Electronics Principle and Practice	70
	Total periods	340

30% Periods theory sessions and 70% Periods practical activities.

Module 1 : BASICS OF CARDIOLOGY AND ELECTRONICS PRINCIPLES		Unit 1.1 : HUMAN ANATOMY OVERVIEW	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<p>Anatomy & Physiology Systems of the body</p> <p>Skills:</p> <ul style="list-style-type: none"> • Identification • Categorization • Observation • Comparison <p>Anatomical terms and positions</p> <p>Skills:</p> <ul style="list-style-type: none"> • Identification • Observation • Comparison 	<p><i>The learner will be able to:</i></p> <ul style="list-style-type: none"> • Define anatomy and physiology. • Classify the organ systems of the body. • Explain different organs in the system. • Identify different anatomical terms and positions. • Locate different organs in their anatomical position. 	<ul style="list-style-type: none"> • Group discussion about the different systems of the body based on previous knowledge. • Demonstration of anatomical position and introduction of anatomical terms. • Demonstration of charts • Animated CDs 	<ul style="list-style-type: none"> • Activity log • Portfolio • Identification using charts and models
Module 1 : BASICS OF CARDIOLOGY AND ELECTRONICS PRINCIPLES		Unit 1.2 : CELL	
<p>Structure of cell</p> <p>Skills:</p> <ul style="list-style-type: none"> • Identification • Observation • Functions of each cell organelles • Differentiation • Identification • Observation 	<ul style="list-style-type: none"> • Identify the different parts of cell. • Explain the functions of various cell organelles. 	<ul style="list-style-type: none"> • Discussion based on previous knowledge. • Definition of cell. • Demonstration of chart and discuss the structure • Group discussion about the functions of cell organelles. • Preparation of charts and labelling 	<ul style="list-style-type: none"> • Activity log • Drawing and labeling of diagrams • Questions • Charts

Module 1 : BASICS OF CARDIOLOGY AND ELECTRONICS PRINCIPLES		Unit 1.3 : SKELETAL SYSTEM	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<p>Familiarization of bones of the Skelton</p> <p>Skills: Identification Observation Comparison Categorization Drawing</p> <p>Classification of bones Based on size and shape</p> <p>Skills: Comparison Categorization Differentiation</p>	<p><i>The learners will be able to:</i></p> <ul style="list-style-type: none"> Identify the different bones of skeleton. Locate the bones according to anatomical position. Compare different bones. Define skeleton and explain the functions of skeleton. Categorize bones of the skeleton according to position, size and shape. Compare the different bones. 	<ul style="list-style-type: none"> Demonstration of <ul style="list-style-type: none"> Skeleton Chart Animated CD Discussion Illustration Demonstration using <ul style="list-style-type: none"> Models Chart Animation Discussion based on demonstration 	<ul style="list-style-type: none"> Activity log Quiz Questions Record Chart Model Questions Explanation using models Identification of bones Classification of bones
<p>Thoracic cage: Bones of thoracic cage</p> <p>Skills Observation Identification Classification Drawing</p>	<ul style="list-style-type: none"> Identify the bones of thoracic cage with their anatomical position. Locate different bones of thoracic cage. List the bones of thoracic cage. Classify the ribs. 	<ul style="list-style-type: none"> Demonstration of <ul style="list-style-type: none"> Skeleton Chart Animated CD Group discussion based on previous knowledge. Preparation of chart, model 	<ul style="list-style-type: none"> Chart Activity log Model Questions Diagram

Module 1 : BASICS OF CARDIOLOGY AND ELECTRONICS PRINCIPLES		Unit 1.3 : SKELETAL SYSTEM	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
Mediastinum <ul style="list-style-type: none"> • Definition • Divisions of mediastinum • Contents of mediastinum Skills <ul style="list-style-type: none"> • Observation • Identification • Classification • Drawing • Comparison 	<p>The learners will be able to</p> <ul style="list-style-type: none"> • Describe the position of mediastinum • Identify the divisions of mediastinum. • Identify the contents of mediastinum. • Sketch the divisions of mediastinum. 	<ul style="list-style-type: none"> • Demonstration of <ul style="list-style-type: none"> - Chart - CD - Diagram • Illustration of the divisions of mediastinum and contents of mediastinum 	<ul style="list-style-type: none"> • Chart • Diagram • Questions
Unit 1.4 : BIO ELECTRICITY			
Bio Electricity <ul style="list-style-type: none"> • Cell membrane transport Skills <ul style="list-style-type: none"> • Observation • Identification • Electrical activity of the cell. Skills <ul style="list-style-type: none"> • Observation 	<ul style="list-style-type: none"> • compare the different phases of electrical activity. • Illustrate the electrical activity • Identify the origin of ECG wave forms i.e. P, QRS, T wave forms. • Identify the bio potentials of Brain & muscles. 	<ul style="list-style-type: none"> • Discussion of different stages of cell membrane transport. • Demonstration of diagrams showing polarized cell. • Depolarisation • Replolarisation • Preparation of chart 	<ul style="list-style-type: none"> • Questions • Activity log • Chart • Discussion notes
Unit 1.5 : RESPIRATORY SYSTEM			
Respiratory system <ul style="list-style-type: none"> • Upper respiratory tract • Lower respiratory tract Skills <ul style="list-style-type: none"> • Identification • Observation • Drawing • Comparison 	<ul style="list-style-type: none"> • Identify the parts of respiratory system • Explain the functions of respiratory system • Describe the relation between heart and respiratory system. 	<ul style="list-style-type: none"> • Demonstration of charts, videos, models • Discussion based on demonstration • Preparation of charts, models and diagrams 	<ul style="list-style-type: none"> • Questions • Activity log • Charts • Models • Discussion notes

