B.Sc. Cardiac Technology Degree course from the Academic Year - 2018-19

SYLLABUS

PAPER – I
BASIC ANATOMY

THEORY

Introduction to Anatomy

Basic Anatomical terminology

Osteology- Upper limb – clavicle, scapula, humerous, radius, ulna
Lower limb - femur, hipbone, sacrum, tibia, fibula
Vertebral column

Thorax – Intercostal space, pleura, bony thoracic cage, ribs sternum & thoracic vertebrae

Lungs – Trachae, bronchial tree and circulation.

Heart – Surface and gross anatomy of heart, chambers of the heart, valves of the heart, major blood Vessels of heart, pericardium, coronary arteries, pulmonary circulation and venous system.

Myology – Muscles of thorax, muscles of upper limb (arm & fore arm)
Flexor and extensor group of muscles (origin, insertion, nerve supply, action)

Histology – Types of tissue

(a) Epithelia - Squamous
Glandular
Transitional
Cartilage

(b) Connective tissue – bone, fibrous tissue, muscle Excretory sytem –

Kidney, ureters, bladder, structure of nephrons . PRACTICALS

Heart cut section, Anatomy of Heart and Identification of _structures

Histology – Slides for identification, general features, heart _muscle valve_and atherosclerosis

PHYSIOLOGY

1. Overview of the cardiovascular system

   Functions of the cardiovascular system
   Circulation of blood

   Central control of the cardiovascular system

2. Cardiac cycle
   Mechanical events

   Arterial cycle and central venous pressure cycle
   Clinical aspects of human cardiac cycle

3. Cardiac excitation and contraction
   Mechanism of contraction
   Sinoatrial node function
   The cardiac conduction system
   Atrioventricular node function
   Autonomic regulation of the heart rate

4. Assessment of cardiac output
   Fick principle

   Thermodilution and indicator dilution methods
   Pulse Doppler methods
   Miscellaneous methods

5. Hemodynamics
   Relationship between pressure, flow and
   resistance Frank-Starling law

   Preload, afterload and contractility Control
   of stroke volume and cardiac output

6. Solute transport between blood and tissues
   Circulation of fluid between plasma, interstitium lymph

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

8. Control of blood vessels
   Local control mechanisms
   Nervous control
   Hormonal control

9.Specialization in individual circulation
   Coronary circulation
   Cerebral circulation

Pulmonary circulation
Cutaneouos circulation

10. Cardiovascular receptors, reflexes and central control

11. Coordicated cardiovascular responses
Posture
Valsalva manoeuvre
Exercise
Divingreflex

12. Cardiovascular responses ion pathological situations Shock and haemorrhage
Syncope Essential hypertension Chronic cardiac failure

13. Respiratory physiology
Mechanics of respiration
Principles of gas exchange regulation of respire

14. Hematology and coagulation physiology blood components Blood groups and blood transfusion Hemostasis

BIO-CHEMISTRY

Biomolecules and the cell:

Major complex biomolecules of cell and cell organelles-Prokaryotic and eukaryotic cell

Carbohydrates

Chemical structure, function- Classification- Monosaccharides- Disaccharides- Polysaccharides-Homopolysaccahrides-Heteropolysaccharudes-Glycoproteins

Proteins:

Amino acids- Classification- Structure of proteins- Determination of protein structure- Properties of proteins- Denaturation- Classification of proteins- Antigen, Antibody- Types, Plasma proteins- Blood clotting.

Lipids:

Chemical structure, functions, Classification-fatty acids Triacylglycerols, Phospholipids, glycoproteins, Lipoproteins- Steroids - Amphipathic lipids.

Nucleic acids:

Purines and pyrimidine- Structure of DNA – Watson & Crick model of DNA - Structure of RNA – Types of RNA

Enzymes:

Definition – Nomenclature – Classification – Factors affecting enzyme activity – Active site – Coenzyme – Enzyme Inhibition – Mechanism of enzyme action – Units of enzyme – Isoeznzymes – Enzyme pattern in diseases.

