

# SUMANDEEP VIDYAPEETH

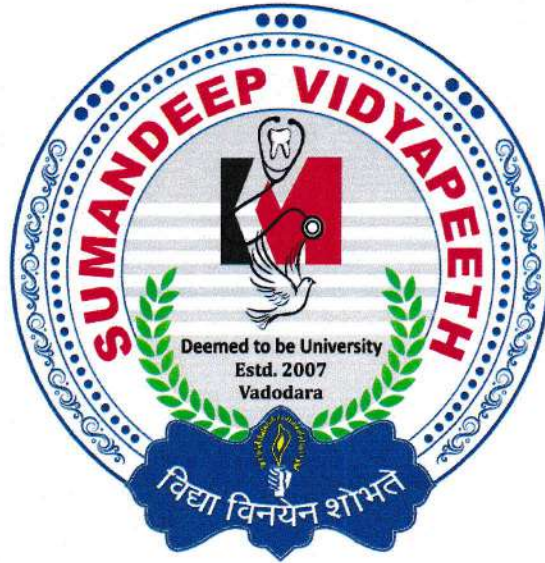
(Declared as Deemed to be University under Section 3 of the UGC Act 1956)

Accredited by NAAC with a CGPA of 3.53 out of four-point scale at 'A' Grade

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## CURRICULUM

### Bachelor of Science (B.Sc) CARDIAC CARE TECHNOLOGY

Attested CTC

*Sharaney*  
15/2/2021

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*U. Chandrashekar*

2016



## INTRODUCTION

### Scope

The quality of paramedical care has improved tremendously in the last few decades due to the advances in technology, thus creating fresh challenges in the field of healthcare. It is now widely recognized that health service delivery is a team effort involving both clinicians and non-clinicians, and is not the sole duty of physicians and nurses. Professionals that can competently handle sophisticated machinery and advanced protocols are now in high demand. In fact, diagnosis is now so dependent on technology, that paramedical and healthcare professionals are vital to successful treatment delivery.

Effective delivery of healthcare services depends largely on the nature of education, training and appropriate orientation towards community health of all categories of health personnel, and their capacity to function as an integrated team, with a range of skills and expertise, play key roles within the National Health Service, working autonomously, in multi-professional teams in various settings. All of them are first-contact practitioners and work across a wide range of locations and sectors within acute, primary and community care.

### Learning goals and objectives for paramedical healthcare professionals

The learning goals and objectives of the undergraduate and graduate education program will be based on the performance expectations. They will be articulated as learning goals (why we teach this) and learning objectives (what the students will learn). Using the framework, students will learn to integrate their knowledge, skills and abilities in a hands-on manner in a professional healthcare setting. These learning goals are divided into nine key areas, though the degree of required involvement may differ across various levels of qualification and professional cadres.

### Program outcomes

After completion of B.sc Cardiac care technology should be able to assist physicians by diagnosing and treating diseases of the heart and blood vessels and take the images of the heart and peripheral blood vessels through both invasive and non-invasive procedures, such as catheterization, balloon angioplasty, or the use of ultrasound equipment

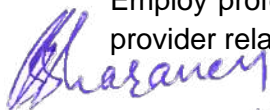
### Ethics and accountability

Students will understand core concepts of clinical ethics and law so that they may apply these to their practice as healthcare service providers. Program objectives should enable the students to:

- Describe and apply the basic concepts of clinical ethics to actual cases and situations
- Recognize the need to make health care resources available to patients fairly, equitably and without bias, discrimination or undue influence

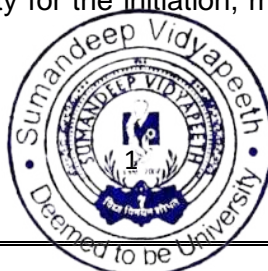
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• Demonstrate an understanding and application of basic legal concepts to the practice  
• Employ professional accountability for the initiation, maintenance and termination of patient-provider relationships



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- Demonstrate respect for each patient's individual rights of autonomy, privacy, and confidentiality

### Commitment to professional excellence

The student will execute professionalism to reflect in his/her thought and action a range of attributes and characteristics that include technical competence, appearance, image, confidence level, empathy, compassion, understanding, patience, manners, verbal and non-verbal communication, an anti-discriminatory and non-judgmental attitude, and appropriate physical contact to ensure safe, effective and expected delivery of healthcare.

### Eligibility for admission:

He/she has passed the Higher Secondary (10+2) Science or a duly constituted Board with pass marks in Physics, Chemistry, Biology

### Duration of the course:

Duration of the course is 4 years including 1-year internship.

### Attendance:

A candidate has to secure minimum 80% attendance in overall with at least-

1. 75% attendance in theoretical
2. 80% in Skills training (practical) for qualifying to appear for the final examination.

No relaxation, whatsoever, will be permissible to this rule under any ground including indisposition etc.