Module 1 : BASICS OF CARDIOLOGY AND ELECTRONICS PRINCIPLES		Unit 1.6 : CARDIOVASCULAR SYSTEM	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<p>Position and relations of heart</p> <ul style="list-style-type: none"> Position and relations of heart. <p>Skills</p> <p>Identification Observation</p>	<p><i>The learner will be able to:</i></p> <ul style="list-style-type: none"> Locate the position of heart. Identify relations of heart Explain the size, shape, boarders and surfaces of heart. 	<ul style="list-style-type: none"> Discussion based on previous knowledge. Demonstration of <ul style="list-style-type: none"> Model -Chart -CD Diagram - Multimedia Preparation of chart and labelling 	<ul style="list-style-type: none"> Activity log Chart Diagram Questionnaire
<p>Layers of heart</p> <ul style="list-style-type: none"> Pericardium Myocardium Endocardium <p>Skills</p> <p>Differensiation Identification</p> <p>Classification Observation</p>	<ul style="list-style-type: none"> Compare different layers of heart. Identify the structure and function of layers of heart. Locate the different layers 	<ul style="list-style-type: none"> Discussion Demonstration of <ul style="list-style-type: none"> Multimedia Chart Diagram Discussion Demonstration Preparation and labelling of chart 	<ul style="list-style-type: none"> Chart Diagram Activity log Questionnaire
<p>Pericardium</p> <ul style="list-style-type: none"> Structure and function <p>Skills</p> <p>Identification Comparison Observation</p>	<ul style="list-style-type: none"> Identify the structure of pericardium Draw the layers of pericardium. Describe the function of pericardium. 	<ul style="list-style-type: none"> Discussion Demonstration of <ul style="list-style-type: none"> Diagrams Microscopic examination of slides Illustration Preparation and labelling of chart 	<ul style="list-style-type: none"> Activity log Chart Diagram Questionnaire
<p>Cardiac muscles</p> <p>Skills</p> <p>Observation Identification Drawing Comparison</p>	<ul style="list-style-type: none"> Identify the structure of cardiac muscle. Sketch the structure of cardiac muscles Describe the properties of cardiac muscles 	<ul style="list-style-type: none"> Discussion Demonstration of <ul style="list-style-type: none"> Diagrams Microscopic examination of slides Illustration Preparation and labelling of chart 	<ul style="list-style-type: none"> Drawing Activity log Questions Identification using slides

Module 1 : BASICS OF CARDIOLOGY AND ELECTRONICS PRINCIPLES		Unit 1.6 : CARDIOVASCULAR SYSTEM	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
Chambers of heart and blood vessels Skills Identification Categorisation Observation Charting	<p><i>The learner will be able to:</i></p> <ul style="list-style-type: none"> Identify the chambers of heart and blood vessels. Describe the functions, position, structure of chambers and blood vessels. 	<ul style="list-style-type: none"> Discussion Demonstration <ul style="list-style-type: none"> Chart Model Diagrams Preparation of <ul style="list-style-type: none"> Chart Model 	<ul style="list-style-type: none"> Portfolio Drawing and labelling of diagrams Activity log Questions charts
Valves of the heart Skills Observation Identification Comparison	<ul style="list-style-type: none"> Locate the position of cardiac valves. Distinguish atrio ventricular and semilunar valves Identify the structure and action of valves. 	<ul style="list-style-type: none"> Discussion Demonstration Chart preparation based on opening and closing of valves. 	<ul style="list-style-type: none"> Activity log Prepared questionnaire Chart showing opening and closing of valves.
Circulation of blood Skills Observation Identification Comparison	<ul style="list-style-type: none"> locate the flow of blood across the heart. Differentiate the pulmonary and systemic circulations. 	<ul style="list-style-type: none"> Discussion Demonstration Illustration 	<ul style="list-style-type: none"> Charts Questionnaire Activity log
Coronary artery Skills Observation Identification Differentiation	<ul style="list-style-type: none"> Identify the right and left coronary arteries. Locate the origin of coronary arteries. Identify the areas of distribution of right and left coronary arteries. Explain the coronary artery disease. 	<ul style="list-style-type: none"> Discussion Demonstration Illustration Demonstration of animated CD showing coronary arteries Data collection 	<ul style="list-style-type: none"> Charts Questionnaire Activity log Discussion notes Collections

Module 1 : BASICS OF CARDIOLOGY AND ELECTRONICS PRINCIPLES		Unit 1.6 : CARDIOVASCULAR SYSTEM	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
Conductive system of heart Skills Observation Identification Charting	<p><i>The learner will be able to:</i></p> <ul style="list-style-type: none"> • Locate the different parts of conductive system. • Analyse the impulse conduction pathway. • Sketch the parts of conductive system. • Recognize the relation between conduction system and origin of ECG waves. 	<ul style="list-style-type: none"> • Discussion about bioelectric potential • Demonstration <ul style="list-style-type: none"> - Chart - Diagram - animations • Preparation of models • Flow chart preparation 	<ul style="list-style-type: none"> • Activity log • Drawing and labelling of diagrams • Questions • Model • Flow chart
Cardiac cycle Skills Comparison Differentiation Identification	<ul style="list-style-type: none"> • Explain cardiac cycles, different phases of cardiac cycle. • Differentiate phases of cardiac cycle. 	<ul style="list-style-type: none"> • Discussion • Demonstration using <ul style="list-style-type: none"> - Chart - animations 	<ul style="list-style-type: none"> • Questions • Activity log • Record
Heart sounds Skills Identification Listening Observation Comparison	<ul style="list-style-type: none"> • identify the different sounds by listening. • Identify the causes of heart sounds • Explain the significance of heart sounds. 	<ul style="list-style-type: none"> • Discussion • Practical activity • Demonstration using <ul style="list-style-type: none"> - stethoscope • Discussion Based on demonstration 	<ul style="list-style-type: none"> • Questions • Activity log • Practical evaluation • Discussion notes
Physiological variables associated with cardiac cycle - Cardiac output, - Heart rate - Pulse Skills Identification, Observation Recording, Comparison, Analization	<ul style="list-style-type: none"> • Define various parameters associated with cardiac cycle • Compare the different parameters. • Expertise in recording blood pressure. • Handle the sphygmomanometer and stethoscope • Automatic BP checking machine. • Evaluate B.P 	<ul style="list-style-type: none"> • Discussion • Demonstration • Practical activity • Measurement of BP using sphygmomanometer • Measurement of pulse 	<ul style="list-style-type: none"> • Practical evaluation • Questions • Activity log • Skill in BP recording

