GALGOTIAS UNIVERSITY

Syllabus of

B.Sc. Cardiovascular Technology

Name of School: School of Medical and Allied Sciences

Department: Cardiovascular Technology

Year: 2015-18

GALGOTIAS UNIVERSITY

(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

School of Medical and Allied Sciences

Course: B.Sc Cardiovascular Technology

Scheme: 2015 – 2016

First Semester

S.No	Course Code	Subject	L	T	P	C	Evaluation Scheme			
							Internal	External	Total	CBL/PBL
1.	CVT101	General Anatomy-I	3	0	0	3	30	70	100	**CBL**
2.	CVT102	General Physiology -I	3	0	0	3	30	70	100	**CBL**
3.	CVT103	Biochemistry-I	3	0	0	3	30	70	100	**CBL**
4.	LLL101	Universal Human Values & Ethics	3	0	0	3	30	70	100	**CBL**
5.	EVS102	Energy & Environment Sciences	3	0	0	3	30	70	100	**CBL**
6.	CVT151	General Anatomy-I (P)	0	0	2	1	30	70	100	**CBL**
7.	CVT152	General Physiology-I (P)	0	0	2	1	30	70	100	**CBL**
8.	CVT153	Biochemistry-I (P)	0	0	2	1	30	70	100	**CBL**
		Total				**18**	**240**	**560**	**800**	

Second semester

S.No	Course Code	Subject	L	T	P	C	Evaluation Scheme			
							Internal	External	Total	CBL/PBL
1.	CVT104	General Anatomy-II	3	0	0	3	30	70	100	CBL
2.	CVT105	General Physiology-II	3	0	0	3	30	70	100	CBL
3.	CVT106	Cardiac Pharmacology and Clinical Treatment	3	0	0	3	30	70	100	CBL
4.	CVT107	Cardio Pathology -I	3	0	0	3	30	70	100	CBL
5.	CVT108	Computer Fundamentals	2	0	0	2	30	70	100	CBL
6.	CVT153	Cardiac Pharmacology and Clinical Treatment (P)	0	0	2	1	30	70	100	CBL
7.	CVT154	Computer Fundamentals and programming (P)	0	0	2	1	30	70	100	CBL
		TOTAL				**16**	**210**	**490**	**700**	

Third semester

S.No,	Course Code	Subject Name	L	T	P	C	Evaluation Scheme			
							Internal	External	Total	CBL/ PBL
1.	CVT201	Cardio Pathophysiology-II	3	0	0	3	30	70	100	CBL
2.	CVT202	Microbiology	3	0	0	3	30	70	100	CBL
3.	CVT203	Medical Electronics, biophysics and computer usage relevant to Cardiac Technology-I	3	0	0	3	30	70	100	CBL
4.	CVT204	Basic Electrocardiography-I	3	0	0	3	30	70	100	CBL
5.	ENG131	Communicative English-I	2	0	0	2	30	70	100	CBL
6.	CVT251	Microbiology (P)	0	0	2	1	30	70	100	CBL
7.	CVT252	Medical Electronics, biophysics and computer usage relevant to Cardiac Technology-I (P)	0	0	2	1	30	70	100	CBL
8.	CVT253	Basic Electrocardiography-I (P)	0	0	2	1	30	70	100	CBL
9.	ENG181	Communicative English I (P)	0	0	2	1	30	70	100	CBL
		TOTAL				**18**	**270**	**630**	**900**	