### Medium of instruction:

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

**Assessment:** Assessments should be completed by the academic staff, based on the compilation of the student's theoretical & clinical performance throughout the training programme. To achieve this, all assessment forms and feedback should be included and evaluated. Student must attain at least 50% marks in each Theory, Internal assessment and Practical independently / separately for each individual subject.

### Course of Instruction:

Course Name	Course code	Theory (In hrs.) (Class and lab)	Practical (In hrs.) (Clinical)
<b>First Year - Total Hours 380</b>			
Anatomy	BCCT101	60	40
Physiology	BCCT102	60	40
Pathology & Microbiology	BCCT103	60	40
Biochemistry	BCCT104	60	20
<b>Total</b>		<b>240</b>	<b>140</b>
<b>Second Year - Total Hours 300</b>			

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Applied Pathology	BCCT201	60	40
Applied Microbiology	BCCT202	60	40
Applied pharmacology	BCCT203	60	--
Medicine Relevant to Cardiac Care Technology	BCCT204	40	--
<b>Total</b>		<b>220</b>	<b>80</b>
<b>Third Year -720Total Hours</b>			
Introduction related to cardiac care technology	BCCT301	80	160
Clinical aspect of cardiac care	BCCT302	80	160
Advance cardiac care	BCCT303	80	160
<b>Total</b>		<b>240</b>	<b>480</b>
<b>Fourth Year</b>			
<b>Internship (Integrated Practice) - Total Hours 2184</b>			

### Scheme of Examination:

Course	Course Code	Assessment			
		Hours	Internal	External	Total
<b>First Year</b>					
Anatomy	BCCT101	3	20	80	100
Physiology	BCCT102	3	20	80	100
Pathology & Microbiology	BCCT103	3	20	80	100
Biochemistry	BCCT104	3	20	80	100
<b>Total</b>			<b>80</b>	<b>320</b>	<b>400</b>
<b>Second Year</b>					
Applied Pathology	BCCT201	3	20	80	100
Applied Microbiology	BCCT202	3	20	80	100
General Medicine	BCCT203	3	20	80	100
Applied pharmacology	BCCT204	3	20	80	100
<b>Total</b>			<b>80</b>	<b>320</b>	<b>400</b>
<b>Third Year</b>					
Introduction related to cardiac care technology	BCCT301	3	20	80	100
Clinical aspect of cardiac care	BCCT302	3	20	80	100
Advance cardiac care	BCCT303	3	20	80	100
<b>Total</b>			<b>60</b>	<b>240</b>	<b>300</b>
<b>Attested CTC</b>					
Internship - Practical					
<b>Total</b>			<b>20</b>	<b>80</b>	<b>100</b>

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## FIRST YEAR B.SC. CARDIAC CARE TECHNOLOGY

### **BCCT101 - ANATOMY**

**(60 HOURS)**

#### **Unit 1- Organization**

- Terms, terminology, planes
- Tissues of the body (General) Epithelial tissue
- Glands, mucous membrane.

#### **Unit 2- Skeletal system**

- Cartilage
- Bones
- Ossification, blood supply
- Joints
- Synovial joint

#### **Unit 3- Muscular tissue**

- Muscle classification – I
- Muscle – II

#### **Unit 4- Nervous system**

- Neuron, Neuroglia
- Spinal cord & Spinal nerves
- Parts of brain & major functions
- Cranial nerves
- Autonomic nervous system

#### **Unit 5- Sensory organs**

- Nose & Olfaction
- Tongue

#### **Unit 6- Circulation & Lymphatic**

- Systemic, Pulmonary, Portal
- Heart, chambers, valves
- Coronary circulation, Venous drainage, applied
- Major branches of aorta, major veins, pulse
- Femoral and Axillary artery
- Diaphragm
- Lymphoid tissue classification, structure I
- Lymphoid tissue classification, structure II
- Lymphatic drainage, lymphatic trunks

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### Unit 7- Respiratory system

- Larynx, Trachea
- Pleura & lung & structure
- Bronchopulmonary segments, Para nasal sinuses

### Unit 8 - Digestive system

- Pharynx, Esophagus
- Stomach, Duodenum
- Liver, Gall bladder, Pancreas
- Jejunum, Ileum, Appendix
- Colon, Rectum, Anal canal

### Unit 9 - Urinary system)

- Kidney
- Ureter, Urinary bladder
- Prostate, Urethra

### Unit 10 - Endocrine system

- Thyroid, Parathyroid
- Suprarenal
- Pituitary Pancreas,

### Unit 11- Reproductive system

- Female reproductive system
- Male reproductive

### PRACTICALS:

(40 HOURS)

- Human skeleton
- Organ systems
- Organs – 1
- Organs – 2
- Organs – 3
- Organs – 4
- Organs – 5
- Types of Cartilages
- Bones -1
- Bones -2
- Bones -3
- Histology of compact bones
- Muscles of body as functional groups

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- Histology of types of muscles

## BCCT102 - PHYSIOLOGY

(60 HOURS)