Vitamins & Minerals:

Fat soluble vitamins(A,D,E,K) – Water soluble vitamins – B-complex vitamins- principal elements(Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chlorine and sulphur)- Trace elements – Calorific value of foods – Basal metabolic rate(BMR) – respiratory quotient(RQ) Specific dynamic action(SDA) – Balanced diet – Marasmus – Kwasoirkar

Hormones:

Classification – Mechanism of action – Hypothalamic hormones – Pitutary – Anterior, posterior – Thyroid – Adrenal cortex, Adrenal medulla – Gonadal hormones – Menstrual cycle – GI hormones

Acids and bases:

Definition, pH, Henderson – Hasselbalch equation, Buffers, Indicators, Normality, Molarity, Molality, fluid and electrolyte balance.

BIOCHEMISTRY SYLLABUS FOR PRACTICALS–(UNDERGRADUATES)

QUALITATIVE TESTS OF MONOSACCHARIDES (GLUCOSE AND FRUCTOSE)

1. Molisch’s test
2. Fehling’s test
3. Benedict’s test
4. Seliwanoff’s test QUALITATIVE

TESTS OF LIPIDS

1. Solubility tests
2. Emulsification tests
3. Saponification tests

QUALITATIVE TESTS OF PROTEINS

1. Isoelectric precipitation tests

2. Heat coagulation tests

PAPER - II

1. PATHOLOGY, MICROBIOLOGY , CLINICAL FEATURES AND TREATMENT OF DISEASES PERTINENT TO CARDIAC TECHNOLOGY

GENERAL PATHOLOGY

1 **INTRODUCTION**, CONCEPT OF DISEASE, CELL INJURY CAUSES, CELLULAR RESPONSES TO STRESS & NOTORIOUS STIMULI, CELLULAR ADAPTATION OF GROWTH & DIFFERENTIATION – ATROPHY, HYPERTROPHY, HYPERPLASIA AND METAPLASIA.

2. **CELL INJURY** – **REVERSIBLE INJURY** – TYPES, MORPHOLOGY, INTRACELLULAR ACCUMULATIONS, FATTY CHANGE, CELLULAR AGEING

3. **CELL INJURY – IRREVERSIBLE INJURY** – TYPES, MORPHOLOGY, NECROSIS, APOPTOSIS, DYSTROPHIC AND METASTATIC CALCIFICATION

4. GENERAL FEATURES OF **INFLAMMATION**, HISTORY, STIMULI FOR ACUTE INFLAMMATION, VASCULAR & CELLULAR EVENTS, CHEMICAL MEDIATORS.

5. **CHRONIC INFLAMMATION**- CAUSES, FEATURES AND EXAMPLES

6. **WOUND HEALING**, REGENERATION, REPAIR & FRACTURE HEALING

7. **EDEMA** – TYPES WITH EXAMPLES, HYPEREMIA, CHRONIC VENOUS CONGESTION & HEMORRHAGE

8. **THROMBOSIS** – ETIOPATHOGENESIS, MORPHOLOGY AND FATE OF THROMBUS

9. **EMBOLISM** – ETIOPATHOGENESIS AND MORPHOLOGY

10**. GANGRENE AND SHOCK**

11**. VITAMIN DEFICIENCES** AND ASSOCIATED CARDIOVASCULAR DISORDERS.

SYSTEMIC PATHOLOGY

I.THE BLOOD VESSELS AND LYMPHATICS

- **HYPERTENSION**– ETIOPATHOGENESIS, CLINICAL FEATURES, MORPHOLOGY AND COMPLICATIONS
- **ATHEROSCLEROSIS** – ETIOPATHOGENEIS, MORPHOLOGY, COMPLCATIONS, GENETIC FACTORS AND CLINICAL IMPLICATIONS

- **VASCULITIS** - INFECTIOUS ARTERITIS, NON-INFECTIOUS ARTERITIS – TYPES, CLINICAL FEATURES AND MORPHOLOGY.