Unit 1.7 : HEART DISEASE			
Module 1 : BASICS OF CARDIOLOGY AND ELECTRONICS PRINCIPLES	Learning Outcomes	Suggested Activities	Assessment
<p>Ideas/Concepts/Skill</p> <p>Heart diseases</p> <ul style="list-style-type: none"> - Coronary heart disease - Cardiac Arrhythmias - Structural heart disease - Arrhythmias - Abnormalities in cardiac position - Miscellaneous <p>Skills</p> <ul style="list-style-type: none"> - Identification - Observation - Communication 	<p><i>The learner will be able to:</i></p> <ul style="list-style-type: none"> • Explain heart disease • symptoms of heart disease. • analyse the risk factors of heart disease. • Explain the risk factors of heart disease to the society . 	<ul style="list-style-type: none"> • Discussion • Demonstration • Interview with experts • Assignment • Chart preparation • Data Collection 	<ul style="list-style-type: none"> • Questionnaire • Chart preparation • Data collection • Assignment • Survey
Unit 1.8 : ELECTRONICS PRINCIPLES & PRACTICE			
Module 1 : BASICS OF CARDIOLOGY AND ELECTRONICS PRINCIPLES	Learning Outcomes	Suggested Activities	Assessment
<p>Ideas/Concepts/Skill</p> <p>Ohm's Law</p> <ul style="list-style-type: none"> • Resistance • Resistivity <p>Skills</p> <ul style="list-style-type: none"> • Observation • Experimenting • Communication <p>Colour coding of resistors</p> <p>Skills</p> <ul style="list-style-type: none"> • Observation • Comparison • classification 	<ul style="list-style-type: none"> • Recognise ohm's law and concept of electrical resistance. • Explain resistance and resistivity • Experiment related to ohm's law. <ul style="list-style-type: none"> • Explain the colour coding of resistors • Identify the colour coding of resistors • Practice colour coding technique 	<ul style="list-style-type: none"> • Experiment • Project • Discussion <ul style="list-style-type: none"> • Practical's • Discussion 	<ul style="list-style-type: none"> • Practical • Activity log • Questions. • Discussion notes <ul style="list-style-type: none"> • Practical • Activity log • Discussion notes

Module 1 : BASICS OF CARDIOLOGY AND ELECTRONICS PRINCIPLES		Unit 1.8 : ELECTRONICS PRINCIPLES & PRACTICE	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<ul style="list-style-type: none"> • Kirchoff's law • Wheatstone's bridge • Meter bridge <p>Skills</p> <ul style="list-style-type: none"> • Observation • Experimenting • Predicting • Communication <p>Transducer</p> <ul style="list-style-type: none"> - Active transducer - Passive transducer <p>Skills</p> <ul style="list-style-type: none"> • Identification • Observation • Communication • Classification <p>Electrodes for ECG Recording</p> <p>Skills</p> <ul style="list-style-type: none"> • Identification • Differentiation • Comparison <p>Biological amplifiers</p> <p>Skills</p> <ul style="list-style-type: none"> • Identification • Differentiation • Comparison 	<p><i>The learner will be able to:</i></p> <ul style="list-style-type: none"> • Explain wheatstone's bridge principle • find out the value of unknown resistance of given material <ul style="list-style-type: none"> • define transducer • Classify the transducer based on the working principle. • Describe the application of transducers in biomedical field. <ul style="list-style-type: none"> • Explain the different types of electrodes. • choose appropriate electrodes for ECG recording. • Differentiate the merits and demerits of electrodes. • Explain the concept of different amplifier configuration. • Describe the need of amplification using transistors. • Identify the principle and working of isolation amplifier. 	<ul style="list-style-type: none"> • Demonstration • Practical • Discussion <ul style="list-style-type: none"> • Discussion • Demonstration • Diagrammatic representations • Data collection • Assignment • Chart preparation <ul style="list-style-type: none"> • Demonstration of electrodes • Discussion about the use of electrodes • Chart preparation <ul style="list-style-type: none"> • Demonstration • Discussion • Practical 	<ul style="list-style-type: none"> • Practical • Activity log • Questions. <ul style="list-style-type: none"> • Questions • Charts • Assignment <ul style="list-style-type: none"> • Questions • Chart preparation • Practical's <ul style="list-style-type: none"> • Practical • Activity log • Questions

UNIT ANALYSIS

MODULE 1

Name of Module : Basics of Cardiology and Electronics Principles and Practice

Unit 1 : Human Anatomy Overview

Introduction

For anyone concerned with the medical field it is essential to know the structure of human body. Human being is a very complex multicellular organism in which the maintenance of life depends up on a vast numbers of physiological activities. The sum of these activities enables the human being to live in and utilizes his environment. The study of human body involves anatomy and physiology. The learners are already aware of basic structure and function of human body.

Value and attitudes

This chapter helps to develop awareness about the various organ systems of the body, importance of each system of the body and the anatomical terminology.