### Unit 1- General Physiology

- Introduction to cell physiology,
- transport across cell membrane

### Unit 2 - Blood

- Introduction - composition and function of blood
- Plasma proteins
- Red blood cells.
- Hemoglobin
- WBC
- Platelets
- Homeostasis
- Blood Group

### Unit 3 - Nerve - Muscle Physiology

- Resting membrane potential & Action potential
- Types of muscle & Mechanism of Muscle Contraction
- Neuromuscular Junction
- Neuron and neuroglia
- Properties of nerve fibre
- Secretion & Composition & function of CSF

### Unit 4 - GIT

- Movement of GIT
- Deglutition & Mechanism of Vomiting
- Digestive Juices in upper digestive tract
- Digestive juices in lower digestive tract

### Unit 5 - Excretory system

- Kidneys-structure, function
- Glomerular filtration rate
- Counter current mechanism of concentration of urine,
- micturition, Diuretics
- Artificial kidney, renal function tests
- Skin
- Regulation of body Temperature

### Unit 6 - Respiratory system

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- Mechanism of Breathing
- Hypoxia
- O<sub>2</sub> and CO<sub>2</sub> transport
- Pulmonary volume & Capacities

### Unit 7 - Cardio Vascular System

- Introduction to CVS & general principles of circulation
- Properties of Cardiac muscle
- Cardiac cycle, heart sounds, Pulse
- Cardiac output, Heart rate ,BP ,ECG
- Coronary circulation, Cutaneous circulation-Triple response ,Shock
- Effects of exercise on CVS and Respiratory system

### Unit 8 - Lymphatic System

### Unit 9 - Endocrine System

- Hormones of pituitary, Thyroid
- Parathyroid Gland
- Hormones of Adrenal Gland & Pancreas

### Unit 10 - Reproductive System

- Introduction to reproductive system, Puberty
- Male reproductive system,
- Female reproductive system,
- Physiological changes during pregnancy, pregnancy tests, parturition & lactation
- Male & Female contraceptive methods
- Special senses
- Vision
- Audition
- Olfaction
- Gustation

### PRACTICALS:

(40 HOURS)

- Introduction and Laboratory guidelines
- Demonstration of estimation of Hemoglobin
- Practical of estimation of Hemoglobin
- Practical of BT & CT
- Practical of Blood Grouping
- ESR & PCV
- Blood Pressure
- Pulse

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- Heart rate & heart sound
- Breathing rate & breathing sound
- Identification of blood cells by peripheral smear. RBC, WBC, Platelets.
- Revisions

## BCCT103 PATHOLOGY & MICROBIOLOGY

(60 HOURS)

### PATHOLOGY (30 HOURS)

#### Unit 1 - Histo Pathology

- Introduction to Histo Pathology
- Receiving of Specimen in the laboratory
- Grossing Techniques
- Mounting Techniques – various Mountants
- Maintenance of records and filing of the slides.
- Use & care of Microscope
- Various Fixatives, Mode of action, Preparation and Indication. Section Cutting
- Tissue processing for routine paraffin sections
- Decalcification of Tissues.
- Staining of tissues - H& E Staining
- Bio-Medical waste management

#### -Unit 2 - Clinical Pathology

- Introduction to Clinical Pathology
- Collection, Transport, Preservation, and Processing of various clinical Specimens
- Urine Examination – Collection and Preservation of urine. Physical, chemical, Microscopic Examination
- Examination of CSF and other body fluids.
- Sputum Examination.
- Examination of feces

#### Unit 3 - Hematology

- Introduction to Hematology
- Normal constituents of Blood, their structure and function.
- Collection of Blood samples
- Various Anticoagulants used in Hematology
- Various instruments and glassware used in Hematology, Preparation and use of glassware
- Laboratory safety guidelines
- SI units and conventional units in Hospital Laboratory
- Hb, PCV, ESR
- ~~Arrested Coagulation~~ Hemostasis
- Bleeding Time, Clotting Time, Prothrombin Time, Activated Partial Thromboplastin Time.

#### Unit 4 - Blood Bank

Introduction

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- Blood grouping and Rh Types
- Cross matching

### **PRACTICALS:**

**(20 HOURS)**

- Urine Examination.
- Physical
- Chemical
- Microscopic
- Blood Grouping Rh typing.
- Hb Estimation, Packed Cell Volume[PCV], Erythrocyte Sedimentation rate{ESR}
- Bleeding Time, Clotting Time.
- Histopathology – Section cutting and H &E Staining.