- **ANEURYSMS**- TYPES, ETIPATHOGENESIS, CLINICAL FEATURES AND MORPHOLOGY

II. <u>HEART</u>

- **HEART FAILURE** - ETIOLOGY, TYPES OF HEART FAILURE, COMPENSATORY MECHANISMS
- **CONGENITAL HEART DISEASE** MALPOSITIONS OF THE HEART, SHUNTS (CYANOTIC CONGENITAL HEART DISEASE), OBSTRUCTIONS (OBSTRUCTIVE CONGENITAL HEART DISEASE)

- **ISCHAEMIC HEART DISEASE**, ETIOPATHOGENESIS, LABDIAGNOSIS, EFFECTS OF MYOCARDIAL ISCHAEMIA,GROSS AND MICROSCOPIC FEATURES.

- **RHEUMATIC FEVER AND RHEUMATIC HEART DISEASE** – ETIOPATHOGENESIS AND MORPHOLOGY

- **ENDOCARDITIS,** ATYPICAL VERRUCOUS (LIBMAN-SACKS) ENDOCARDITIS, NON-BACTERIAL THROMBOTIC (CACHECTIC, MARANTIC) ENDOCARDITIS, INFECTIVE (BACTERIAL) ENDOCARDITIS – TYPES, ETIOLOGY AND MORPHOLOGY

- **VALVULAR DISEASES AND DEFORMITIES** – ETIOPATHOGENESIS, TYPES, CLINICAL FEATURES AND MORPHOLOGY

- **CARDIOMYOPATHY** - CARDIAC HYPERTROPHY AND DILATATION – ETIOPATHOGENESIS, TYPES AND MORPHOLOGY.

- **MYOCARDIAL DISEASES** - MYOCARDITIS, CARDIOMYOPATHY - ETIOPATHOGENESIS, TYPES AND MORPHOLOGY

- **PERICARDIAL DISEASES**, PERICARDIAL FLUID ACCUMULATIONS, PERICARDITIS – TYPES AND MORPHOLOGY

- **TUMOURS OF THE HEART** – TYPES, GROSS AND MICROSCOPIC FEATURES.

- STRESS MYOCARDITIS,COVID MYOCARDITIS,VIRAL MYOCARDITIS AND VIRAL INDUCED CLOTTING.

MICROBIOLOGY SYLLABUS

I General Microbiology:

Introduction and History of Microbiology Sterilisation and Dis-infection General and specific Methods related to instruments and catheters used in Cardiac related conditions

Staining : Grams and Acid Fast

Basics in Culture Media and Identification of Bacteria
Antibiotic Sensitivity Testing and its Clinical Application
Hospital Infection Control Practices
Bio Medical Waste Management

II Immunology

Basics of Cells and Organs of Immune System

Types of Immunity--- Innate, Humoral and Cell mediated
Antigen, Antibody and Antigen – Antibody reaction
Serological and Immunological tests
Hypersensitivity Reactions --- Anaphylaxis
Immunodeficiency and Autoimmunity Transplantation
Immunity and HLA Typing Immuno-haematology
Vaccines and Universal Immunisation

III Diseases of the Blood and Cardio Vascular System

: Diseases transmitted by blood and blood products
Mechanism of transmission and its Prevention
: Rheumatic fever --- Aetiology, pathogenesis,
Laboratory diagnosis and Prevention
: Infective Endocarditis: Aetiology, pathogenesis,
Laboratory diagnosis and Prevention

: Hepatitis B and C virus – Structure, Pathogenesis,
lab diagnosis and prevention
: HIV --- Structure, Pathogenesis, Lab diagnosis
and Prevention

: Sepsis—Aetiology, Pathogenesis, Lab diagnosis
and Prevention
: Device Associated Infections --- Aetiological agents,

Mechanism of transmission, Bio films and Prevention

IV: Practicals:

: Spotters demonstration for identification and two points for identification.
: Grams Staining --- Procedure, observation and Reporting

: Acid Fast Staining --- Procedure, observation and Reporting

: Problem Solving Exercise --- Simple case studies related To Blood and Cardio vascular conditions in which Cardiac technologist has a role to perform.