Module 1 : BASICS OF CARDIOLOGY AND ELECTRONICS PRINCIPLES		Unit 1.1 : HUMAN ANATOMY OVERVIEW	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<p>Anatomy & Physiology</p> <p>1.1.1 Systems of the body</p> <p>Skills:</p> <ul style="list-style-type: none"> - Identification - Categorization - Observation - Comparison <p>1.1.2 Anatomical terms and positions</p> <p>Skills:</p> <ul style="list-style-type: none"> - Identification - Observation - Comparison 	<p><i>The learner will be able to:</i></p> <ul style="list-style-type: none"> • Learner will be able to : • Define anatomy and physiology. • Classify the organ systems of the body. • Explain different organs in the system. • Identify different anatomical terms and positions. • Locate different organs in their anatomical position. 	<ul style="list-style-type: none"> • Group discussion about the different systems of the body based on previous knowledge. • Demonstration of anatomically position and introduction of anatomical terms. • Demonstration of charts • Animated CDs 	<ul style="list-style-type: none"> • Activity log • Portfolio • Identification using charts and models

THROUGH THE CHAPTERS

Concept:

- Anatomy & Physiology
- Organ Systems

The mentor initiates a general discussion based on the previous knowledge of the learner about the human body.

Points to be discussed

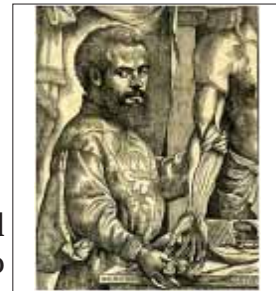
- Anatomy
- Physiology
- Important organ systems of the body

Consolidation points

- Anatomy is the study of the parts and structure of the body and their relationship to each other
- Physiology is the study of different functional activities of the human body

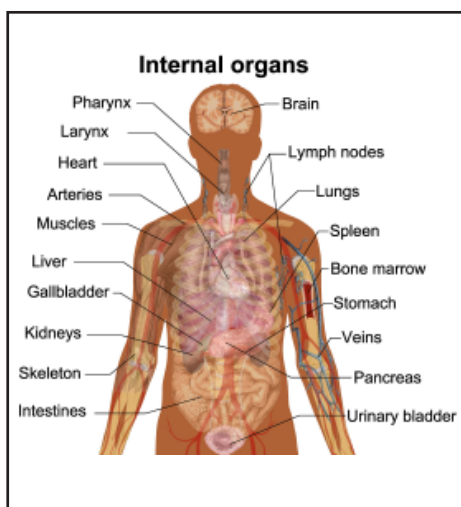
The major organ systems of the body are

- **Musculoskeletal**
Consists of bones and muscles. Give support and helps in movement
- **Respiratory system**
Consists of the air passages and lung, by which the oxygen is taken in transferred to the blood and carbon dioxide is eliminated.
- **Cardiovascular System**
Consists of heart and blood vessels. Heart pumps blood to various parts of the body which helps to transport oxygen, nutrients and waste products.



Andreas Vesalius

Andreas Vesalius is regarded as the “Founder of Modern Anatomy” because he made the world realize that anatomy can only be taught through dissection.



- **Nervous System**
Consists of brain, spinal cord and nerves. It is the system of communication between environment and various parts of the body.
- **Digestive System**
Digestive system consists of alimentary tract and associated glands. The alimentary tract extends from the mouth to anus. Accessory glands includes salivary glands, liver and pancreas. The complex food is converted to simple absorbable forms by the process of digestion.

- Excretory System**

The excretory system includes urinary system, the skin, lungs and alimentary canal. The waste product carbon dioxide is volatile and eliminated, is exhaled from the lungs. Waste products of food residue are removed by way of alimentary tract. Water is eliminated through all channels of excretion (lung, skin, large intestine and kidneys) The remaining waste products like inorganic salts and most of the nitrogenous waste products are excreted with the help of kidneys.
- Reproductive system**

Reproduction is the process by which a living organism gives rise to new individuals of its own kind, The method of reproduction in man is sexual type. The system concerned with the organs of production of gametes, fertilization and development of the embryo.
- Endocrine System**

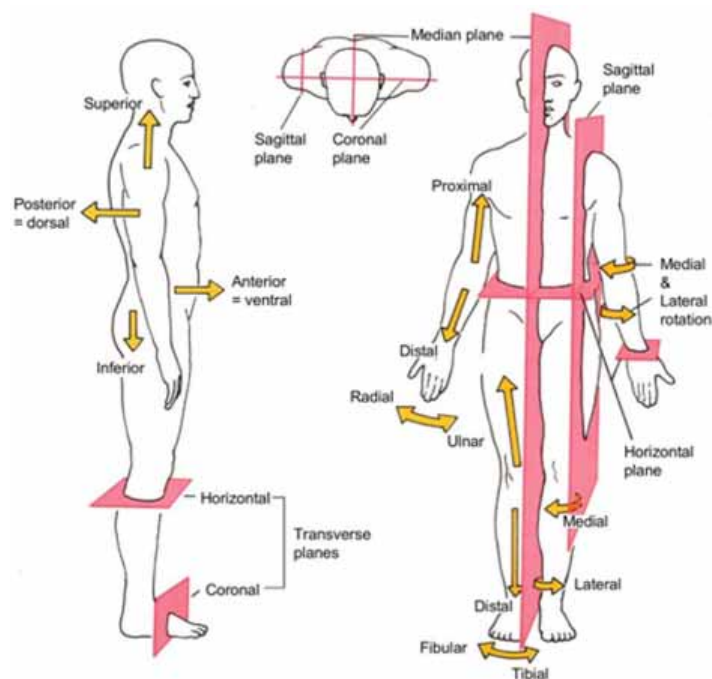
The endocrine system consists of endocrine glands and hormones. Hormones are chemical substance secreted from endocrine glands . Each hormone has a particular site of action on certain organs. The important endocrine glands in the human body are pituitary thyroid, parathyroid, adrenal, thymus, pineal body, pancreas and gonads.

