

**DHANALAKSHMI SRINIVASAN UNIVERSITY**

**SAMAYAPURAM - 621112**



**SYLLABUS FOR BACHELOR OF SCIENCE IN CARDIAC TECHNOLOGY**

**HEALTH FOR ALL**

## **CARDIAC TECHNOLOGY**

### **I YEAR**

<b>S.NO</b>	<b>NAME OF THE SUBJECTS</b>	<b>TOTAL HOURS ALLOTTED</b>
1.	ANATOMY	60 HOURS
2.	PHYSIOLOGY	60 HOURS
3.	BIOCHEMISTRY	30 HOURS
4.	PATHOLOGY, MICROBIOLOGY AND PHARMACOLOGY RELATED TO CARDIAC TECHNOLOGY	60 HOURS
5.	MEDICAL ELECTRONICS, BIOPHYSICS AND COMPUTER USAGE RELEVANT TO CARDIAC TECHNOLOGY AND BASIC ELECTRO CARDIOGRAPHY	60 HOURS
6.	ENGLISH	60 HOURS
7.	INTRODUCTION TO COMPUTERS	50 HOURS
8.	CLINICAL	1000 HOURS

### **II YEAR**

<b>S.NO.</b>	<b>NAME OF THE SUBJECTS</b>	<b>TOTAL HOURS ALLOTTED</b>
1.	CLINICAL FEATURES AND TREATMENT RELEVANT TO CARDIAC TECHNOLOGY AND BASIC LIFE SUPPORT	40 HOURS
2.	ADVANCED ECG AND TREADMILL EXERCISE STRESS TESTING AND 24 HOUR AMBULATORY ECG AND BP RECORDING	50 HOURS
3.	ECHOCARDIOGRAPHY	60 HOURS
4.	CLINICAL	1000 HOURS

### **III YEAR SUBJECT**

S.NO	NAME OF THE SUBJECTS	TOTAL HOURS ALLOTTED
1.	CARDIAC CATHETERIZATION LABORATORY BASICS	120 HOURS
2.	CARDIAC CATHETERIZATION LABORATORY ADVANCED	120 HOURS
3.	CLINICAL	1000 HOURS

## **CARDIAC TECHNOLOGY**

### **PAPER – I BASIC ANATOMY**

- Introduction to Anatomy
- Basic Anatomical terminology

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

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

**Lungs** – Trachea, bronchial tree and circulation.

**Heart major** – Surface and gross anatomy of heart, chambers of the heart, valves of the heart,  
and 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  
Transitiona  
|Cartilage  
(b) Connective tissue – bone, fibrous tissue, muscle

Excretory system – 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, after load 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
  - Cutaneous circulation
10. Cardiovascular receptors, reflexes and central control
11. Coordinated cardiovascular responses
  - Posture
  - Valsalva manoeuvre
  - Exercise
  - Diving reflex
12. Cardiovascular responses in pathological
  - Situations Shock and haemorrhage
  - Syncope Essential
  - Hypertension Chronic
  - Cardiac failure
13. Respiratory physiology
  - Mechanics of respiration
  - Principles of gas exchange regulation of respiration
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-Homopolysaccharides-Heteropolysaccharides-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 –  
Isoenzymes – 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 – Kwashiorkor

### **Hormones:**

Classification – Mechanism of action – Hypothalamic hormones – Pituitary – 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**

#### **Course Objective**

This course will cover common cardiovascular diseases, their related pathology and microbiology, outline of clinical presentation and management of these conditions including medical and surgical interventions.