2. PHARMACOLOGY RELATED TO CARDIAC TECHNOLOGY

Course objective:

This course will cover general pharmacology with special emphasis on common drugs used, route of administration, types of formulations, dose and frequency of administration, side effects and toxicity, management of toxic effect, drug interaction, knowledge of chemical and trade names, importance of manufacture and expiry dates and instructions about handling each drug.

1. Anti-anginal agents

Beta blockers-propranolol, atenolol, metoprolol, bisoprolol carvedilol, esmolol.
Nitrates-nitroglycerine, isosorbide dinitrate, isosorbide mononitrate, transdermal nitrate patches

Calcium channel blockers-nifedipine, verapamil, dilteazem, amlodipine

Nicorandil, Trimetazidine, Ranolazine, Ivabradine,

2. Anti-failure agents

Diuretics-furosemide, torsamide, thiazide diuretics, metolazone, spironolactone, combination diuretics

Angiotensin convertying enzyme (ACE) inhibitors ARB (Angiotensin Receptor Blocker) – Valsartan Cosartan Telmisartan – captopril Enalapril, ramipril, lisinopril, ACE inhibitors for diabetics and hypertensive renal disease

Digitalis and acute ionotropes – digoxin, odoubutamine, dopamine, adrenaline, noradrenaline, isoprenaline

Beta Blockers – Carvidilol, Bisoprolol, metaprolol

3. Anti-hypertensive drugs

Diuretics, beta-blockers, ACE inhibitors, calcium antagonists, direct Vasodilators, centrally acting and peripherally acting vasodilators.
Angiotensin Receptor Blocker – Valsartan LosartanTelmisartan olmesartan

4. Anti- arrhythmic agents

Amiodarone, adenosine, verapamil, diltiazem, lidocaine, mexiletine, Phenytoin, flecainide, bretylium, atropine, Isoprenaline

5. Antithrombotic agents

Platelet inhibitors: aspirin, clopidogrel, Prasugrel, ticagrelor_____
Anticoagulants: heparin, low molecular weight heparin, warfarin fondaparinux_ Fibrinolytics: streptokinase, urokinase _Tenectaplase reteplase Glycoprotein 2b3a antagonists: abciximab, tirofiban, eptifibatide

6. Lipid lowering and anti-atherosclerotic drugs: statins, estimibe, niacin, fenofibrate
7. Miscellaneous drugs Protamine

Narcotics: morphine, pethidine, fentanyl

Sedatives: diazepam, midazolam

Steroids: hydrocortisone, oprednisolone,
Antihistamines: diphenhydramine

Antibiotics: pecicillins, cephalosporins,
aminoglycosides Antacids and proton
pump inhibitors

Anaesthetic agents: local general

PAPER – III

MEDICAL ELECTRONICS, BIOPHYSICS AND COMPUTER USAGERELEVANT TO CARDIAC TECHNOLOGY

Syllabus

Introduction to medical physics
Blood pressure recording
Pressure transducers
Defibrillators
Cathode ray tubes and physiological monitors
Impedence plethysmography
Pulse oximetry

Medical ultrasound and Doppler

Ionic currents and Electrocardiography
Electrocardiographic processing and display system
Radiation physics
Techniques of monitoring radiation exposure
Measures to reduce radiation exposure
Computer use in medical care and data entry

2. BASIC ELECTROCARDIOGRAPHY (ECG)

Syllabus

Fundamental principles of electrocardiography
Cardiac electrical field generation during
activation Cardiac wave fronts

Cardiac electrical field generation during ventricular
recovery Electrocardiographic lead systems
Standard limb leads

Precordial leads and the Wisdom central

termina Augmented limb leads

The hexaxial reference frame and electrical

axis Recording adult and pediatric ECGs

The normal electrocardiogram

Atrial activation

The normal P wave
Artial repolarization

Atrioventricular node conduction and the PR
segment Ventricular activation and the QRS

complex Ventricular recovery and ST-T wave
U wave Normal variants
Rate and rhythm (To Include in IInd Year)

ENGLISH

Communication:-Role of communication

Defining Communication
Classification of communication
Purpose of communication
Major difficulties in communication
Barriers to communication
Characteristics of successful communication – The seven Cs Communication at the work place
Human needs and communication “Mind mapping” Information communication

