SYLLABUS AND CURRICULUM OF CERTIFICATE IN CARDIAC CARE TECHNICIAN COURSE

CERTIFICATE IN CARDIAC CARE TECHNICIAN

The Certificate in Cardiac Care Technician course is a short-term Allied Health Care program designed to train students in assisting cardiologists and cardiac surgeons during diagnosis, monitoring, and treatment of heart diseases.
It focuses on cardiac procedures, ECG, echocardiography, cardiac emergencies and ICU care.

Course Overview

- **Full Form**: CERTIFICATE IN CARDIAC CARE TECHNICIAN (CCCT)
- **Duration**: 1 Year + 3 Months (Internship)
- **Eligibility**:
    - 10^{TH} pass
    - Minimum 45–50% marks
    - On the basis of certificate – diploma in same course (lateral entry)

Career Opportunities after CCCT

- **Hospitals (Government & Private)**
- **Cardiology Clinics**
- **Diagnostic Centres**
- **Cath Labs**
- **Cardiac Rehabilitation Centres**
- **NGOs and Emergency Response Units**

SEMESTER – I

PAPER CODE	SUBJECT NAME	THEORY HOURS	PRACTICAL HOURS	THEORY MARKS	PRACTICAL MARKS
CCCT101	GENERAL & CARDIOVASCULAR ANATOMY & PHYSIOLOGY	45 Min	1 Hrs.	50	50
CCCT102	BASICS OF BIOCHEMISTRY	45 Min	1 Hrs.	50	50
CCCT103	GENERAL MICROBIOLOGY & INFECTION CONTROL	45 Min	1 Hrs.	50	50
CCCT104	INTRODUCTION TO CARDIAC CARE TECHNOLOGY	45 Min	1 Hrs.	50	50

GENERAL & CARDIOVASCULAR ANATOMY & PHYSIOLOGY

THEORY

1. Introduction to Human Anatomy & Physiology

1. Definition and importance of Anatomy & Physiology
2. Levels of structural organization of the human body
    - Cell → Tissue → Organ → System → Organism
3. Anatomical terms:
    - Planes, Positions, Directions, and Regions of the body
4. Body cavities and their contents
5. Overview of major body systems (brief introduction)

2. Cell & Tissues

1. Structure and function of a typical cell
    - Cell membrane, cytoplasm, nucleus, organelles (mitochondria, ribosomes, etc.)
2. Cell division – mitosis and meiosis
3. Types of tissues:
    - Epithelial
    - Connective
    - Muscular
    - Nervous
4. Specialized tissues of the heart (nodal & conductive tissue)

3. Skeletal, Muscular & Nervous Systems (General Overview)

1. Major bones and joints of the body
2. Muscles – types, structure, and functions
3. Nervous system:
    - Central and Peripheral nervous system
    - Autonomic Nervous System (Sympathetic & Parasympathetic)
    - Control of heart rate by autonomic nervous system

4. The Cardiovascular System (Main Focus Area)

1. **Anatomy of the Heart**
    - Location, position, size, and coverings (pericardium)
    - Internal structure – chambers, valves, septa, blood flow through the heart
    - Major blood vessels – aorta, vena cava, pulmonary arteries & veins
2. **Coronary Circulation**
    - Coronary arteries and veins
    - Collateral circulation
    - Common sites of blockage
3. **Conduction System of the Heart**
    - SA node, AV node, Bundle of His, Purkinje fibers
    - Sequence of cardiac impulse generation and conduction
4. **Physiology of the Heart**
    - Cardiac cycle: systole, diastole, heart sounds
    - Stroke volume, cardiac output, ejection fraction
    - Blood pressure: definition, normal range, regulation
5. **Cardiac Function & Control**
    - Autonomic control of heart (vagal and sympathetic)
    - Effects of exercise and emotions on heart rate
    - Baroreceptor and chemoreceptor reflexes

5. Blood and Lymphatic System

1. Composition and functions of blood
2. RBCs, WBCs, Platelets – structure & functions
3. Hemoglobin and blood clotting process
4. Blood groups and transfusion basics
5. Lymphatic circulation and its role in cardiac health

6. Blood Vessels & Circulation

1. Structure of arteries, veins, and capillaries
2. Systemic and Pulmonary circulation
3. Portal and Coronary circulation
4. Factors affecting blood pressure and flow
5. Common vascular disorders – Atherosclerosis, Hypertension, Varicose veins

7. Respiratory & Renal Systems (Relation with Cardiac Function)

1. Structure and function of respiratory system
2. Gas exchange and oxygen transport to heart
3. Kidney structure & regulation of blood volume and pressure
4. Role of renin-angiotensin system in BP control

8. Endocrine & Metabolic Regulation of Heart

1. Hormonal control of heart function (Adrenaline, Thyroxine, etc.)
2. Electrolyte balance and cardiac rhythm
3. Effects of diabetes and thyroid disorders on cardiac system

PRACTICAL

➢ UNIT I – Introduction to Human Anatomy

1. Identification of body regions, planes, and anatomical terms using charts/models.
2. Demonstration of body cavities and their contents.
3. Study of anatomical positions and directional terms (anterior, posterior, superior, inferior, etc.).
4. Identification of major human body systems (digestive, respiratory, cardiovascular, nervous, etc.) through charts or models.

➢ Study of Cell and Tissues

1. Observation of prepared slides of:
    - Epithelial tissue
    - Connective tissue
    - Muscular tissue
    - Nervous tissue
2. Identification of cell structures under microscope/model.
3. Demonstration of specialized cardiac muscle tissue (intercalated discs).

➢ Skeletal, Muscular & Nervous System (Basic Overview)

1. Study of human skeleton and major bones (skull, ribs, sternum, vertebrae).
2. Identification of important muscles (pectoralis major, diaphragm, intercostal muscles).
3. Demonstration of central nervous system parts (brain and spinal cord models).
4. Demonstration: Role of autonomic nervous system in cardiac control (using charts/models).

➢ Cardiovascular System (Main Practical Section)

1. Study of structure of the human heart using models/specimens.
2. Identification of:
    - Chambers, valves, and septa of heart
    - Major blood vessels (aorta, pulmonary artery, vena cava)

3. Demonstration of coronary circulation using diagrams/models.
4. Demonstration of conduction system of the heart (SA node, AV node, Bundle of His, Purkinje fibers).
5. Blood flow pathway through the heart and body circulation.
6. Observation of cardiac cycle with multimedia simulation or video model.
7. Demonstration of normal heart sounds (S1, S2) using stethoscope or simulator.
8. Measurement of pulse rate in radial, brachial, and carotid arteries.
9. Measurement of blood pressure using sphygmomanometer (manual & digital).
10. Recording of ECG – correct placement of leads and identification of waves (P, QRS, T).
11. Calculation of heart rate from ECG strip.
12. Demonstration of blood pressure changes during posture/exercise.