### **MICROBIOLOGY (30 HOURS)**

#### **Unit 1: General Microbiology**

- History: Louis Pasteur, Robert Koch
- Microscope: Parts, function and its types
- Morphology of bacteria: classification of microorganisms, bacteria cell, staining of bacteria-Gram and ZN stain
- Physiology of bacteria: Growth and nutrition of bacteria, Growth curve
- Sterilization and disinfection: Dry heat, moist heat sterilization, filtration, Radiation, disinfectants use in hospital
- Culture media: simple and complex media, preparation and its use
- Culture methods: aerobic and anaerobic
- Identification of bacteria: catalase test, coagulase test, oxidase test, Urease test, IMViC TESTS

#### **Unit-2: Immunology**

- a. Infection
- b. Immunity
- c. Antigen
- d. Antibody

#### **Unit 3: Collection, transport and processing of clinical specimens:**

- Throat swab
- Sputum
- Urine
- Pus
- Blood
- CSF

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#### **Unit 4: Health care associated Infections: Sources, Method of transmission and Prevention**

#### **Unit 5: Principle and Practices of Biomedical waste management:**

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**PRACTICALS:****(20 HOURS)**

- Microscope: parts function, focus, care and handling
- Hanging drop preparation
- Performance of Gram's stain
- Performance of ZN stain
- Culture media preparation: Nutrient agar, Blood agar, Chocolate agar, NA slant, MacConkey agar
- Functioning of Autoclave and Hot air oven
- Visit to hospital for the demonstration of Biomedical Waste Management
- Aseptic practices in laboratory and safety precautions

**BCCT104 BIOCHEMISTRY****(60 HOURS)**

- Introduction and scope of Clinical Biochemistry
  - Functioning Clinical Laboratory: - Role of Medical Laboratory technologist, Code of Ethics.
  - Laboratory Safety including Biomedical waste disposal
  - Reagents: - Preparation, Formulation, storage, safety and uses.
  - Collection and Preservation of Sample/specimen & anti-coagulants
  - Chemistry of Body fluids: - Blood, CSF, Urine, Milk, Bile, Gastric Juice and Saliva.
  - Buffers of Body system and pH regulation.
  - Glassware's & plastic ware's used in laboratory and its calibration, cleaning, care and maintenance.
  - Biophysics: -Osmosis, Dialysis, Viscosity, Surface tension, Colloids and Sedimentation, Osmotic Pressure and osmolality.
  - Blood buffers and pH regulation.
  - Cell biology:- Prokaryotic and Eukaryotic, cell organelles, subcellular fraction and its function.
  - Chemistry and Biomedical Importance of
- 
- Carbohydrate
  - Proteins
  - Lipids
  - Nucleic acid.
  - Enzymes:
  - Vitamins
  - Minerals
  - Chemistry of Body fluids: - Blood, CSF, Urine, Milk, Bile, Gastric Juice and Saliva.

**PRACTICALS:****(20 HOURS)**

- To demonstrate glassware's, apparatus and plastic wares used in laboratory.
- Preparation of different percentage solutions
- Preparation of normal and molar solutions. (0.1 N NaOH, 0.2N HCl, 0.1 M H<sub>2</sub>SO<sub>4</sub>).
- Reactions of Carbohydrate
- Reactions of Protein: - Precipitation and Color reaction
- Analysis of Normal Urine- Physical, Chemical and Microscopic

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- Analysis of abnormal Urine:- Physical, Chemical and Microscopic
- Qualitative analysis of Saliva.
- Qualitative analysis of Milk
- Qualitative analysis of Bile.
- Qualitative analysis of CSF.
- Qualitative analysis of Gastric juice

## **SECOND YEAR B.SC. CARDIAC CARE TECHNOLOGY**

### **BCCT201- APPLIED PATHOLOGY**

**(60 HOURS)**

#### **Unit 1- Cardiovascular system**

- Atherosclerosis- Definition, risk factors, briefly Pathogenesis morphology, clinical significance and prevention.
- Hypertension- Definition, types and briefly Pathogenesis and effects of Hypertension.
- Aneurysms – Definition, classification, Pathology and complications.
- Pathophysiology of Heart failure.
- Cardiac hypertrophy – causes, Pathophysiology & Progression to Heart Failure.
- Ischemic heart diseases-Definition, Types. Briefly Pathophysiology, Pathology& Complications of various types of IHD.
- Valvular Heart diseases- causes, Pathology & complication.
- Complications of artificial valves.
- Cardiomyopathy – Definition, Types, causes and significance.
- Pericardial effusion- causes, effects and diagnosis.
- Congenital heart diseases – Basic defect and effects of important types of congenital heart diseases.

#### **Unit 2- Hematology**

- Anemia - Definition, morphological types and diagnosis of anemia.
- Brief concept about Hemolytic anemia and polycythemia.
- Leukocyte disorders- Briefly leukemia, leukocytosis, agranulocytosis etc.,
- Bleeding disorders- Definition, classification, causes & effects of important types of bleeding disorders. Briefly various laboratory tests used to diagnose bleeding disorders.

#### **Unit 3 - Respiratory System**

- Chronic obstructive airway diseases – Definition and types.
- Brief causes, Pathology and complications of each type of
- Brief concept about obstructive versus restrictive pulmonary COPD disease.
- Pneumoconiosis- Definition, types, Pathology and effects in brief.
- Pulmonary congestion and edema.
- Pericardial effusion – causes, effects and diagnosis.