Comprehension passage:-
Reading purposefully
Understanding what is read
Drawing conclusion
Finding and analysis

Explaining:-

How to explain clearly
Defining and giving reasons
Explaining differences
Explaining procedures
Giving directions

Writing business letters:-
How to construct correctly
Formal language

Address
Salutation
Body
Conclusion

Report writing:-
Reporting an accident

Reporting what happened at a session
Reporting what happened at a meeting

BASICS OF COMPUTER

COURSE CONTENT:

Introduction to computer – I/O devices – memories – RAM and ROM – Different kinds of ROM – kilobytes. MB, GB their conversions – large computer – Medium, Micro, Mini computers – Different computer languages – Number system – Binary and decimal conversions – Different operating system – MS DOS – Basic commands – MD, CD, DIR,TYPE and COPY CON commands – Networking – LAN, WAN,MAN(only basic ideas)

Typing text in MS word – Manipulating text – Formatting the text – using different font sizes, bold, italics – Bullets and numbering – Pictures, file insertion – Aligning the text and justify – choosing paper size – adjusting margins – Header and footer, inserting page No's in a document – Printing a file with options – Using spell check and grammar – Find and replace – Mail merge – inserting tables in a document.

Creating table in MS-Excel – Cell editing – Using formulas and functions – Manipulating data with excel – Using sort function to sort numbers and alphabets – Drawing graphs and charts using data in excel – Auto formatting – Inserting data from other worksheets.

Preparing new slides using MS-POWERPOINT – Inserting slides – slide transition and animation – Using templates – Different text and font sizes – slides with sounds – Inserting clip arts, pictures, tables and graphs – Presentation using wizards.

Introduction to Internet – Using search engine – Google search – Exploring the next using Internet Explorer and Navigator – Uploading and Download of files and images – E-mail ID creation – Sending messages – Attaching files in E-mail – Introduction to "C" language – Different variables, declaration, usage – writing small programs using functions and sub – functions. Java, c+ Hoops – To prepare a Excel sheet and Video conference in CCTV footage reading.

PRACTICAL

Typing a text and aligning the text with different formats using MS-Word Inserting a table with proper alignment and using MS-Word

Create mail merge document using MS-word to prepare greetings for 10 friends Preparing a slide show with transition, animation and sound effect using MS-Powerpoint

Customizing the slide show and inserting pictures and tables in the slides using MS-powerpoint

Creating a worksheet using MS-Excel with data and sue of functions Using MS-Excel prepare a worksheet with text, date time and data Preparing a chart and pie diagrams using MS-Excel

Using Internet for searching, uploading files, downloading files creating e-mail ID Using C language writing programs using functions

SECOND YEAR
Syllabus

Paper I- Clinical Features and treatment related cardiac technology and basic life support

Review of anatomy and physiology of blood and cardio vascular system,

Assessment-History and Physical assessment • Etiology, Pathophysiology,

clinical manifestations, diagnosis, treatment modalities of:

• Vascular system
- Hypertension, Hypotension
- Artherio sclerosis
- Raynaud's disease
- Aneurism and Approaches to Peripheral vascular disorders Heart
• Coronary artery diseases
• Ischemic Heart Disease
• Artherosclerosis Angina pectoris
• Myocardial infarction
• Valvular disorders of the heart
- Congenital and acquired - Rheumatic Heart diseases
Infective Endocarditic, congenital heart Diseases
• Endocarditis, Pericarditis Myocarditis
• Cardio Myopathies
• Cardiac dysrhythmias, Heart Block
• Congestive cardiac failure Cor-pulmonale, pulmonary edema, cardiogenic shock, cardiac tamponade
• Cardiac emergencies and arrest
• Cardio Pulmonary Resuscitation (CPR)
• Cardiac disrrthmia and Heart Block

Drugs used in treatment of Blood and cardio vascular disorders

Whole Blooded Plasma and PCD – Pathology and illness – Approach to Paediatric Patients

t

- Airway Management
- Anaphylaxis
- Approach to Shock
- Initial Management of Shock
- Approach to Syncope
- Approach to Restless Patient
- Approach to Pediatric Patients
- Safe transfer of patients to definitive care areas
- Approach to Trauma Patients