Fourth semester

S. No.	Course code	Subject Name	L	T	P	C	Evaluation Scheme			
							Internal	External	Total	CBL/PBL
1.	CVT205	Medical Electronics, biophysics and computer usage relevant to Cardiac Technology-II	3	0	0	3	30	70	100	CBL
2.	CVT206	Basic Electrocardiography-II	3	0	0	3	30	70	100	CBL
3.	CVT207	Advanced Electro-Cardiography-I	3	0	0	3	30	70	100	CBL
4.	ENG231	Communicative English - II	2	0	0	2	30	70	100	CBL
5.	CVT254	Medical Electronics, biophysics and computer usage relevant o cardiac technology – II (P)	0	0	2	1	30	70	100	CBL
6.	CVT255	Basic Electrocardiography- II (P)	0	0	2	1	30	70	100	CBL
7.	ENG281	Communicative English - II (Lab)	0	0	2	1	30	70	100	CBL
						14	**210**	**490**	**700**	

Fifth semester

S. No,	Course Code	Subject Name	L	T	P	C	Evaluation Scheme			
							Internal	External	Total	CBL/PBL
1.	CVT301	Treadmill exercise stress testing and 24 hour Ambulatory ECG recording	3	0	0	3	30	70	100	CBL
2.	CVT302	Echocardiography	3	0	0	3	30	70	100	CBL
3.	CVT303	Advanced Electro Cardiography-II	3	0	0	3	30	70	100	CBL
4.	CCT304	Cardiac Care Technician-I	10	0	0	10	30	70	100	CBL
5.	CVT351 (P)	Treadmill exercise stress testing and 24 hour Ambulatory ECG recording (P)	0	0	4	2	30	70	100	CBL
6.	CVT352 (P)	Echocardiography (P)	0	0	4	2	30	70	100	CBL
7.	CCT353 (P)	Cardiac Care Technician-I (P)	0	0	6	3	30	70	100	CBL
		TOTAL				**26**	**210**	**490**	**700**	

Sixth semester

S. No,	Course code	Subject Name	L	T	P	C	Evaluation Scheme			
							Internal	External	Total	CBL/PBL
1.	CVT304	Cardiac catheterization laboratory basics	3	0	0	3	30	70	100	CBL
2.	CVT305	Cardiac catheterization laboratory advanced	3	0	0	3	30	70	100	CBL
3.	CVT306	Research Methodology and Biostatistics	3	0	0	3	30	70	100	CBL
4.	CCT307	Cardiac Care Technician-II	8	0	0	8	30	70	100	CBL
5.	CVT353	Cardiac catheterization laboratory basics (P)	0	0	4	2	30	70	100	CBL
6.	CVT354	Cardiac catheterization laboratory advanced (P)	0	0	4	2	30	70	100	CBL
7.	CCT355	Cardiac Care Technician-II (P)	0	0	12	6	30	70	100	CBL
		TOTAL				27	**210**	**490**	**700**	

Seventh semester

S.No	Course Code	Subject	L	T	P	C	Evaluation Scheme			
							Internal	**External**	**Total**	**CBL/PBL**
1.	**CVT401**	Clinical Internship Including Project Work	0	0	40	20	30	70	100	PBL
		Total				**20**			**100**	

Eighth semester

S.N.	Course Code	Subject	L	T	P	C	Evaluation Scheme			
							Internal	**External**	**Total**	**CBL/PBL**
1.	**CVT402**	Clinical Internship Including Project Work	0	0	40	20	30	70	100	PBL
		Total				**20**			**100**	

Total **159**

Detailed Syllabus

Name of The Course	General anatomy-I			
Course Code	CVT101			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

To understand the basic human anatomy and its functions.

Course Outcomes

CO1	To understand, analyze and illustrate the human body as a whole.
CO2	To understand, analyze the locomotor system and differentiate the various parts of the same.
CO3	The student will be able to understand, analyze and illustrate the heart and the vascular system.
CO4	The student will be able to analyze and illustrate the gastro-intestinal tract.
CO5	The student will be able to analyze and illustrate the respiratory system in detail.