Concept: Anatomical terms and positions

Activity suggested

1. Demonstration of anatomical position.

The mentor first demonstrates the anatomical position of the body by positioning one of the learners as model. Then introduce the anatomical position



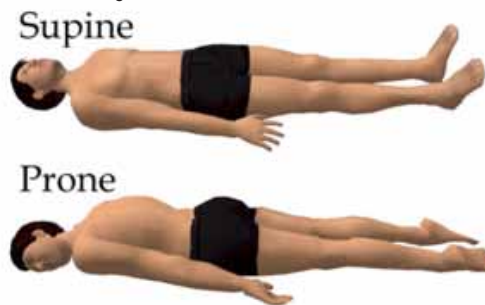
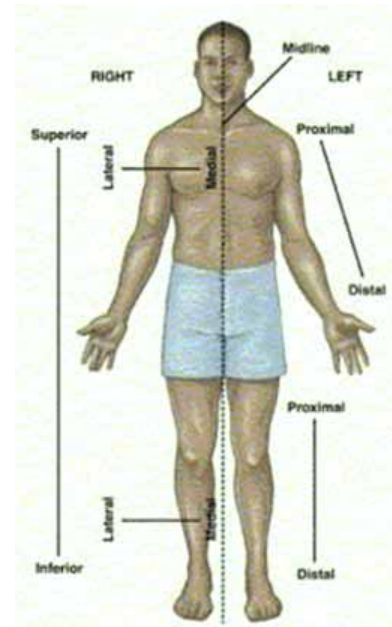
Points to be known.

- Standing erect
- Eyes looking forward
- Upper extremities at the side of body, palms turned forward.

2. Demonstration of charts to introduce anatomical terms

Terms to be introduced

- Anterior / Ventral
 - Towards the front of the body
- Posterior / Dorsal
 - Towards the back of the body
- Medial
 - Towards the midline
- Lateral
 - Away from the midline
- Superior
 - A Part above another
- Inferior
 - A Part below another
- Proximal
 - Nearest to the point of attachment to the body
- Distal
 - Away from the point of attachment to the body
- Central
 - Situated at or related to a center
- Peripheral
 - Towards the surface of the body
- Supine
 - Position of the body lying with back on the table [face UP]
- Prone
 - Position of the body lying flat with chest down and back UP.



Assigned activity

- Prepare notes in the activity log
- Identification of anatomical position and relation of various organs using charts and models.
- Visiting anatomy museums and medical exhibitions
- Preparation of charts

Repository of CE activities

a. Process Assessment

Participation in discussion, seminars and class room activities has to be evaluated by fixing indicators for each learning process. The indicators like participation, conceptual understanding attainment of skill, performance / presentation. For self assessment appropriate tools may be adopted.

b. Portfolio Assessment

- Report of group discussion
- Prepared charts photography and other data

Unit Assessment

- Unit Test
- Quiz Programme
- Oral Test
- Preparation of question and writing answers

SAMPLE QUESTIONS

1. Differentiate the following anatomical terms
 - a. Anterior
 - b. Posterior
 - c. Medial.
 - d. Lateral
 - e. Central
 - f. Peripheral
2. MCQ
 - a. Anatomy is the term which means study of
 - i. Physiology
 - ii. Morphology
 - iii. Cell function
 - iv. Human functions
 - b. Study dealing with the explanations of how all organ works would be an example of
 - i. Anatomy
 - ii. Cytology
 - iii. Teleology
 - iv. Physiology
 - c. The process of turning molecules that are ingested into forms that are compatible with the organism is...
 - i. Digestion
 - ii. Absorption
 - iii. Assimilation
 - iv. Circulation
 - d. The exchanging of gases for the purpose of producing energy is called
 - i. Breathing
 - ii. Respiration
 - iii. Circulation
 - iv. Responsiveness
 - e. The removal of a compound that the body no longer requires is called
 - i. Secretion
 - ii. Excretion
 - iii. Movement
 - iv. Digestion
 - f. The following belong together except which one
 - i. Brain
 - ii. Vertebral
 - iii. Spinal cord
 - iv. Stomach

- g. The heart lies in the Space
 - i. Thoracic cavity
 - ii. Pleural cavity
 - iii. Abdominal cavity
 - iv. Cranial cavity
- 3. Complete the following
 - a. Supine - position of the body lying with back on the table
 - b. Prone -
.....
- 4. Give a brief description about anatomical position and anatomical terms

MODULE 2 : CARDIOVASCULAR DIAGNOSIS

Overview of the Module: Electrocardiography is one of the most widely used non-invasive technique for the diagnosis of heart disease .It is the first electrical device to find widespread use in medical field and still holds its importance as a diagnostic tool of cardiac disorders

When heart contracts electrical current is produced and propagated throughout the body to the skin. By using electrodes, this current can be recorded. This is called electrocardiogram. The production and propagation of bioelectrical potential across the cardiac cell are already discussed in the first module. This module includes history of ECG, basic principles, working and parts of ECG machine, method of recording ECG and common ECG abnormalities.

The use of engineering method and the development of instrumentation contribute substantially in progress made in recent years reduce the death from heart disease. In this module ECG and other cardiovascular measurement system are discussed.

This module enables the student to acquire skill in recording ECG and its applications. A thorough knowledge in this module can only be attained through hospital visit and OJT.