PAPER - II - ADVANCED ELECTRO CARDIOGRAPHY (ECG)

The abnormal electrocardiogram
Left atrial abnormality
Right atrial abnormality
Left ventricular hypertrophy and enlargement
Right ventricular hypertrophy and enlargement
Intraventricular conduction delays
Left anterior fascicular block
Left posterior fascicular block
Left bundle branch block
Right bundle branch block
Myocardial ischemia and infarction
Repolarization (ST-Twave) abnormalities
QRS changes
Evolution of electrocardiographic changes
Localization of ischemia or infarction
Non-infarction Q waves
Primary and seconday T wave change
Electrolyte and metabolic ECG abnormalities
Cardiac arrhythmias
Ventricular premature beats
Supra-ventricular tachycardias
Atrial flutter/fibrillation
Ventricular Tachycardia/Ventricular fibrillation
Atrio Ventricular block
Prolonged PR interval

Mobitz type 1 and 2 block
Complete heart block
Direct Current (DC) shock
Defibrillator
Monophasic and biphasic shock
Technique of cardioversion
Indications for cardioverion

Textbook recommended:
Introduction to Electrocardiography-Schamroth

TREADMILL EXERCISE STRESS TESTING AND 24 HOUR

AMBULATORY ECG (HOLTER) RECORDING AND AMBULATORY BP.

Syllabus

Exercise physiology
Exercise protocols
Lead systems
Patient preparation
ST segment displacement – types and measurement
Non-electrocardiographic observations
Exercise test indications, contra-indications and precautions
Cardiac arrhythmias and conduction disturbances during stress testing Emergencies in the stress testing laboratory
Principles of Holter Recording
Connections of the Holter recorder Holter Analysis
Guidelines for ambulatory electrocardiography

PAPER - III. ECHOCARDIOGRAPHY

M- mode and 2D transthoracic echocardiography
Views used in transthoracic echocardiography
Doppler echocardiography: pulsed, continuous wave and colour Measurement of cardiac dimendions
Evaluation of systolic and diastolic left ventricular function Regional wall motion abnormalities
Stroke volume and cardiac output assessment Transvalvular gradients
Orifice area
Continuity equation
Echocardiography in Valvular heart disease: Mitral stenosis
Mitral regurgitation
Mitral valve prolapse
Aortic stenosis Aortic regurgitation Infective endocarditis
Prosthetic valve assessment
Echocardiography in Cardiomyopathies: Dilated Hypertrophic
Restrictive Constrictive pericarditis
Pericardial effusion and cardiac tamponade
Echocardiographic detection of congentital heart desease: Atrial septal defect
Ventricular septal defect
Patent ductus arteriosus
Pulmonary stenosis
Tetralogy of Fallot
Coarctation of aorta Left

atrial thrombus Left
atroal myxoma
Transo0esophageal echocardiography

Stress Echo Cardiography and Contrast Echo Cardiography

Text book recommended:

Echocardiography – Feigenbaum

THIRD YEAR

I. Cardiac catheterization laboratory basics (3months)
II. Cardiac catheterization laboratory advanced (9months)

PAPER - I. CARDIAC CATHETERIZATION LABORATORY BASICS

Type of catheters

Catheter cleaning and packing

Techniques of sterilization-advantages and disadvantages of each method preparing up the cardiac catheterization laboratory for a diagnostic study Table movement

Image intensifier movement

Image play back

Intra cardiac pressures

Pressure recording systems

Fluid filled catheters versus catheter tipped manometers
Artifacts, damping, ventricularization
Pressure gradient recording – pullback, peak – to peak
Cardiac output determination
Thermo dilution method
Oxygen dilution method
Principles of oximetry
Shunt detection and calculations.
Coronary angiography
Coronary angiographic catheters
Use of the manifold
Angiographic views in coronary angiography
Laboratory preparation for coronary angiography
Left Ventriculography – catheters, views, use of the injector
Right heart catheterization and angiography