➢ Blood & Lymphatic System

1. Estimation of hemoglobin (Sahli's method/demo).
2. Determination of bleeding time and clotting time.
3. Demonstration of blood grouping and cross-matching procedure.
4. Study of components of blood (RBCs, WBCs, platelets – through charts/slides).
5. Demonstration of lymphatic vessels and lymph nodes using model/chart.

➢ Blood Vessels & Circulation

1. Identification of arteries and veins from models:
    - Aorta, carotid, subclavian, femoral, jugular veins.
2. Demonstration of systemic, pulmonary, and coronary circulation using chart/model.
3. Observation of capillary circulation under microscope (frog web demonstration or video simulation).

➢ Respiratory & Renal Systems (Linked with Cardiac Function)

1. Identification of organs of respiration on model/specimen.
2. Demonstration of mechanism of breathing and gas exchange (simulation/video).
3. Demonstration of kidney and nephron structure using model.
4. Understanding of fluid balance and its effect on cardiac output (interactive discussion/demo).

➢ Endocrine & Electrolyte Regulation

1. Identification of endocrine glands from model/chart.
2. Demonstration (AV simulation) of hormonal effects on heart rate (adrenaline, thyroid hormones).
3. Explanation of electrolyte balance and its relation to cardiac rhythm (Na^+, K^+, Ca^{2+} balance).

BASICS OF BIOCHEMISTRY

THEORY

1. Introduction to Biochemistry

- Definition, scope, and importance of biochemistry
- Role of biochemistry in health sciences and cardiac care
- Organization of human body from biochemical point of view
- Major biomolecules – carbohydrates, proteins, lipids, nucleic acids
- pH, buffer systems, and their importance in the body
- Concept of enzymes and metabolism

2. Carbohydrates

- Definition, classification, and biological importance of carbohydrates
- Monosaccharides (glucose, fructose, galactose) – structure and properties
- Disaccharides (maltose, lactose, sucrose) and polysaccharides (starch, glycogen, cellulose)
- Glycolysis, glycogenesis, glycogenolysis, and gluconeogenesis – overview
- Blood sugar regulation and hormones involved (insulin, glucagon)
- Diabetes mellitus – biochemical basis and cardiac implications
- Clinical estimation of blood glucose (FBS, PPBS, RBS)
- Common laboratory tests for carbohydrates (Benedict's, Fehling's, Barfoed's, Molisch's test)

3. Proteins and Amino Acids

- Definition and classification of proteins
- Structure of amino acids and peptide bond
- Essential and non-essential amino acids
- Levels of protein structure – primary, secondary, tertiary, quaternary
- Biological functions of proteins (enzymatic, structural, transport, defense)
- Protein metabolism overview (transamination, deamination, urea cycle)
- Protein-energy malnutrition (Kwashiorkor, Marasmus)
- Clinical importance of serum proteins (albumin, globulin, fibrinogen)
- Qualitative tests for proteins (Biuret, Xanthoproteic, Ninhydrin tests)

4. Lipids

- Definition, classification, and functions of lipids
- Simple, compound, and derived lipids
- Fatty acids – saturated and unsaturated
- Triglycerides, phospholipids, cholesterol – structure and function
- Role of lipids in cardiac health (HDL, LDL, VLDL)
- Lipid metabolism – β-oxidation, ketone body formation
- Atherosclerosis and hyperlipidemia – biochemical aspects
- Normal serum lipid values and lipid profile interpretation

5. Enzymes

- Definition, nature, and importance of enzymes
- Classification and nomenclature of enzymes
- Factors affecting enzyme activity (temperature, pH, substrate concentration)
- Mechanism of enzyme action (Lock and Key, Induced Fit theory)
- Coenzymes and cofactors
- Enzyme inhibition – competitive & non-competitive
- Clinical significance of enzymes:
    - Cardiac enzymes: **CK-MB, LDH, SGOT (AST), SGPT (ALT), Troponin**
    - Pancreatic enzymes: **Amylase, Lipase**
- Enzyme assays and interpretation in cardiac emergencies

6. Vitamins and Minerals

- Classification:
    - Fat-soluble (A, D, E, K)
    - Water-soluble (B-complex, C)
- Sources, functions, and deficiency manifestations
- Role of vitamins in energy metabolism and cardiac muscle function
- Major minerals: Calcium, Sodium, Potassium, Iron, Iodine, Magnesium, Chloride
- Electrolyte balance and its effect on cardiac rhythm and contraction
- Clinical investigations: serum calcium, sodium, potassium estimation

7. Water, Electrolyte & Acid-Base Balance

- Distribution of body fluids – intracellular and extracellular compartments
- Water balance and dehydration
- Osmosis, diffusion, and fluid movement
- Role of electrolytes in maintaining cardiac function
- Acid-base balance – buffer systems (bicarbonate, phosphate, protein)
- Respiratory and renal regulation of acid-base balance
- Acidosis and alkalosis – causes and effects
- Clinical estimation of electrolytes (Na^+, K^+, Cl^-)

8. Nucleic Acids & Energy Metabolism

- Structure and functions of DNA and RNA
- Role of nucleic acids in protein synthesis and heredity
- ATP – energy currency of the cell
- Overview of bioenergetics and energy production in mitochondria
- Role of oxidative phosphorylation in cardiac muscle energy supply

9. Biochemical Investigations and Clinical Correlation

- Blood glucose estimation (FBS, PPBS, RBS)
- Blood urea and serum creatinine

- Liver function tests (LFT): SGOT, SGPT, Bilirubin
- Kidney function tests (KFT): Urea, Creatinine, Electrolytes
- Lipid profile: Total cholesterol, HDL, LDL, Triglycerides
- Serum enzyme assays for cardiac function (CK-MB, LDH, Troponin)
- Clinical relevance of biochemical tests in myocardial infarction, hypertension, and metabolic syndrome

PRACTICAL

➢ Laboratory Orientation & Safety

1. Introduction to biochemistry laboratory instruments:
    - Centrifuge
    - Colorimeter
    - Spectrophotometer
    - pH meter
    - Pipettes, burettes, flasks, and test tubes
2. Laboratory safety rules and precautions
3. Handling of biological samples (blood, serum, plasma, urine)
4. Preparation of laboratory solutions and reagents (normal, molar, buffer solutions)
5. Cleaning and maintenance of glassware and instruments
6. Disposal of biochemical and biological waste

➢ Carbohydrates

1. Qualitative tests for carbohydrates:
    - Molisch's test (general test for carbohydrates)
    - Benedict's test for reducing sugars
    - Fehling's test for glucose detection
    - Barfoed's test for monosaccharides
    - Iodine test for starch
2. Estimation of blood glucose:
    - Using **glucose oxidase-peroxidase (GOD-POD)** method or **glucometer** demonstration
3. Interpretation of normal and abnormal glucose levels
4. Demonstration of glucose tolerance test (GTT) – principle and significance