#### **1. Valvular heart disease**

- Etiology
- Acquired valvular heart disease
- Rheumatic fever and rheumatic heart disease Aortic stenosis
- Aortic regurgitation Mitral valve disease Mitral stenosis Mitral regurgitation
- Combined valvular heart disease Tricuspid valve disease Infective endocarditis
- Valvuloplasty and valve surgery (To include in IIInd Year)

#### **2. Coronary artery disease**

- Pathophysiology and clinical recognition Angina Pectoris
- Symptomatic and asymptomatic myocardial ischemia Types and locations of myocardial infarction Thrombolytic therapy Medical treatment
- Percutaneous interventions (To include in IIInd Year) Surgical treatment Cardiac rehabilitation

#### **3. Systemic hypertension**

- Essential and secondary hypertension

#### **4. Heart failure**

- Surgical and medical treatment

#### **5. Myocardial diseases Dilated**

- Cardiomyopathy
- Hypertrophic
- Cardiomyopathy Restrictive
- Cardiomyopathy Myocarditis

## **6. Pericardial Diseases**

- Pericardial effusion
- Constrictive pericarditis
- Cardiac tamponade

- 7. Electrical disturbances of the heart Sinus node dysfunction**
- Arrhythmias and conduction disturbances
  - Treatment of arrhythmias – pharmacological, radiofrequency ablation and surgery (To include in IIInd Year)
- 8. Pulmonary hypertension**
- Primary pulmonary hypertension
  - Pulmonary thromboembolism
- 9. Peripheral Vascular Disease Atherosclerotic**
- Peripheral vascular disease Aortic
  - Aneurysms
  - Aortic dissection
  - Takayasu arteritis
- 10. Congenital heart disease**
- Acyanotic heart disease
  - Atrial septal defect
  - Ventricular septal defect
  - Patent ductus arteriosus
  - Congenital valvular disease
  - Coarctation of aorta
- (a) Cyanotic congenital heart disease
- Tetralogy of Fallot
  - Double outlet right ventricle
  - Pulmonary atresia
  - Transposition of great arteries
  - Truncus arteriosus
  - Total anomalous pulmonary venous connection

## **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, metoprolol
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 \_Tenectaplaste 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 as physiological monitor
- Impedance 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 Wilson central terminal Augmented limb leads
- The hexaxial reference frame and electrical axis Recording adult and pediatric ECGs
- The normal electrocardiogram Atrial activation
- The normal P wave Atrial 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 II 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 “Mindmapping” 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 effectusing 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 createge-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
- Arterio 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

- 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-T wave) abnormalities  
QRS changes
- Evolution of electrocardiographic changes  
Localization of ischemia or infarction
- Non-infarction Q waves
- Primary and secondary 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 cardioversion

### **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 dimensions
- 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 congenital heart disease: Atrial septal defect
- Ventricular septal defect Patent ductus arteriosus Pulmonary stenosis Tetralogy of Fallot Coarctation of aorta Left
- Atrial thrombus Left
- Atrial myxoma
- Transoesophageal 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 methodOxygen dilution methodPrinciples of oximetry
  - Shunt detection and calculations.Coronary angiography
  - Coronary angiographic cathetersUse 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. Catheters 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. Fundamentals 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 heartdisease Contrast agents
  - Ionic and non-ionic
  - Typesof non-ionic agents Contrast nephropathy
  - Measures to reduce incidence of contrast nephropathy Coronary angioplasty (PTCA)
  - Equipment and hardware used inPTCA: Guiding catheters Guidewires
  - BalloonsStents
  - Setting up the laboratory for a PTCAcase Management of complications: Slow flow/no flow Acute stent thrombosis Dissection Perforation
- Pediatric Interventions
  - Aortic and pulmonary valvuloplasty
  - Coarcatation 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 BM
  - 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 balloons

- Intra-aortic balloon pump (IABP)
  - Theory of intra-aortic balloon
  - counterpulsation 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 pacin
  - Pacemaker parameter checking Follow-up of
  - pacemaker patients
- Cardiac electrophysiology
  - Catheters used in electrophysiology studie
  - Connection of catheters during an EP stud
  - 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
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**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)	
		Max	Min	Max	Min
1.	* English	100	50	50	25
2.	* Computer	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)
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\* 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 Cardiac 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 mark



## BIOCHEMISTRY

### Practical Examination

I. Major Practical	Topics	No. of Questions	Question X marks	Total
	Qualitative Analysis	1	1 X 3	3Marks
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 usagerelevant 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)