Radiation _protection
1. Catherters used in Electrophysiology studies
2. Connection of Catheters during in EP study
3. Equipment used in Arthmia, Induction and Mapping
4. Radio frequency ablation
5. ECM
6. Ventricular assist device
7. Fundaments of pace maker

PAPER – II CARDIAC CATHETERIZATION LABORATORY ADVANCE

Aortic angiography – aortic root, arch, abdominal aorta
Peripheral angiography and carbondioxide angiography
Catheterization and angiography in children with congenital heart disease Contrast agents

- Ionic and non-ionic Types
- of non-ionic agents
- Contrast nephropathy
- Measures to reduce incidence of contrast nephropathy Coronary angioplasty (PTCA)
- Equipment and hardware used in PTCA: Guiding catheters
- Guidewires
- Balloons
- Stents
- Setting up the laboratory for a PTCA case Management of complications:
- Slow flow/no flow
- Acute stent thrombosis
- Dissection
- Perforation

Pediatric Interventions

- Aortic and pulmonary valvuloplasty
- Coarcation angioplasty and stenting
- Device closure of PDA,ASD,VSD
- Technique and decices used
- Sizing of devices
- Coil.closure of PDAs

Balloon Mitral valvuloplasty (BMV)

- Techniques and hardware used in BMV
- Setting up the laboratory for a BMV case
- Technique and equipment used for transseptal puncture Recording of transmitral pressure gradients Management of cardiac temponade

Peripheral intercentions

- Equipment and techniques used
- Endovascular exclusion of aneurysms
- Self-expanding stents, covered stents and cutting ballons

Intra-aortic balloon pump (IABP)

- Theory of intra-aortic balloon couonterpulsation Indications for IABP use
- Setting up the IABP system

Thromboembolic disease

Indications and use of venacaval filters

Techniques of thrombolysis – drug and catheters used
Thrombus aspirations systems – coronary, peripheral
Thrombus aspirations systems – coronary, peripheral

Cardiac pacing

Temporary pacing – indications,
technique Permanent pacing
Indications
Types of pacemakers and leads

Setting up the laboratory for permanent pacing Pacemaker parameter checking Follow-up of pacemaker patients

Cardiac electrophysiology

Catheters used in electrophysiology studies
Connection of catheters during an EP study
Equipment used in arrhythmia induction and
mapping Radiofrequency ablation
Image archival systems and compact disc (CD) writing

Reference Books:

Cardoac Catheterizatipn – Grossman

ALLIED HEALTH SCIENCES
EXAMINATION QUESTION PAPER PATTERN
B.Sc. DEGREE COURSES

Essay	3 x 10 = 30 Marks
Short Notes	8 x 5 = 40 Marks
Short Answers	10 x 3 = 30 Marks
Total	100 Marks

BEXAMINATION PATTERN – I YEAR

B.Sc. Degree in Cardiac Technology

S.No.	Internal Subjects	Theory		Practical		Internal Assessment		Viva	
		Max	Min	Max	Min	Max	Min	Max	Min
Paper I.	Applied Anatomy, Physiology and Bio-chemistry related to Cardiac Technology	100	50	50	25	50	25	-	-
Paper II	Pathology, Microbiology and Pharmacology related to Cardiac Technology	100	50	50	25	50	25	-	-
Paper III.	Medical Electronics, biophysics and computer usage relevant to Cardiac Technology and Basic Electrocardiography	100	50	50	25	50	25	-	-

Internal Paper:

S.No.	Subject	Theory		Internal Assessment (IA)	
1.	* English	Max	Min	Max	Min
2.	* Computer	100	50	50	25
		100	50	50	25

* English and Computer are internal papers. Marks to be sent to the university. There will be no university examination for English and Computer paper.

Internal Assessment

Theory (20)	Practical (20)	Log Book/Project/Record(10)

* Wherever there is no Log Book/Project/ Record work the 10 mark be added to the Practical of the respective subject.