➢ Proteins

1. Qualitative identification of proteins:
    - Biuret test
    - Xanthoproteic test
    - Millon's test
    - Ninhydrin test
2. Demonstration of protein precipitation using heat and acid
3. Estimation of total serum protein by **Biuret method**
4. Determination of albumin and A/G ratio (demonstration)

5. Clinical significance of serum protein levels in cardiac and liver diseases

➢ Lipids

1. Qualitative tests for lipids:
    - Solubility test
    - Grease spot test
    - Saponification test
    - Sudan III staining test
2. Estimation of serum cholesterol using **CHOD-POD method** (demonstration)
3. Interpretation of lipid profile (Total cholesterol, HDL, LDL, VLDL, Triglycerides)
4. Correlation of lipid profile results with **atherosclerosis and cardiac risk**

➢ Enzymes

1. Demonstration of enzyme activity – amylase on starch (effect of temperature and pH)
2. Demonstration of enzyme inhibition (using simple model system)
3. Estimation of serum enzyme activity (demonstration only):
    - SGOT (AST)
    - SGPT (ALT)
    - LDH
    - CK-MB (creatine kinase – cardiac marker)
4. Interpretation of enzyme levels in **cardiac and liver diseases**

➢ Vitamins & Minerals

1. Demonstration of qualitative test for vitamin C (ascorbic acid – DCPIP method)
2. Identification of sources of fat-soluble and water-soluble vitamins (charts/models)
3. Estimation of serum calcium and inorganic phosphate (demonstration)
4. Demonstration of sodium and potassium estimation using **flame photometer**
5. Interpretation of electrolyte imbalance and its effect on cardiac rhythm

➢ Water, Electrolyte & Acid-Base Balance

1. Preparation of buffer solutions (phosphate and bicarbonate buffers)
2. Determination of pH using **pH meter**
3. Demonstration of the effect of acids and bases on buffer capacity
4. Demonstration of clinical tests for dehydration and electrolyte imbalance
5. Interpretation of arterial blood gas (ABG) sample (demonstration/video-based)

➢ Biochemical Investigations

1. Estimation of:
    - Blood urea (diacetyl monoxime or urease method)
    - Serum creatinine (Jaffe's method)
    - Serum bilirubin (diazo method)

2. Demonstration of **Liver Function Test (LFT)** and **Kidney Function Test (KFT)** parameters
3. Analysis and interpretation of sample lab reports (glucose, urea, creatinine, enzymes, lipid profile)
4. Maintenance of patient biochemical records

➢ Clinical Correlation with Cardiac Function

1. Demonstration of cardiac enzyme testing (CK-MB, LDH, Troponin – principle & procedure)
2. Correlation of biochemical findings in:
    - Myocardial infarction
    - Angina pectoris
    - Hyperlipidemia
    - Diabetes mellitus
3. Preparation of biochemical case study report

GENERAL MICROBIOLOGY & INFECTION CONTROL

THEORY

1. Introduction to Microbiology

1. Definition, scope, and importance of microbiology in healthcare
2. History and pioneers of microbiology (Pasteur, Koch, Lister)
3. Classification of microorganisms:
    - Bacteria: Gram-positive & Gram-negative, cocci, bacilli
    - Viruses: DNA and RNA viruses
    - Fungi: Yeasts and molds
    - Parasites: Protozoa and helminths (overview)
4. Characteristics of pathogenic vs non-pathogenic microbes
5. Normal human microbiota and their significance

2. Bacteriology Basics

1. Structure of bacterial cell – cell wall, capsule, flagella, pili
2. Bacterial growth and multiplication – binary fission, growth curve
3. Bacterial nutrition and culture media types
4. Staining techniques:
    - Gram staining
    - Acid-fast staining
    - Capsule staining
5. Laboratory identification of common bacteria:
    - Staphylococcus aureus, Streptococcus, E. coli, Salmonella

6. Bactericidal vs bacteriostatic agents

3. Virology & Mycology (Overview)

1. Viral structure and replication cycles
2. Common pathogenic viruses relevant to hospital settings:
    - Hepatitis B & C, HIV, Influenza
3. Fungal infections (mycoses) – Candida, Aspergillus
4. Role of fungi and viruses in immunocompromised cardiac patients

4. Immunology & Host Defense

1. Innate immunity – physical, chemical, cellular barriers
2. Acquired immunity – humoral and cell-mediated immunity
3. Antigens, antibodies, and their types
4. Hypersensitivity reactions (basic concepts)
5. Vaccination principles – common vaccines relevant to healthcare workers

5. Clinical Microbiology & Specimen Handling

1. Collection, labeling, and transport of specimens:
    - Blood, urine, sputum, swabs, CSF
2. Principles of culture, isolation, and identification of pathogens
3. Importance of **aseptic technique** during specimen collection
4. Basic laboratory safety: Biosafety levels, PPE use, spill management

6. Infection Control in Healthcare Settings

1. Definition and importance of infection control
2. Hospital-acquired infections (HAI):
    - Definition, causes, and common examples (UTI, pneumonia, surgical site infections)
3. Chain of infection and breaking the chain
4. Standard precautions – hand hygiene, PPE, sharps handling
5. Isolation techniques and patient placement

7. Sterilization & Disinfection

1. Principles and purpose of sterilization and disinfection
2. Sterilization methods:
    - Physical: Autoclave, hot air oven, dry heat, UV radiation
    - Chemical: Alcohols, aldehydes, iodophors, chlorine compounds
3. Disinfection of instruments, surfaces, and equipment in cardiac units
4. Monitoring and quality control of sterilization procedures
5. Fumigation – methods and importance in OT and ICU

8.Waste Management & Biomedical Safety

1. Types of biomedical waste (BMW) and color-coded disposal system
2. Handling and disposal of sharps and infectious waste
3. Spill management and environmental decontamination
4. Safety protocols for cardiac care technicians in ICU and OT

9. Infection Control in Cardiac Care

1. Prevention of infections in ICCU/ICU/OT
2. Aseptic technique for ECG, catheters, and cardiac procedures
3. Care of invasive lines and drains to prevent bloodstream infections
4. Disinfection of cardiac monitors, ventilators, and patient equipment
5. Surveillance of infection rates in cardiac wards

10.Clinical Demonstration / Case Studies

1. Demonstration of proper hand hygiene (WHO 6-step method)
2. Demonstration of PPE donning and doffing
3. Demonstration of sterilization of instruments and equipment
4. Spotting of charts/models:
    - Color-coded biomedical waste bins
    - Autoclave, hot air oven, UV light
    - PPE kits and isolation carts
5. Discussion of real-life infection control cases in cardiac patients

PRACTICAL

➢ Laboratory Orientation & Safety

1. Orientation to microbiology laboratory setup and instruments
    - Autoclave, hot air oven, incubator, microscope, Bunsen burner
2. Laboratory safety rules and precautions
3. Handling of biological specimens (blood, urine, swabs)
4. Preparation of culture media (nutrient agar, MacConkey, blood agar)
5. Proper disposal of laboratory waste – sharps, glass, infectious material