#### **Unit 4 - Renal System**

Clinical manifestations of renal diseases. Briefly causes,

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- mechanism, effects and laboratory diagnosis of ARF & CRS.
- Brief Glomerulonephritis and Pyelonephritis.
- End stage renal disease – Definition, causes, effects and role of dialysis and renal transplantation in its management.
- Brief concept about obstructive uropathy.

## PRACTICALS

(40 HOURS)

- Description & diagnosis of the following gross specimens.
- Atherosclerosis.
- Aortic aneurysm.
- Myocardial infarction.
- Emphysema
- Chronic glomerulonephritis.
- Chronic pyelonephritis.
- Interpretation & diagnosis of the following charts.
- Hematology Chart - AML, CML, Hemophilia, neutrophilia, eosinophilia
- Urine Chart - ARF, CRF, Acute glomerulonephritis.
- Estimation of Hemoglobin.
- Estimation Bleeding & Clotting time

## APPLIED MICROBIOLOGY

(60 HOURS)

### Unit 1- Health care associated infections and Antimicrobial resistance

- Infections that patients acquire during the course of receiving treatment for other conditions within a healthcare setting like Methicillin Resistant Staphylococcus aureus infections, Infections caused by *Clostridium difficile*, Vancomycin resistant enterococci etc.
- Catheter related blood stream infections, Ventilator associated pneumonia, Catheter Related urinary tract infections, Surveillance of emerging resistance and changing flora. The impact and cost attributed to Hospital Associated infection.

### Unit 2 - Disease communicable to Healthcare workers in hospital set up and its preventive measure:

- Occupationally acquired infections in healthcare professionals by respiratory route ( tuberculosis, varicella-zoster, respiratory syncytial virus etc ), blood borne transmission ( HIV, Hepatitis B, Hepatitis C, Cytomegalovirus, Ebola virus etc), oral, fecal route ( Salmonella, Hepatitis A etc), direct contact ( Herpes Simplex Virus etc).
- Preventive measures to combat the spread of these infections by monitoring and Control.

### Unit 3 - Microbiological surveillance and sampling

- Required to determine the frequency of potential bacterial pathogens including Streptococcus pneumoniae, Hemophilus influenzae, and Moraxella catarrhalis and also to assess the antimicrobial resistance.
- Sampling: rinse technique, direct surface agar plating technique.

### Unit 4 - Importance of sterilization

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- Disinfection of instruments used in patient care: Classification, different methods, advantages and disadvantages of the various methods.
- Disinfection of the patient care unit
- Infection control measures for ICU's

### Unit 5 - Sterilization

- Rooms: Gaseous sterilization, one atmosphere uniform glow discharge plasma (OAUGDP).
- Equipments: classification of the instruments and appropriate methods of sterilization.
- Central supply department: the four areas and the floor plan for instrument cleaning, high-level disinfecting and sterilizing areas

### Unit 6 -Preparation of materials for autoclaving:

- Packing of different types of materials,
- loading, holding time and unloading.

### PRACTICALS

(40 HOURS)

- Principles of autoclaving & quality control of Sterilization.
- Collection of specimens from outpatient units, inpatient units, minor operation theater and major operation theater for sterility testing.
- The various methods employed for sterility testing.
- Interpretation of results of sterility testing.
- Disinfection of wards, OT and Laboratory.

### BCCT204 - APPLIED PHRMCOLGY

(60 HOURS)

- Introduction & Sources of Drug
- Routes of drug Administration
- Pharmacokinetics:
- Membrane Transport
- Absorption and Distribution of drug
- Pharmacokinetics:
- Metabolism and Excretion
- Kinetics of Elimination
- Pharmacodynamic:
- Mechanism of drug action
- Pharmacodynamic:
- Receptor Pharmacology
- Factors affecting drug action
- Autonomic Nervous System:
- Anatomy & functional organisms of ANS
- Cholinergic drugs Part-I:
- Classification, Therapeutic uses & Side effects

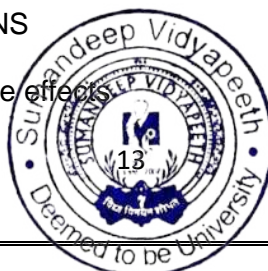
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- Cholinergic drugs Part-II:
- Classification, Therapeutic uses & Side effects
- Anticholinergic drugs:
- Classification, Therapeutic uses & Side effects
- Adrenergic drugs:
- Classification, Therapeutic uses & Side effects
- Antiadrenergic drugs Part-I:
- Classification Therapeutic uses
- Side effects
- Antiadrenergic drugs Part-II:
- Classification Therapeutic uses
- Side effects
- Diuretics Part-I
- Diuretics Part-II
- Drug affecting Renin-Angiotensin System:
- ACE inhibitors
- Drug affecting Renin-Angiotensin System:
- ARBs (Angiotensin Receptor Blockers)
- Antianginal drugs:
- Nitrates ]
- Antianginal drugs:
- Others
- Drugs for heart failure:
- Cardiac Glycosides
- Drugs for heart failure:
- Others
- Antihypertensive drugs Part-I
- Antihypertensive drugs Part-II
- Drugs for Myocardial infarction
- Antiarrhythmic drugs
- Blood:
- Coagulants & Anticoagulants
- Thrombolytics & Antiplatelet drugs
- Lipid lowering drug
- Anti-peptic ulcer drugs like proton pump inhibitors & others
- Chemotherapy:
- Penicillin
- Chemotherapy:
- Pharmacovigilance
- Autonomic Nervous System:
- Interpretation of relevant charts.
- Cardiovascular Drugs:
- Interpretation of relevant charts