LIST OF EXPECTED SKILLS

The learner will be able to

- Arrange the leads for ECG recording
- Sketch the lead configurations
- Record electrocardiogram
- Eliminate the artifacts while ECG recording
- Analyse normal and abnormal ECG waveforms
- Identify the common ECG abnormalities
- Practice the method of TMT testing
- Identify the method of holter monitoring
- Identify the parts and use of cardiac monitors
- Identify the principle and method of echocardiography
- Identify the need of cardiac catheterization
- Identify the application of defibrillators
- Identify the application of pacemakers
- Perform CPR

CARDIOVASCULAR DIAGNOSIS**Periods : 340**

Unit No.	Name of the unit	Periods
2.1	Electrocardiography	200
2.2	Exercise ECG	30
2.3	Holter Monitoring	08
2.4	Cardiac Monitors	09
2.5	Echocardiography	15
2.6	Cardiac catheterization	11
2.7	Defibrillators	10
2.8	Pace makers	10
2.9	Cardiopulmonary Resuscitation	20
2.10	Screening of heart diseases	22
2.11	Medical Ethics	05

30% Period theory and 70% Period practical's

List of Practical Activities after each unit frame

- 2. 1. 3 Electrocardiography
Practice the arrangement of various lead patterns (Bipolar limb leads, unipolar limb leads, precordial leads and Special leads)
- 2. 1. 4 Standardization procedure - Half, Normal, Double
- 2.1.7 Identify the parts of an ECG machine using an old dismantled ECG machine
- 2.1.8 Procedure of ECG recording
 - patient preparation
 - Placement of electrodes
 - Recording
 N.B (Recording of ECG 25 cases)
- 2.1.10 Calculation of heart rate from ECG
- 2.1.10 Analyze the parameters of ECG wave form
- 2.1.11 Recognition of wrong lead connections
- 2.2 Familiarization and identification of cardio vascular diagnostic equipment
- 2.2 TMT test
- 2.3 Holter Monitoring
- 2.4 Cardiac monitors
- 2.5 Echocardiography
- 2.6 Cath lab
- 2.7 Defibrillator
- 2.8 Pacemakers
- 2.9 Perform ABC on a dummy
- 2.10 Calculation of Body mass index
- 2.10 Body composition monitoring

Module 2 : CARDIOVASCULAR DIAGNOSIS		ELECTROCARDIOGRAPHY	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
History of ECG Skills <ul style="list-style-type: none"> • Communication • Identification 	<p><i>The learner will be able to:</i></p> <ul style="list-style-type: none"> • Explain the historical background behind the invention of ECG • Describe the contributions of William Einthoven in the invention of ECG • Identify the method of ECG recording in its earliest stages. 	<ul style="list-style-type: none"> • Discussion • Data collection • Assignment 	<ul style="list-style-type: none"> • Activity log • Questions • Collection • Assignment
Lead System Skills <ul style="list-style-type: none"> • Identification skill • Technical skill • Categorizations • Differentiation 	<ul style="list-style-type: none"> • Identify different lead Systems • Identify the need of using multiple leads • Locate and arrange of different leads • Locate various chest lead position • Sketch the lead configurations 	<ul style="list-style-type: none"> • Demonstration of leads • Illustration of lead configurations • Animations • Chart preparation • Discussion • Practical 	<ul style="list-style-type: none"> • Questions • Practical • charts
Standardisation Skills <ul style="list-style-type: none"> • Identification • Observation • Comparison • Decision making 	<ul style="list-style-type: none"> • Explain the need of standardization • Compare normal half and double standardization • Explain the technique of standardization 	<ul style="list-style-type: none"> • Demonstration using ECG machine • Discussion based on demonstration • Chart preparation • Practice the standardisation procedure in lab 	<ul style="list-style-type: none"> • Practical • Questions • Charts
Damping Skills <ul style="list-style-type: none"> • Observation • Identification • Comparison 	<ul style="list-style-type: none"> • Describe the definition of damping • Differentiate damping condition • Analyse the effect of damping in ECG recording 	<ul style="list-style-type: none"> • Demonstration • Illustration • Discussion • Chart preparation • Practical 	<ul style="list-style-type: none"> • Activity log • Questions • Chart • Practical

Module 2 : CARDIOVASCULAR DIAGNOSIS		ELECTROCARDIOGRAPHY	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<p>ECG Paper Skills</p> <ul style="list-style-type: none"> • Observation • Identification • Differentiation 	<p><i>The learner will be able to:</i></p> <ul style="list-style-type: none"> • Identify the peculiarity of ECG Papers • Identify the divisions of graph papers • Compare the horizontal and vertical markings 	<ul style="list-style-type: none"> • Demonstration • Illustration • Drawing 	<ul style="list-style-type: none"> • Chart • Activity log • Questions
<p>ECG Machine Skills</p> <ul style="list-style-type: none"> • Observation • Identification • Differentiation 	<ul style="list-style-type: none"> • Identify the parts of ECG Machine • Explain the function of ECG machine • Describe the block diagram of machine 	<ul style="list-style-type: none"> • Demonstration of block diagram • Discussion based on demonstration • Preparation of chart • Preparation of model 	<ul style="list-style-type: none"> • Questions • Activity log • Chart • Models
<p>Procedure of ECG recording Skills</p> <ul style="list-style-type: none"> • Skill to prepare patient for ECG recording 	<ul style="list-style-type: none"> • Prepare the patient for ECG recording • recognize the importance of electrode gel • Locate the Placement of electrodes • Decide to handle a patient (amputated patient) • Record ECG • Label and mounting of rhythm strips 	<ul style="list-style-type: none"> • Demonstration of procedure • Practicing ECG recording on lab • The method of ECG recording can practice during OJT 	<ul style="list-style-type: none"> • Questions • Activity log • Practical • Handling of tools • Skill in recording • Labelling and mounting of recorded rhythm strips • Patient preparation • Electrode placement
<p>Parameters of ECG Skills</p> <ul style="list-style-type: none"> • Identification • Observation • Comparison 	<ul style="list-style-type: none"> • Explain the amplitude and duration of each wave forms. • Identify the size and shape of waveforms • Analyse the calculation of heart rate • Compare the variation in heart rate 	<ul style="list-style-type: none"> • Demonstration of recorded strips • Group discussion • Case study 	<ul style="list-style-type: none"> • Activity log • Questions • Practical's • Discussion notes