➢ Microscopy

1. Handling and use of light microscope
2. Preparation of wet mount slides
3. Observation of yeast, bacterial morphology using prepared slides
4. Measurement of microorganisms using ocular micrometer
5. Demonstration of staining techniques:
    - Gram staining
    - Acid-fast staining (AFB)
    - Capsule staining

➢ Culture Techniques

1. Inoculation of bacteria on agar plates (demonstration only)
2. Isolation techniques:
    - Streak plate method
    - Pour plate method
3. Observation of bacterial growth and colony morphology
4. Identification of common hospital pathogens (Staphylococcus aureus, E. coli) – model/chart demonstration
5. Demonstration of bacterial growth curve

➢ Sterilization & Disinfection

1. Demonstration of sterilization methods:
    - Autoclave, hot air oven, UV light, chemical sterilants
2. Demonstration of disinfectants on bacterial cultures (Cidex, alcohol)
3. Testing sterilization efficiency (autoclave tape, Bowie-Dick test)
4. Handling and storage of sterile instruments and materials

➢ Infection Control & Aseptic Techniques

1. Proper hand hygiene demonstration (WHO 6-step method)
2. Donning and doffing of PPE (gloves, gown, mask, goggles, face shield)
3. Preparation of sterile field and maintenance in OT
4. Safe handling of invasive lines (catheter, ECG electrodes, drains)
5. Techniques to prevent hospital-acquired infections (HAI) in ICU/OT

➢ Biomedical Waste Management

1. Identification of biomedical waste categories (infectious, sharps, chemical, general)
2. Demonstration of color-coded bins for disposal:
    - Yellow, red, blue, white, black
3. Safe disposal of sharps and infectious materials
4. Demonstration of spill management and decontamination procedures

➢ Laboratory Spotting & Identification

1. Microscopic slides of bacteria, fungi, yeast (prepared slides)
2. Culture plates and colony morphology (demonstration)
3. Sterilization indicators and autoclave tape
4. PPE kits and isolation carts
5. Charts/models of infection control measures

➢ Clinical Demonstration / Case Studies

1. Case discussion of hospital-acquired infections in cardiac patients
2. Demonstration of infection control measures in ICCU and OT

3. Handling and decontamination of ECG leads, monitors, and cardiac instruments
4. Demonstration of environmental cleaning in ICU/OT (disinfection of surfaces, floor, and equipment)
5. Preparation of a **microbiology & infection control record book**

INTRODUCTION TO CARDIAC CARE TECHNOLOGY

THEORY

1. Introduction to Cardiac Care Technology

1. Definition and scope of cardiac care technology
2. Role of a cardiac care technician in hospitals, ICCU, OT, and emergency care
3. History and development of cardiac care units (CCU/ICCU)
4. Cardiac care team members and their responsibilities:
    - Cardiologist
    - Cardiac care technician
    - Nurse
    - Perfusionist
    - Physiotherapist

2. Anatomy & Physiology of Cardiovascular System

1. Structure of the heart – chambers, valves, coronary vessels
2. Conduction system – SA node, AV node, Bundle of His, Purkinje fibers
3. Cardiac cycle – systole, diastole, cardiac output, stroke volume
4. Blood vessels – arteries, veins, capillaries
5. Circulatory pathways – systemic, pulmonary, coronary
6. Electrolytes and their role in cardiac function

3. Basic Biochemistry & Cardiac Markers

1. Biochemical composition of blood – plasma, proteins, enzymes
2. Cardiac enzymes: CK-MB, LDH, AST/SGOT, Troponin – role in diagnosis
3. Lipid profile and its significance in cardiovascular disease
4. Blood sugar and electrolyte monitoring in cardiac patients

4. Electrocardiography (ECG)

1. Introduction to ECG – principle and importance
2. ECG leads and placement (limb & chest leads)
3. Recording a 12-lead ECG
4. Normal ECG waveforms: P, QRS, T waves
5. Common ECG abnormalities:
    - Arrhythmias – tachycardia, bradycardia
    - Myocardial infarction patterns
    - Heart blocks

6. Interpretation of ECG strips

5. Cardiac Monitoring & Hemodynamics

1. Cardiac monitors – types, function, and usage
2. Continuous ECG monitoring and alarms
3. Blood pressure monitoring – invasive and non-invasive methods
4. Pulse oximetry – principle, procedure, normal values
5. Central venous pressure (CVP) monitoring – purpose and technique
6. Basic understanding of cardiac output monitoring

6. Cardiac Procedures & Interventions

1. Introduction to cardiac catheterization – diagnostic & interventional
2. Pacemaker – types, indications, and monitoring
3. Defibrillation and cardioversion – principles and procedure
4. Assisting in angioplasty and stent placement
5. Common cardiac surgeries – CABG, valve replacement, and post-operative care
6. Role of cardiac care technician during procedures

7. Pharmacology in Cardiac Care

1. Common cardiac drugs – classification, indications, and precautions:
    - Antiarrhythmics
    - Anticoagulants
    - Vasodilators
    - Beta-blockers and ACE inhibitors
    - Diuretics
2. Administration routes and monitoring for side effects
3. Emergency drug protocols in ICCU

8. Infection Control & Safety in Cardiac Care

1. Principles of asepsis and antisepsis in ICCU
2. Hand hygiene, PPE, and sterile techniques
3. Infection control protocols for invasive lines, catheters, and ventilators
4. Biomedical waste management in cardiac care unit
5. Electrical and fire safety in ICCU and OT

9. Patient Care & Monitoring

1. Pre-procedure patient preparation – ECG, catheterization, angiography
2. Post-procedure monitoring – vital signs, hemodynamic parameters
3. Recognition of complications – arrhythmias, hypotension, bleeding
4. Psychological support to cardiac patients and family
5. Documentation and record maintenance – ECG reports, vital charts, medication charts

10. Advanced Cardiac Support

1. Basics of CPR and Advanced Cardiac Life Support (ACLS)
2. Defibrillator and resuscitation protocols
3. Emergency response for cardiac arrest in ICCU/OT
4. Assisting in ventilatory support for cardiac patients
5. Team coordination during cardiac emergencies

11. Case Studies & Practical Applications

1. ECG interpretation of real-life cases
2. Cardiac enzyme report interpretation
3. Post-operative cardiac patient monitoring scenarios
4. Practical demonstration of cardiac monitoring, defibrillation, and emergency care

PRACTICAL

➢ Laboratory & Equipment Orientation

1. Orientation to ICCU/OT and cardiac care equipment
2. Identification and handling of cardiac monitors, defibrillators, and ECG machines
3. Laboratory safety and patient safety protocols
4. Preparation and calibration of equipment before use
5. Cleaning and maintenance of cardiac instruments