### MEDICINE RELEVANT TO CARDIAC CARE TECHNOLOGY

(40 HOURS)

- ~~Introduction of Medicine~~
- Introduction
- Cardiovascular System:
- Ischemic Heart Disease
- Cardiovascular System

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- Rheumatic Heart Disease
- Cardiovascular System:
- Hypertension
- Cardiovascular System:
- Ischemic Heart Disease and LV Failure
- Cardiovascular System:
- Congenital Heart Disease
- Cardiovascular System:
- Pulmonary hypertension
- Cardiovascular System:
- Pulmonary Oedema
- Peripheral Vascular Disease
- Hematology:
- Iron Deficiency Anemia
- Hematology:
- Other Anemias
- Hematology:
- Bleeding disorders and diagnostic laboratory tests
- Respiratory System:
- Chronic Obstructive Pulmonary Disease(COPD)
- Respiratory System:
- Obstructive vs Restrictive Lung Disease and PFT
- Renal System:
- ARF ,CRF and End stage Renal Disease
- Renal System:
- Role of Dialysis, Renal transplantation and its management
- Autonomic Nervous System
- Central Nervous System Disorders and their Etiology
- Diabetes Mellitus
- Obesity
- Pregnancy
- Elderly Patients
- Paediatric Patient

### **THIRD YEAR B.SC. CARDIAC CARE TECHNOLOGY**

#### **INTRODUCTION TO CARDIAC CARE TECHNOLOGY**

**(80 HOURS)**

#### **Unit 1- Electrocardiography (ECG)**

- Basic Principles
- The Electrocardiographic paper
- The Electrocardiograph
- The Electrical field of Heart
- The leads: Standard limb, Pericardial lead, 'V' lead & 'AV' lead
- Basic ECG deflections
- Basic action of electrocardiograph

#### **Unit 2 - Normal ECG**

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- The 'P' wave
- The 'qrs' complex
- The genesis of 'qrs' complex
- T wave; the S-T segment
- The 'U' wave
- Rate & rhythm
- So called rotation of the heart – The Q-T interval
- The Electrical axis
- Pericardial pattern of ECG
- Chamber enlargement – atrial enlargement, LV hypertrophy & RV hypertrophy

### Unit 3 - Exercise stress Testing

- Exercise protocols
- Electrocardiography measurements
- Exercise testing – Indication and techniques
- Echocardiography
- Principles of Echocardiography
- Basic principles of ultrasound
- M-Mode of Echocardiography
- Two-dimensional Echocardiography
- Doppler Echocardiography; color flow
- Transesophageal Echocardiography
- Instrumentation
- Basic pulse Echo system
- Transducers
- Pulse generation
- Echo detection
- A mode, B-Mode, M-Mode
- Display & recording
- Echocardiographic Examination
- Selecting transducers
- Position of the patient
- Placement of the transducer
- Setting control
- M-Mode labelling
- 2 D Echo
- Normal variants
- Terminology
- Identification of segments .

### Unit 4 - Doppler Echocardiography

- Introduction to Doppler color Echocardiography .
- The Doppler principles.
- ~~Basic~~ **Advanced** ultrasound techniques.
- Color Doppler flow imaging.
- Clinical application of Doppler Echocardiography.
- **Physical principles & instrumentation in spectral & color Doppler flow imaging.**

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- Physical principles and Doppler effect. The Doppler Echocardiography system display.
- Blood flow pattern – Laminar & non-laminar flow .
- Doppler Echo cardiograph modes.
- Continuous wave Doppler system .
- Pulsed Doppler system .
- High pulse repetition frequency.
- Problems of color imaging .

#### **Unit 5 - Contrast Echo**

#### **Unit 6 - Echo measurements-‘ASE’ recommendation**

### **CARDIAC CARE TECHNOLOGY – CLINICAL (80 HOURS)**

#### **Unit 1- Interpretation of Normal ECG**

- Basic abnormalities of ECG in RHD, IHD & CHD.

#### **Unit 2 - Echo in rheumatic heart disease**

- Echo in mitral stenosis, mitral incompetence, aortic stenosis, aortic incompetence, pulmonary hypertension. Post AVR, post MVR. Prosthetic valve malfunction, LA clot.

#### **Unit 3 - Echo in congenital heart disease**

- Echo in ASD, VSD, PDA pulmonary stenosis, aortic stenosis, coarctation of aorta, TOF.