Module 2 : CARDIOVASCULAR DIAGNOSIS		ELECTROCARDIOGRAPHY	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<p>Artifacts in ECG Skills</p> <ul style="list-style-type: none"> • Identification • Differentiations • Problem Solving <p>Common ECG Abnormalities Skills</p> <ul style="list-style-type: none"> • Observation • Identification • Comparison <p>Role of ECG technician Skills</p> <ul style="list-style-type: none"> • Identification • Critical thinking • Observation <p>Types of exercise Tread mill Test Skills</p> <ul style="list-style-type: none"> • Observation • Identification • Comparison • Technical Skill 	<p><i>The learner will be able to:</i></p> <ul style="list-style-type: none"> • Identify the different artifact in ECG recording • Explain the causes of artifacts and its elimination • Identify the Ecg changes in coronary artery disease, arrhythmias • Structural heart disease, Abnormalities in cardiac position • Identify the critical condition of the patient by identifying the ECG signals and inform the doctor • Differentiate the abnormal ECG tracings in non-cardiac and cardiac condition • Explain the different types of exercise ECG • Describe method of TMT test • Explain the instrument used to perform TMT test • Identify the uses of TMT test • Describe the protocol used in TMT testing. • Compare TMT test with resting ECG 	<ul style="list-style-type: none"> • Demonstration of different artifacts • Group discussion • Illustration • Artifacts can be familiarised during OJT • Data collection • Assignment • Discussion • Interaction with experts during OJT/Field visit • Discussion • Observation • OJT • Data collection • Demonstration of TMT test using <ul style="list-style-type: none"> - videos - charts • Discussion • Data collection • Technique can be familiarized during OJT or field visit • Learner can observe the procedure of TMT during OJT/Field visit 	<ul style="list-style-type: none"> • Activity log • Questions • Questionnaire • Activity log • Assignment • Discussion notes • OJT report • Collection • Activity log • Questions • Questions • Collections • Portfolio • Discussion notes • OJT report

Module 2 : CARDIOVASCULAR DIAGNOSIS		UNIT 2.3: AMBULATORY ECG RECORDING	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<p>Holter monitoring : Principles of Holter Utilities and indication Skills Observation Identification Comparison</p>	<p><i>The learner will be able to:</i></p> <ul style="list-style-type: none"> Define holter monitoring identify the need of holter monitoring Describe the method of holter monitoring Compare the merits and demerits of the technique 	<ul style="list-style-type: none"> Demonstration of videos and photos. Discussion using reference materials. Data collection Familiarisation of technique during OJT/fieldvisit. 	<ul style="list-style-type: none"> Portfolio Activity log Questionnaire Discussion notes OJT report
Module 2 : CARDIOVASCULAR DIAGNOSIS		UNIT 2.4: CARDIAC MONITORS	
<p>Cardiac monitor - Parts - Working leads Skills • Identification • Observation • Communication</p>	<ul style="list-style-type: none"> List of the need of cardiac monitor Sketch the parts of cardiac monitor Identify the leads used in cardiac monitor 	<ul style="list-style-type: none"> Familiarisation of cardiac monitor during OJT Group discussion Assignment Chart preparation 	<ul style="list-style-type: none"> Questions Activity log Charts Assignment OJT report
Module 2 : CARDIOVASCULAR DIAGNOSIS		UNIT 2.5: ECHOCARDIOGRAPHY	
<p>Principle, Instrumentation, Technique, types of echocardiography, uses Skills • Identification • Observation • Comparison</p>	<ul style="list-style-type: none"> Explain the principle of Echo Identify the standard Echo windows Recognize the frequency used Identify the different modalities of Echo and their uses 	<ul style="list-style-type: none"> Demonstration using <ul style="list-style-type: none"> Videos Field visit/OJT Discussion Assignment Data collection 	<ul style="list-style-type: none"> Portfolio Questionnaire Activity log OJT report

Module 2 : CARDIOVASCULAR DIAGNOSIS		UNIT 2.6: CARDIAC CATHETERISATION	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<p>Cardiac Catheterisation</p> <ul style="list-style-type: none"> • Catheter • Need of catheterization • Coronary angiogram • Angioplasty • Use of catheterisation <p>Skills</p> <ul style="list-style-type: none"> • Identification • Observation • Communication • Differentiation 	<p><i>The learner will be able to:</i></p> <ul style="list-style-type: none"> • Identify a catheter • Describe the need of cardiac catheterization • Differentiate coronary angiogram and angioplasty • list the applications of cardiac catheterization • Identify the components in a cath lab 	<ul style="list-style-type: none"> • Visit a hospital having the facility of cardiac catheterization lab • Identify the component in a cath lab • Discussion with doctors • Demonstration of video showing the method of catheterization • Assignment 	<ul style="list-style-type: none"> • Activity log • Questionnaire • Assignment • Discussion notes
Module 2 : CARDIOVASCULAR DIAGNOSIS		UNIT 2.7: DEFIBRILLATORS	
<p>Defibrillation</p> <ul style="list-style-type: none"> • Defibrillation • Principle • Parts of defibrillators • Types of defibrillators • Precautions • ICD <p>Skills</p> <ul style="list-style-type: none"> • Identification • Observation • Comparison • Classification 	<ul style="list-style-type: none"> • Explain fibrillation • Discuss the principle of defibrillation • Compare atrial and ventricular fibrillation • Identify the parts of a defibrillators • Identify the types of defibrillators • Explain the electrode positions and precautions during defibrillation • Explain the use of ICD. 	<ul style="list-style-type: none"> • Demonstration of video showing defibrillation • Group discussion • Interactive classes • Assignment • OJT 	<ul style="list-style-type: none"> • Questions • Activity log • Assignment • Discussion notes • OJT report