➢ Electrocardiography (ECG) Practice

1. Identification of ECG machine parts and functions
2. Placement of electrodes for:
    - 3-lead ECG
    - 12-lead ECG
3. Recording ECG on healthy volunteers
4. Recognizing normal ECG waveforms (P, QRS, T)
5. Recording ECG in simulated abnormal conditions (arrhythmias, tachycardia, bradycardia)
6. Documentation and labeling of ECG strips

➢ Cardiac Monitoring

1. Use of multi-parameter cardiac monitors (ECG, HR, SpO_2, BP)
2. Non-invasive blood pressure measurement (manual and automatic)
3. Pulse oximetry – procedure, placement, and monitoring
4. Observation and interpretation of monitored parameters
5. Detection of alarm conditions and corrective measures

➢ Patient Preparation & Care

1. Pre-procedure patient assessment – vital signs, history, consent
2. Preparing patient for ECG, angiography, or catheterization
3. Proper positioning of patients for cardiac procedures
4. Post-procedure monitoring – vital signs, hemodynamic status, ECG
5. Infection control practices – hand hygiene, PPE, sterile technique

➢ Defibrillation & Emergency Procedures

1. Identification and parts of a defibrillator
2. Demonstration of manual and automated external defibrillator (AED) use
3. Safety precautions before and during defibrillation
4. Simulation of cardiac arrest scenarios in ICCU
5. Basic CPR practice on mannequins
6. Team coordination during resuscitation

➢ Cardiac Drugs & Administration (Demonstration)

1. Identification of common cardiac drugs – antiarrhythmics, vasodilators, anticoagulants
2. Routes of administration – oral, IV, subcutaneous
3. Observation of monitoring during drug administration
4. Recognition of adverse drug reactions and emergency response

➢ Case Studies & Simulated Scenarios

1. ECG interpretation of simulated patient cases
2. Cardiac enzyme report discussion (CK-MB, Troponin, LDH)
3. Monitoring and responding to simulated cardiac emergencies
4. Documentation of patient monitoring and procedure notes
5. Discussion of post-operative care scenarios (CABG, valve replacement)

➢ Spotting / Identification

1. ECG machine, electrodes, cables
2. Cardiac monitor, pulse oximeter, defibrillator
3. PPE kits – gown, gloves, mask, face shield
4. Crash cart and emergency equipment layout
5. Charts/models of cardiac anatomy and conduction system

SEMESTER II

PAPER CODE	SUBJECT NAME	THEORY HOURS	PRACTICAL HOURS	THEORY MARKS	PRACTICAL MARKS
CCCT201	PATHOLOGY RELATED TO CARDIAC SYSTEM	45 Min	1 Hrs.	50	50
CCCT202	BASICS OF PHARMACOLOGY IN CARDIOLOGY	45 Min	1 Hrs.	50	50
CCCT203	PATIENT CARE & SAFETY IN CARDIOLOGY	45 Min	1 Hrs.	50	50
CCCT204	INTRODUCTION TO ELECTROCARDIOGRAPHY (ECG)	45 Min	1 Hrs.	50	50

PATHOLOGY RELATED TO CARDIAC SYSTEM

THEORY

UNIT 1: INTRODUCTION TO CARDIAC PATHOLOGY

- Definition of pathology
- Role of pathology in cardiac diseases
- Causes of heart diseases
- Classification of cardiac disorders
    - Congenital
    - Acquired
- Importance of laboratory diagnosis in cardiac diseases
- Basic terminology used in cardiac pathology

UNIT 2: INFLAMMATORY DISEASES OF THE HEART

2.1 Myocarditis

- Definition
- Causes (viral, bacterial, autoimmune)
- Pathological changes
- Signs and symptoms
- Complications

2.2 Endocarditis

- Definition
- Types:

    - Infective endocarditis
    - Non-infective endocarditis
- Etiology and risk factors
- Pathology and complications

2.3 Pericarditis

- Definition
- Types:
    - Acute pericarditis
    - Chronic pericarditis
- Causes
- Pathological features

UNIT 3: ISCHEMIC HEART DISEASE (IHD)

- Definition
- Etiology and risk factors
- Pathogenesis of ischemia
- Types of ischemic heart disease:
    - Angina pectoris
    - Myocardial infarction (MI)
    - Sudden cardiac death

Myocardial Infarction

- Definition
- Causes
- Pathological changes in MI
- Complications of MI

UNIT 4: RHEUMATIC HEART DISEASE

- Definition
- Etiology (rheumatic fever)
- Pathogenesis
- Valvular involvement
- Pathological changes in valves
- Complications

UNIT 5: CONGENITAL HEART DISEASES

- Definition
- Causes of congenital heart defects
- Classification:
    - Cyanotic heart diseases
    - Acyanotic heart diseases

Common Congenital Disorders

- Atrial septal defect (ASD)
- Ventricular septal defect (VSD)
- Patent ductus arteriosus (PDA)
- Tetralogy of Fallot

UNIT 6: VALVULAR HEART DISEASES

- Definition
- Causes of valvular diseases
- Types:
    - Mitral stenosis
    - Mitral regurgitation
    - Aortic stenosis
    - Aortic regurgitation
- Pathological changes in valves
- Complications

UNIT 7: CARDIOMYOPATHIES

- Definition
- Classification:
    - Dilated cardiomyopathy
    - Hypertrophic cardiomyopathy
    - Restrictive cardiomyopathy
- Etiology
- Pathological features
- Clinical importance

UNIT 8: HYPERTENSIVE HEART DISEASE

- Definition
- Effect of hypertension on heart
- Pathological changes
- Complications

UNIT 9: HEART FAILURE

- Definition
- Types:
    - Left-sided heart failure
    - Right-sided heart failure
    - Congestive heart failure
- Causes
- Pathological changes
- Complications

UNIT 10: CARDIAC TUMORS

- Definition
- Types:
  - Benign tumors (Myxoma)
  - Malignant tumors
- Pathological features

UNIT 11: ATHEROSCLEROSIS & CORONARY ARTERY DISEASE

- Definition of atherosclerosis
- Risk factors
- Pathogenesis
- Pathological changes in coronary arteries
- Complications

UNIT 12: THROMBOSIS & EMBOLISM IN CARDIAC DISEASE

- Definition of thrombosis
- Causes of cardiac thrombus
- Embolism and its types
- Clinical significance

UNIT 13: LABORATORY INVESTIGATIONS IN CARDIAC PATHOLOGY

- Cardiac biomarkers:
  - Troponin
  - CK-MB
  - LDH
- Blood tests related to cardiac diseases
- Role of pathology lab in diagnosis

UNIT 14: POST-MORTEM FINDINGS IN CARDIAC DISEASES

- Importance of autopsy
- Common pathological findings in heart diseases

PRACTICAL

➢ BASIC PATHOLOGY LAB TECHNIQUES

- Introduction to pathology laboratory
- Laboratory safety rules & precautions
- Handling of blood samples
- Use of laboratory equipment:
  - Microscope
  - Centrifuge