#### **Unit 4 - Echo in ischemic heart disease**

- Echo in acute myocardial infarction, old myocardial infarction and other ischemic heart disease related conditions, LV aneurysm.

#### **Unit 5 - Echo in other cardiovascular disease**

- Echo in various types of cardio myopathy infective endocarditis diseases of aorta, mitral valve prolapses, myxoma and other cardio vascular diseases.

#### **Unit 6 - Assessment of Cardiac function**

- Measurements of all cardiac chambers and assessment of cardiac function.

#### **Unit 7 - Echo in pericardial disease**

- Pericardial effusion, cardiac tamponade, constructive pericarditis.

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#### **Unit 8 - Cardiac catheterization laboratory**

- General details of cardiac catheterization equipment, how to handle the machine, common problems one may come across and how to overcome it, radiation hazards.

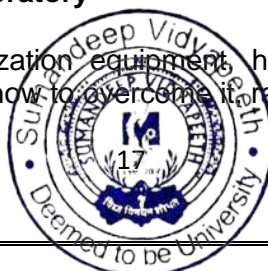
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### Unit 9 - Materials used in the Cath lab

- All catheters, balloons, guidewires, pacemakers contrast material and other material used in the cardiac catheterization laboratory and sterilization of all these materials.

### Unit 10 - Right heart catheterization

- Procedure, Cath position, oximetry at various levels, agios done and its interpretation.

### Unit 11 - Left heart catheterization

- Procedure, Cath position, oximetry at various levels, agios done and its interpretation.

### Unit 12- Coronary angiogram

- Procedure, materials used, type and amount dye used, indications and contraindications, various pictures recorded in various angles and gross interpretation.

### Unit 13 - Peripheral angiogram b

- Procedure, indication and contraindication.

## CARDIAC CARE TECHNOLOGY – APPLIED

(80 HOURS)

### Unit 1 - ECG in Myocardial Infarction

- Definition of myocardial infarction, diagnosis of myocardial infarction, ECG criteria for myocardial infarction, ECG in anterior wall, inferior wall, true posterior wall and sub endocardial infarction and RV infarction.

### Unit 2 - ECG in Rheumatic Heart Disease

- Definition of rheumatic heart disease, valvular involvement in rheumatic heart disease, ECG in mitral stenosis, mitral incompetence, aortic stenosis and aortic in competence.

### Unit 3 - ECG in Hypertension

- Definition of hypertension, how to record blood pressure, ECG in hypertension.

### Unit 4- ECG in congenital heart disease

- Common congenital heart disease.
- ASD, VSD, PDA, pulmonary stenosis, aortic stenosis, coarctation of aorta, TOF, definition of all these conditions ECG changes in all these conditions .

### ECG in other conditions

- ECG in various types of cardiomyopathy, myxedema, pericardial effusion, acute pericarditis and other vascular diseases. Bundle branch block, WPW syndrome, dextrocardia.

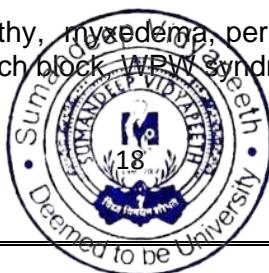
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### **Unit 6 -Trans esophageal echocardiogram**

- Indications, procedure, usefulness and complications, one may encounter and its management.

### **Unit 7- Stress Echo- procedure and indications**

### **Unit 8 - Peripheral Doppler**

- Procedure and usefulness of peripheral Doppler.

### **Unit 9 - Coronary angioplasty**

- Procedure, materials used, complication one may encounter and how to manage it .

### **Unit 10 - Peripheral angioplasty**

- Materials used and procedure. Angioplasty of coarctation of aorta.

### **Unit 11- Fetal echocardiogram**

- Procedure, basic interpretation.

### **Unit 12 - Contrast echocardiogram**

- Procedure and usefulness of contrast echocardiogram.

### **Unit 13 - Myocardial contrast echo**

## **CARDIAC CARE TECHNOLOGY – ADVANCED**

**(80 HOURS)**

### **Unit 1- Cardiac monitoring**

- Definition, purpose of cardiac monitoring, how to Recognize various arrhythmias how to set up an intensive coronary care unit and usefulness of ICCU.

### **Unit 2 - Interpretation of TMT, report**

- Criteria for TMT positive test contraindication for TMT conditions where TMT is not useful, complications that may occur in TMT room and its management.

### **Unit 3 - Use of defibrillator**

- Indications, how to use the defibrillator, complications during the procedure and its management.

### **Unit 4 - Management of cardiac arrest**

- Definition, causes external cardiac massage, artificial respiration and other drugs and procedures used in the management of Cardiac arrest.

### **Unit 5- Myocardial perfusion scan**

- Definition, causes external cardiac massage, artificial respiration and other drugs and procedures used in the management of Cardiac arrest.

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- Procedures and usefulness of myocardial perfusion scan.