UNIT 2.8: PACEMAKERS			
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
Module 2 : CARDIOVASCULAR DIAGNOSIS Pacemakers - parts, classification <ul style="list-style-type: none"> • Pacing • Parts of pacemakers • Classification of pacemakers Skills <ul style="list-style-type: none"> • Identification • Observation • Comparison 	<p><i>The learner will be able to:</i></p> <ul style="list-style-type: none"> • Explain the need of pacing • Identify the parts of pacemakers • Compare the different types of pacemakers 	<ul style="list-style-type: none"> • Recollect the previous knowledge about natural pacemakers • Introduce artificial pacemakers using <ul style="list-style-type: none"> • Group discussion • Interaction with experts durin field visit • Data collection • Chart preparation • Assignment 	<ul style="list-style-type: none"> • Questions • Chart • Assignment • Collection
UNIT 2.9: CARDIO PULMONARY RESUSCITATION			
Module 2 : CARDIOVASCULAR DIAGNOSIS Basic life support Advanced life support <ul style="list-style-type: none"> • Airway • Breathing • Circulation Skills <ul style="list-style-type: none"> • Identification • Communication • To manage a situation 	<ul style="list-style-type: none"> • Describe the different steps involved in CPR • Perform CPR in emergency situations. 	<ul style="list-style-type: none"> • Demonstrate the ABC procedure in a dummy • Practical's • Group discussion • Assignment • Videos 	<ul style="list-style-type: none"> • Practical evaluation • Activity log • Assignment • Discussion notes

UNIT 2.10: SCREENING OF HEART DISEASE			
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
Module 2 : CARDIOVASCULAR DIAGNOSIS Risk factors of heart disease <ul style="list-style-type: none"> • Management of heart disease • Calculation of BMI • Body composition monitors • Automated digital B.P apparatus Skills <ul style="list-style-type: none"> • Observation • Communication • Identification 	<p><i>The learner will be able to:</i></p> <ul style="list-style-type: none"> • Explain the risk factors of heart disease and its management • Record and analyse the parameters like BMI, body fat, B. P, ECG • Conduct a survey of screening of heart disease 	<ul style="list-style-type: none"> • Discussion • Practical • Survey • Interview with experts • Seminar 	<ul style="list-style-type: none"> • Practical evaluation • Survey report • Activity log • Questionnaire
UNIT 2.11: MEDICAL ETHICS			
Module 2 : CARDIOVASCULAR DIAGNOSIS Medical Ethics <ul style="list-style-type: none"> • Moral Principles which can guide medical professionals Skills <ul style="list-style-type: none"> • Life values • Self awareness 	<ul style="list-style-type: none"> • Recognize the rules and regulations to be followed by a technician in medical field 	<ul style="list-style-type: none"> • Discussion • Interactive classes 	<ul style="list-style-type: none"> • Question • Activity • Discussion notes

LIST OF BOOKS AND INSTRUCTIONAL MATERIALS

Module 1

Basics of Cardiology and Electronics Principles

Human Anatomy - B. D Chourasia Volume I

A text book of medicine by K. V Krishna Das

Foundation of Anatomy & Physiology Roas & Wilson

Biomedical instrumentation & publications

- Lesile Chromwell
- Fred J Weibell
- Erich A Pfeiffes
- Dr. M. Aramugham

Module 2

Cardiovascular Diagnosis

ECG made Easy - John R Hampton

An introduction to electrocardiography - colin schamroth

Making sense of the ECG - Andrew R Houzton & David Gray

A text book of medical Instruments - S. Ananthe

Medical Instrumentation - John G Webstes

Handbook of biomedical instrumentation - R S Kandpur

Introduction to biomedical equipment technology - Joseph J Cars, John M Brown

LIST OF TOOLS/EQUIPMENT/MATERIALS REQUIRED FOR FIRST YEAR Module 1 & 2

Sl. No	Name of Item	Specification Required	Quantity	Prize
1	Human Torso Model		2	
2	Human Skeleton		1	
3	Models - Heart Lungs Thoracic cage		2 1 1	
4	Charts Human Anatomy cell Skeletal system Respiratory system Cardiovascular system Blood circulation Cardiac cycle		1 Each	
5	Animated CDs in Anatomy and Physiology		1 Each	
6	Microscopic Slides of Cell Cardiac Muscle		2 Each	
7	Electrodes Suction up electrode Metal plate electrode Disposable electrode		1 2 set 10	
8	Microscope			
9	ECG Machine	Single Channel or Three Channel or Digital ECG Machine	3	
10	Sphygmomanometers	Mercury manometers Digital Aneroid	3 2 2	
11	Stethoscope		3	
12	Battery	12v, 2v, 6v	1 Each	
13	Ammeter Micro ammeter Millimeter	0 - 3A, 0 - 2A .2	2 Each 2 Each	
14	Voltmeter	0 - 5v, 0 - 2v	2 Each	
15	Rheostat	200 - 400	2 Each	
16	Resistance wire			
17	Key			
18	Resistance Box	1 - 500 1-5K	2 Each	

19	Galvanometers		2	
20	Laptop, LCD Projector		1	
21	Resistor	1000 1 KW 2.2 KW 4.7 KW 5.6 KW 10 KW	15 Each	
22	Multi meter	Analog Digital	2 Each 2 Each	
23	PN Junction Diode	1 N 4007	4	
24	NPN Transistor (BC 107 or BC 548)	5 Each		
25	Body Composition monitor		1	