- Pipettes
- Sterilization & infection control

➢ BLOOD COLLECTION & SAMPLE HANDLING

- Venipuncture technique
- Types of blood samples:
  - Whole blood
  - Serum
  - Plasma
- Anticoagulants used in cardiac investigations
- Labeling, storage & transportation of samples

➢ HEMATOLOGICAL INVESTIGATIONS RELATED TO CARDIAC DISEASES

- Hemoglobin estimation
- Total RBC count
- Total WBC count
- Differential leukocyte count (DLC)
- ESR (Erythrocyte Sedimentation Rate)
- Peripheral blood smear examination

➢ CARDIAC BIOCHEMICAL MARKERS

- Estimation of:
  - Troponin I / Troponin T
  - CK-MB
  - LDH
  - SGOT (AST)
- Indications & interpretation of results
- Role in diagnosis of myocardial infarction

➢ LIPID PROFILE ANALYSIS

- Total cholesterol estimation
- HDL, LDL, VLDL
- Triglycerides
- Risk assessment for coronary artery disease

➢ COAGULATION PROFILE (CARDIAC RELEVANCE)

- Bleeding time (BT)
- Clotting time (CT)
- Prothrombin time (PT / INR)
- Activated partial thromboplastin time (aPTT)
- Role in cardiac patients on anticoagulant therapy

➢ URINE & OTHER SUPPORTIVE TESTS

- Routine urine examination
- Proteinuria in cardiac failure
- Electrolyte imbalance (Na^+, K^+) – basic understanding

➢ HISTOPATHOLOGY

- Identification of:
  - Normal cardiac muscle slide
  - Myocardial infarction slide
  - Rheumatic heart disease slide
  - Atherosclerosis slide
- Tissue processing (basic idea)
- Staining techniques (H&E – identification only)

➢ PATHOLOGY INSTRUMENT IDENTIFICATION

- Microscope
- Centrifuge
- Auto analyzer
- ECG gel & sample tubes (red, blue, green top)
- Cardiac marker testing kits

BASICS OF PHARMACOLOGY IN CARDIOLOGY

THEORY

UNIT 1: INTRODUCTION TO PHARMACOLOGY

- Definition of pharmacology
- Scope and importance of pharmacology in cardiology
- Role of cardiac care technician in drug administration
- Classification of drugs used in cardiac patients
- Drug nomenclature:
  - Generic name
  - Brand name

UNIT 2: BASIC PRINCIPLES OF PHARMACOLOGY

2.1 Pharmacokinetics

- Absorption
- Distribution
- Metabolism
- Excretion

2.2 Pharmacodynamics

- Mechanism of drug action
- Drug receptors
- Dose–response relationship

UNIT 3: ROUTES OF DRUG ADMINISTRATION

- Oral route
- Sublingual route
- Intravenous (IV) route
- Intramuscular (IM) route
- Subcutaneous route
- Transdermal route (patches)
- Advantages & disadvantages of each route

UNIT 4: ADVERSE DRUG REACTIONS & SAFETY

- Definition of adverse drug reaction (ADR)
- Types of ADRs
- Drug toxicity
- Drug allergy
- Drug interactions
- Precautions in cardiac patients
- Medication safety & error prevention

UNIT 5: AUTONOMIC DRUGS USED IN CARDIOLOGY

- Sympathomimetic drugs
- Sympatholytic drugs
- Parasympathomimetic drugs
- Parasympatholytic drugs
- Clinical uses in cardiac care

UNIT 6: DRUGS USED IN HYPERTENSION

- Definition of hypertension
- Classification of antihypertensive drugs:
    - Diuretics
    - Beta blockers
    - ACE inhibitors
    - ARBs
    - Calcium channel blockers
    - Alpha blockers
- Common examples, uses & side effects

UNIT 7: DRUGS USED IN ANGINA PECTORIS

- Definition of angina
- Anti-anginal drugs:
  - Nitrates
  - Beta blockers
  - Calcium channel blockers
- Mechanism of action
- Side effects & precautions

UNIT 8: DRUGS USED IN HEART FAILURE

- Definition of heart failure
- Drugs used:
  - Diuretics
  - ACE inhibitors
  - ARBs
  - Beta blockers
  - Cardiac glycosides (Digoxin)
- Role of each drug
- Monitoring parameters

UNIT 9: ANTI-ARRHYTHMIC DRUGS

- Definition of arrhythmia
- Classification of anti-arrhythmic drugs:
  - Class I
  - Class II
  - Class III
  - Class IV
- Common drugs used in ICU & emergency

UNIT 10: ANTICOAGULANTS & ANTIPLATELET DRUGS

- Anticoagulants:
  - Heparin
  - Warfarin
  - New oral anticoagulants (basic idea)
- Antiplatelet drugs:
  - Aspirin
  - Clopidogrel
- Indications in cardiac patients
- Monitoring (INR, bleeding risk)

UNIT 11: THROMBOLYTIC (FIBRINOLYTIC) DRUGS

- Definition

- Indications in myocardial infarction
- Common drugs:
    - Streptokinase
    - Alteplase
- Precautions & complications

UNIT 12: DRUGS USED IN DYSLIPIDEMIA

- Definition of dyslipidemia
- Lipid-lowering drugs:
    - Statins
    - Fibrates
- Role in prevention of coronary artery disease

UNIT 13: EMERGENCY DRUGS IN CARDIAC CARE

- Adrenaline
- Noradrenaline
- Atropine
- Dopamine
- Dobutamine
- Amiodarone
- Indications & precautions

UNIT 14: DRUG CALCULATION & DOSAGE (BASIC)

- Basic dose calculation
- IV infusion basics
- Drug dilution principles

UNIT 15: STORAGE & HANDLING OF CARDIAC DRUGS

- Storage conditions
- Cold chain maintenance
- Expiry & labeling
- Emergency drug tray management

UNIT 16: LEGAL & ETHICAL ASPECTS (BASIC)

- Safe drug administration
- Responsibility of cardiac care technician
- Documentation & reporting adverse drug reactions

PRACTICAL

➢ INTRODUCTION TO PHARMACOLOGY PRACTICAL

- Introduction to pharmacology practical lab
- Objectives of pharmacology practicals
- Safety rules & precautions in drug handling
- Ethical aspects in drug administration

➢ DRUG IDENTIFICATION & CLASSIFICATION

- Identification of common cardiac drugs by:
  - Generic name
  - Brand name
  - Drug class
- Oral, injectable & emergency cardiac drugs
- Color coding & labeling of drugs

➢ DOSAGE FORMS & ROUTES OF ADMINISTRATION

- Identification of dosage forms:
  - Tablets
  - Capsules
  - Syrups
  - Injections
  - IV infusions
  - Transdermal patches
- Routes of administration:
  - Oral
  - Sublingual
  - IV
  - IM
  - SC
- Indications & precautions in cardiac patients