B.Sc. ALLIED HEALTH SCIENCES
EXAMINATION PATTERN – II YEAR

B.Sc. Degree in Cardiac Technology

S.No.	Internal Subjects	Theory		Practical		Internal Assessment		Viva	
		Max	Min	Max	Min	Max	Min	Max	Min
Paper I.	Clinical features and treatment relevant to Cardia Technology and Basic life support	100	50	50	25	50	25	-	-
Paper II	Advanced ECG and Treadmill exercise stress testing and 24 hour Ambulatory ECG and BP recording	100	50	50	25	50	25	-	-
Paper III.	Echocardiography	100	50	50	25	50	25	-	-

B.Sc. ALLIED HEALTH SCIENCES
EXAMINATION PATTERN – III YEAR

B.Sc. Degree in Cardiac Technology

S.No.	Internal Subjects	Theory		Practical		Internal Assessment		Viva	
		Max	Min	Max	Min	Max	Min	Max	Min
Paper I.	Cardiac catheterization laboratory basics	100	50	50	25	50	25	-	-
Paper II	Cardiac catheterization laboratory advanced	100	50	50	25	50	25	-	-

B. Sc., IN CARDIAC TECHNOLOGY

SCHEME OF EXAMINATION

ANATOMY

PRACTICALS : : 10 Marks

Histology spotters of 3 slides : 3 x 1= 3 marks
Gross anatomy spotters of 3 specimens : 3 x 1= 3 marks
Gross anatomy 4 specimens discussion : 4 x 1= 4 marks

Total : 10 marks

Internal Assessment Practical : 5 marks

Viva : 5 marks.

Grand Total : 20 marks

PHYSIOLOGY

PRACTICALS: 20 Marks

Duration : 90 Minutes

I) MAJOR EXPERIMENTS

Any one of the Major Experiments . : 5 Marks

1. R.B.C. Count.
2. W.B.C. Count.
3. Differential Count.

II) MINOR EXPERIMENTS : 5 Marks

Any one of the Minor Experiments

1. Determination of Blood Groups.
2. Determination of Bleeding & Clottine time.
3. Haemoglobin Estimation.
4. Calculation of absolute Haematological Indies- MCH, MCV, MCHC.

TOTAL : 10 Marks

I.A. Marks 5 Marks.

Viva-voce 5 Marks.

Grand Total : 20 Marks.

BIOCHEMISTRY

Practical Examination

I. Major Practical

Topics	No. of Questions	Question X marks	Total
Qualitative Analaysis	1	1 X 3	3 Marks

II. Minor PracticalS

Topics	No. of Questions	Questions X marks	Total
Titration of simple acid-base and calculation of Normality	1	1 X 3	3 marks

IA Marks 2 Marks

Viva 2 Marks

Grand Total :10 Marks

PATHOLOGY

PRACTICAL EXAMINATION

Duration 90 minutes

Maximum marks 15 Marks I.
Spotters - 3 marks

II. Carryout any two Investigations- 4 marks
Hb/ PCV/ WBC count/ differential count / Abs Eosinophil count / P.S. staining & reporting/ ESR/ Retic count.

III. Urine Examination - 8 marks.
General Physical Examination
Tests for Sugar, Ketone bodies, Blood & Proteins.

Internal Assessment - 5 marks

Viva voce- 5 marks

MICROBIOLOGY

Duration: 90 Minutes

Practicals:

Spotters (1 X 5)	-	5 Marks
Grams Stain	-	5 Marks
ZN Stain	-	5 Marks

Internal Assessment: 10 Marks

Viva 10 Marks

PAPER II.

PHARMACOLOGY RELATED TO CARDIAC TECHNOLOGY

SPOTTERS

Drugs	10 X 2	= 20
Equipment	10 X 2	= 20
Setting up a test	10 X 1	= 10
Total	=	50

Paper IV

Medical Electronics, Biophysics & Complete usage relevant to Cardiac Technology.

Spotters

Equipment

Parts of Computer

POSTINGS DURING ONE YEAR INTERNSHIP:-

3 MONTHS – CATH LAB AND BLOOD BANK
3 MONTHS – ECHO ROOM
3 MONTHS – ICCU
3MONTHS – HOLTER (AMBULATORY ECG)