### **Unit 6 - Cardiac arrhythmias**

- Bradyarrhythmia and tachy arrhythmias and ECG diagnosis of all rhythm disturbances. Sinus arrhythmia, APC, FPC, VPC, VF, VT, AF, SVT, I0HB, II0HB, complete heart block .

### **Unit 7 - Electrolyte disturbances**

- ECG in hypokalemia, etc.

### **Unit 8 -Holter monitoring**

- Procedure and usefulness.

### **Unit 9 – Valvoplasties**

- Procedure, indications, complications and treatment of balloons, mitral valvuloplasty, balloon aortic valvuloplasty balloon pulmonary valvuloplasty and balloon tricuspid valvuloplasty.

### **Unit 10 - Coil closure and device closure of PDA**

- Procedure, indications and materials used for coil and device closure of PDA.

### **Unit 11 - Device closure of ASD**

- Procedure, indications and materials used for device closure of ASD .

### **Unit 12 - Device closure of VSD**

- Procedure, indications and materials used for device closure of VSD.

### **Unit 13 - Electrophysiological studies**

- Basic knowledge of EP studies mapping and ablation.

### **Unit 14 - Oximetry**

- Handling of the instrument and usefulness of the instrument, normal and abnormal values.

### **Unit 15 - Pressure recording**

- Handling of the instrument and pressures in various chambers, normal and abnormal values

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### **Unit 16 - Temporary and permanent pacing**

- Materials used, procedure, complications one may encounter and management. Implantable cardioverter defibrillator devices.

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## Unit 17 - CD recording and storage

- Recording and storage of all the procedures over CD .

## Unit 18 - Procedure during pregnancy

## Unit 19 - Nuclear Cardiology

- Instrumentation, radiopharmaceuticals, patient imaging techniques.

## FOURTH YEAR B.SC. CARDIAC CARE TECHNOLOGY

### Internship (Integrated Practice)

(Total Hours 2184)

The internship will span 1 Year. This will include 6 hours of practice a day, totaling to 2184 hours during internship year. As a part of this, the students will maintain a work logbook which will be duly endorsed by the supervisor or trainer. At the end of internship, the candidate shall submit the work log book along with certificate from the training institute.

The internship time period provides the students the opportunity to continue to develop confidence and increased skill in clinical delivery of services. Students will demonstrate competence in beginning and intermediate procedures. Students will observe the advanced and specialized procedures. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. The students are expected to work for minimum 6 hours per day and this may be more depending on the need and the healthcare setting.

### CODE OF PROFESSIONAL CONDUCT

#### INTRODUCTION

The Code of Professional Conduct is designed and set out as guidance for the Cardiac Physiologist functioning as a clinical practitioner within the relationship that exists with every patient receiving health care.

Essential to that relationship is the patient's trust in the practitioner. This trust hangs upon the patient's assurance of being the practitioner's first concern during their clinical encounter, and upon the patient's confidence that the care received will be competent, whether in diagnosis, therapy or counseling.

#### STANDARD OF PRACTICE AND CARE

Patients are entitled to the highest standard of practice and care. The essential elements of this are professional competence, good relationships with patients and colleagues and observance of professional ethical obligations.

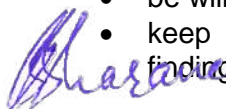
In providing care you must therefore:

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• recognize the limits of your professional competence.

• be willing to consult colleagues

• keep clear, accurate and contemporaneous patient records which report the relevant findings.

  
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- keep colleague informed
- pay due regard to the efficacy and the prudent use of resources.
- be competent, truthful, and accurate, when reporting on investigations.
- be competent when giving or arranging treatment.

## TEACHING

The Society for Cardiological Science and Technology encourages you to contribute to the education and training of colleagues.

All competent practitioners should be prepared to supervise less experienced colleagues.

If you have special responsibilities for teaching you should develop the skills of a competent teacher. If you are responsible for training junior colleagues you must make sure they are properly supervised.

## PATIENTS RIGHTS

- listen to patients and respect their views.
- treat patients politely and considerately.
- respect patients' privacy and dignity.
- give information to patients in a way they can understand.
- respect the right of patients to refuse treatment or to take part in teaching or research, reporting the refusal to the person requesting the procedure.
- respond to complaints promptly and constructively.

ensure that your views about a patient's life style, culture, beliefs, race, color, sex, sexuality, age, social status, or perceived economic worth, do not prejudice the service you give.

## CONFIDENTIALITY

Patients have a right to expect that you will not pass on any personal information which you learn in the course of your professional duties, unless they agree.

## ABUSE OF PROFESSIONAL POSITION

You must not abuse your patients' trust. You must not, for example:

- use your position to establish improper personal relationships with patients or their closerelatives.
- influence your patient to give money or other benefits to you or other people.
- improperly disclose or misuse confidential information about apatient.

## DUTY TO PROTECT PATIENTS

You have a duty to protect patients if you believe that a colleague's conduct, performance, or health, is a threat to them.

Before taking action, you should do your best to find out the facts. Then, if necessary, you must tell someone from the employing authority or from a regulatory body.



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15/2/2022