➢ DRUG CALCULATION & DOSE PREPARATION

- Calculation of drug dosage
- Dilution of IV drugs
- Infusion rate calculation (basic)
- Preparation of emergency cardiac drugs

➢ ANTICOAGULANT & ANTIPLATELET PRACTICAL

- Identification of:
  - Heparin
  - Warfarin
  - Aspirin
  - Clopidogrel

- Monitoring parameters:
  - INR
  - Bleeding signs
- Nursing & technician responsibilities

➢ EMERGENCY CARDIAC DRUGS PRACTICAL

- Identification & handling of:
  - Adrenaline
  - Atropine
  - Dopamine
  - Dobutamine
  - Noradrenaline
  - Amiodarone
- Indications in emergency situations
- Storage & precautions

➢ DRUGS USED IN MAJOR CARDIAC CONDITIONS

- Antihypertensive drugs
- Anti-anginal drugs
- Anti-arrhythmic drugs
- Drugs used in heart failure
- Thrombolytic drugs

➢ DRUG ADMINISTRATION PROCEDURES

- Assisting in IV drug administration
- Sublingual drug administration (e.g., nitroglycerin)
- Checking patient identity & allergy history
- Documentation after drug administration

➢ ADVERSE DRUG REACTIONS (ADR) MONITORING

- Identification of common cardiac drug side effects
- Recognition of drug toxicity
- Reporting adverse drug reactions
- Immediate action during drug reaction

➢ DRUG STORAGE & EMERGENCY TROLLEY

- Storage conditions of cardiac drugs
- Cold chain maintenance
- Emergency drug tray/trolley arrangement
- Checking expiry & stock register

THEORY

UNIT 1: INTRODUCTION TO PATIENT CARE

- Definition of patient care
- Importance of patient care in cardiology
- Role & responsibilities of a Cardiac Care Technician
- Ethical principles in patient care
- Professional behavior & attitude

UNIT 2: PATIENT SAFETY CONCEPTS

- Definition of patient safety
- Types of medical errors
- Prevention of errors in cardiac care
- Safety culture in hospital
- Patient rights & responsibilities

UNIT 3: COMMUNICATION SKILLS IN CARDIAC CARE

- Effective communication with patients
- Communication with relatives
- Communication with doctors & nursing staff
- Breaking bad news (basic concept)
- Documentation & reporting

UNIT 4: INFECTION CONTROL & UNIVERSAL PRECAUTIONS

- Chain of infection
- Hand hygiene techniques
- Use of PPE (gloves, masks, gowns)
- Biomedical waste management
- Prevention of hospital-acquired infections

UNIT 5: VITAL SIGNS MONITORING

- Temperature measurement
- Pulse assessment
- Blood pressure measurement
- Respiratory rate
- Oxygen saturation (SpO_2)
- Importance in cardiac patients

UNIT 6: BASIC LIFE SUPPORT (BLS) & EMERGENCY CARE

- Definition of BLS
- Cardiac arrest recognition

- CPR steps (adult)
- Use of AED
- Role of technician during emergency

UNIT 7: PATIENT POSITIONING & MOBILIZATION

- Positions used in cardiac care:
  - Supine
  - Semi-Fowler's
  - Fowler's
  - Trendelenburg
- Safe patient transfer techniques
- Prevention of falls

UNIT 8: CARE OF CARDIAC PATIENTS

8.1 Pre-Procedure Care

- Patient preparation for ECG, Echo, TMT
- Pre-angiography care
- Patient education

8.2 Post-Procedure Care

- Post-angiography care
- Post-angioplasty care
- Monitoring for complications

UNIT 9: MEDICATION SAFETY

- Rights of drug administration
- Checking drug, dose, route & time
- High-alert medications in cardiology
- Prevention of medication errors

UNIT 10: OXYGEN THERAPY & AIRWAY CARE

- Indications for oxygen therapy
- Types of oxygen delivery devices
- Oxygen safety precautions
- Basic airway management

UNIT 11: CARE OF INVASIVE LINES & DEVICES

- IV cannula care
- Central line care (basic knowledge)
- Care of arterial lines (introductory)

- Pacemaker care (temporary & permanent)

UNIT 12: PAIN & COMFORT MANAGEMENT

- Assessment of chest pain
- Pain relief measures
- Psychological support to cardiac patients
- Comfort & dignity of patient

UNIT 13: NUTRITION, HYGIENE & ELIMINATION CARE

- Diet in cardiac patients (low salt, low fat)
- Oral hygiene & body care
- Bowel & bladder care

UNIT 14: SAFETY DURING DIAGNOSTIC & THERAPEUTIC PROCEDURES

- Safety during ECG, Echo, TMT
- Radiation safety (Cath lab – basic)
- Electrical safety in cardiac equipment

PRACTICAL

➢ ORIENTATION TO CARDIAC CARE PRACTICAL

- Introduction to cardiac care unit (CCU/ICU)
- Roles and responsibilities of cardiac care technician
- Safety rules in cardiac wards
- Professional conduct & ethics

➢ HAND HYGIENE & INFECTION CONTROL PRACTICAL

- Hand washing technique (steps)
- Use of alcohol-based hand rub
- Donning & doffing of PPE
- Biomedical waste segregation (color coding)
- Prevention of hospital-acquired infections

➢ VITAL SIGNS MONITORING

- Measurement of:
  - Body temperature
  - Pulse (rate & rhythm)
  - Blood pressure
  - Respiratory rate
  - Oxygen saturation (SpO_2)
- Recording & reporting abnormal findings

➢ BASIC LIFE SUPPORT (BLS) & CPR PRACTICAL

- Recognition of cardiac arrest
- Adult CPR (step-by-step)
- Chest compression technique
- Use of AED
- Role of technician during cardiac emergency

➢ PATIENT POSITIONING & MOBILIZATION

- Positioning of cardiac patients:
  - Supine
  - Fowler's / Semi-Fowler's
  - Trendelenburg
- Safe patient transfer (bed ↔ wheelchair)
- Fall prevention techniques

➢ OXYGEN THERAPY PRACTICAL

- Identification of oxygen delivery devices:
  - Nasal cannula
  - Face mask
  - Non-rebreather mask
- Setting oxygen flow rate
- Oxygen safety precautions
- Monitoring patient response

➢ MEDICATION SAFETY PRACTICAL

- Checking medication orders
- Five rights of medication administration
- Identification of high-alert cardiac drugs
- Observation of side effects
- Reporting medication errors

➢ CARE OF INVASIVE LINES & DEVICES

- IV cannula care & site inspection
- Care of central line (basic assistance)
- Arterial line awareness (introductory)
- Temporary pacemaker care
- Monitoring for infection or bleeding

➢ PRE-PROCEDURE CARDIAC CARE

- Patient preparation for:
  - ECG

- Echocardiography
- TMT
- Angiography

- Patient education & reassurance
- Consent verification (basic)

➢ POST-PROCEDURE CARDIAC CARE

- Post-angiography care:
  - Puncture site observation
  - Bed rest & limb immobilization
- Post-angioplasty monitoring
- Recognition of complications:
  - Bleeding
  - Pain
  - Hematoma

➢ PAIN ASSESSMENT & COMFORT CARE

- Assessment of chest pain
- Use of pain scale
- Comfort measures
- Psychological support to cardiac patients

➢ NUTRITION, HYGIENE & ELIMINATION CARE

- Assistance in cardiac diet
- Oral hygiene & body care
- Intake & output monitoring
- Bowel & bladder care

➢ SAFETY IN CARDIAC DIAGNOSTIC AREAS

- Electrical safety during ECG & monitors
- Radiation safety in Cath Lab (basic awareness)
- Fire safety & emergency exits

INTRODUCTION TO ELECTROCARDIOGRAPHY (ECG)

THEORY

UNIT 1: INTRODUCTION TO ECG

- Definition of electrocardiography
- History and development of ECG

- Importance of ECG in cardiology
- Role of ECG in diagnosis of cardiac diseases
- Role and responsibilities of Cardiac Care Technician in ECG

UNIT 2: BASIC ANATOMY & PHYSIOLOGY RELATED TO ECG

- Structure of the heart
- Cardiac muscle properties
- Electrical conduction system of the heart:
    - SA node
    - AV node
    - Bundle of His
    - Right & left bundle branches
    - Purkinje fibers

UNIT 3: ELECTRICAL ACTIVITY OF THE HEART

- Cardiac action potential (basic concept)
- Depolarization and repolarization
- Relationship between electrical activity and mechanical contraction

UNIT 4: ECG MACHINE & ACCESSORIES

- Parts of ECG machine
- Types of ECG machines
- Electrodes and leads
- ECG paper:
    - Small square
    - Large square
    - Time and voltage calibration

UNIT 5: ECG LEAD SYSTEM

- Definition of leads
- Types of ECG leads:
    - Limb leads (I, II, III)
    - Augmented leads (aVR, aVL, aVF)
    - Chest (precordial) leads (V1–V6)
- Lead placement (standard positions)

UNIT 6: NORMAL ECG WAVEFORM

- P wave
- PR interval
- QRS complex
- ST segment
- T wave

- QT interval
- Normal values (basic understanding)

UNIT 7: ECG RECORDING TECHNIQUE

- Patient preparation
- Electrode placement
- Standard ECG recording procedure
- Common artifacts and their prevention
- Care and maintenance of ECG machine

UNIT 8: HEART RATE & RHYTHM ANALYSIS

- Methods of calculating heart rate
- Identification of normal sinus rhythm
- Recognition of basic rhythm abnormalities (introductory)

UNIT 9: BASIC ECG INTERPRETATION

- Systematic approach to ECG reading
- Identification of:
    - Normal ECG
    - Sinus bradycardia
    - Sinus tachycardia
- Introduction to axis deviation (basic concept)

UNIT 10: ECG CHANGES IN COMMON CARDIAC CONDITIONS

- Myocardial infarction (basic changes)
- Ischemia and injury patterns
- Left ventricular hypertrophy (introductory)
- Electrolyte imbalance effects (basic)

UNIT 11: SPECIAL ECG RECORDINGS

- Stress ECG (TMT – basic idea)
- Holter monitoring (introduction)
- Bedside ECG monitoring

UNIT 12: ECG SAFETY & PATIENT CARE

- Electrical safety precautions
- Infection control during ECG
- Patient comfort and privacy
- Handling emergency situations during ECG

PRACTICAL

➢ ECG LAB ORIENTATION

- Introduction to ECG room/lab
- ECG machine components
- Power supply, calibration & safety checks
- Role and responsibilities of ECG technician

➢ PATIENT PREPARATION FOR ECG

- Patient identification & consent (basic)
- Explanation of procedure to patient
- Positioning of patient
- Skin preparation (cleaning, shaving if required)
- Ensuring patient comfort & privacy

➢ ECG MACHINE HANDLING

- Switching on/off ECG machine
- Loading ECG paper
- Standardization (1 mV = 10 mm)
- Speed selection (25 mm/sec)
- Maintenance & cleaning of machine

➢ ELECTRODES & LEAD IDENTIFICATION

- Types of electrodes
- Color coding of ECG leads
- Limb leads identification
- Chest (precordial) leads identification

➢ ECG LEAD PLACEMENT (PRACTICAL)

Limb Leads

- Right arm (RA)
- Left arm (LA)
- Right leg (RL)
- Left leg (LL)

Chest Leads

- V1 – V6 exact anatomical positions

➢ RECORDING A STANDARD 12-LEAD ECG

- Step-by-step procedure of ECG recording
- Checking signal quality

- Identifying artifacts during recording
- Printing ECG tracing

➢ HEART RATE CALCULATION

- Large square method
- Small square method
- Rhythm strip method

➢ IDENTIFICATION OF NORMAL ECG

- Normal P wave
- Normal PR interval
- Normal QRS complex
- Normal ST segment
- Normal T wave

➢ BASIC RHYTHM IDENTIFICATION

- Normal sinus rhythm
- Sinus bradycardia
- Sinus tachycardia

➢ ARTIFACTS & ERROR CORRECTION

- Muscle tremor artifact
- Baseline wander
- AC interference
- Loose electrode artifact
- Troubleshooting techniques

➢ INFECTION CONTROL & SAFETY IN ECG

- Cleaning of electrodes
- Use of disposable materials
- Electrical safety precautions
- Universal precautions during ECG

➢ ECG REPORT HANDLING & DOCUMENTATION

- Writing patient details correctly
- Date, time & technician signature
- Safe storage of ECG records
- Handover to doctor

➢ SPECIAL ECG PROCEDURES (BASIC AWARENESS)

- Bedside ECG
- Emergency ECG
- Introduction to Holter & TMT (demonstration only)

LIST OF HOLIDAYS

TOTAL DAY IN 1 YEAR	365/366
SUNDAY	52 DAYS
SUMMER VACATION	10 DAYS
WINTER VACATION	10 DAYS
GAZETTED HOLIDAYS	23 DAYS
OTHER HOLIDAYS	20 DAYS
TOTAL HOLIDAYS	115 DAYS
TOTAL WORKING DAYS	365-115=250

TOTAL HOURS

THEORY CLASS PER DAY	3 HOURS
PRACTICAL CLASS PER DAY	4 HOURS
TOTAL HOURS PER DAY	7 HOURS
TOTAL HOURS IN 1 YEAR	250*7=1750
TOTAL HOURS IN 6 MONTHS	875 HOURS

Chairman

Paramedical Education & Training Council