Text Book (s)

1. B.D Chaursia's, A Text Book of Anatomy
2. William Davis, Understanding Human Anatomy and Physiology, McGraw Hill
3. Ranganathan, T.S., A Text Book of Human Anatomy
4. Snell's Clinical anatomy

Reference Book (s)

1. Gray's Anatomy for Students by Drake
2. Atlas der Anatomie des Menschen
3. Book by Frank H. Netter

Unit-1 Introduction: Human body as a whole 8 hours Definition of anatomy and its divisions, Terms of location, positions and planes, Cell and its organelles, Epithelium-definition, classification, describe with examples, function, Glands classification,describe serous & mucous glands with examples, Basic tissues –

classification with examples.
Unit-2 Locomotion and Support 8 hours Cartilage – types with example & histology, Bone – Classification, names of bone cells, parts of long bone, microscopy of compact bone, names of bones, vertebral column, inter vertebral disc, fontanelles of fetal skull, Joints – Classification of joints with examples, synovial joint (in detail for radiology), Muscular system- Classification of muscular tissue & histology, Names of muscles of the body
Unit-3 Cardiovascular System 8 hours Heart-size, location, chambers, exterior & interior, Blood supply of heart, Systemic & pulmonary circulation, Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial, artery, superficial palmar arch, femoral artery, internal iliac artery, Peripheral pulse, Inferior venacava, portal vein
Unit-4 Gastro-intestinal System 8 hours Parts of GIT, Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas, Radiographs of abdomen.
Unit-5 Respiratory System 8 hours Parts of RS, nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments, Histology of trachea, lung and pleura, Names of paranasal air sinuses.

Continuous Assessment Pattern

Internal Assessment (IA)	External (ETE)	Total Marks
30	70	100

Name of The Course	General physiology-I
Course Code	CVT102
Prerequisite	
Corequisite	
Antirequisite	

	L	T	P	C
	3	0	0	3

Course Objectives:

The basic objective of this course is to get familiar with human physiology.

Course outcome:

On completion of this course, the students will be able to understand-scope and importance of cell, physiological laws, blood groups, blood transfusion and fundamentals of different organ systems.

CO1	To understand, illustrate the cell, its functions with mitosis and meiosis
CO2	To understand and illustrate the importance of physiochemical laws applied to physiology like osmosis, diffusion
CO3	To understand, illustrate the composition of blood and its components and analyze the importance of each component of blood.
CO4	To understand and analyze the physiology of heart and the circulation system
CO5	To understand and analyze the functioning of the respiratory and excretory system

Text Books

1. Essentials of Medical Physiology, Book by K. Sembulingam and Prema Sembulingam
2. Guyton & Hall Textbook of Medical Physiology, by John E. Hall (Author), Mario Vaz (Author), Anura Kurpad (Author), Tony Raj (Author)
3. Medical Physiology by Boron (Author), Walter (Author)

Reference Books

1. Ganong's Review of Medical Physiology
2. Berne & Levy Principles of Physiology
3. Medical Physiology, International Edition Paperback – 18 May 2016by Boron (Author), Walter (Author)

Unit-1 8 hours Cell Definition, Structure and function of Cytoplasmic Organelles, Reproduction-Meosis, Mitosis
Unit-2 8 hours
The important physico-chemical laws applied to physiology Diffusion, Osmosis, Bonding, Filtration, Dialysis, Surface Tension, Adsorption, Colloid.
Unit-3 8 hours
Introduction- composition and function of blood Red blood cells- Erythropoiesis, stages of differentiation function, counts physiological Variation. Haemoglobin -Structure, function, concentration physiological variation. Methods ofEstimation of Hb, White blood cell-

Production, function, life span, count, differential count. Platelets- Origin, normal count, morphology functions. Plasma Proteins- Production, concentration, types, albumin, globulin, fibrinogen, Prothrombin functions. Haemostasis& Blood coagulation.Haemostasis – Definition, normal haemostasis, clotting factors, mechanism of clotting disorders of clotting factors. Blood Bank, Blood groups-A, B, O system, Rh system.
Unit-4 8 hours
Circulation: General principles Heart: myocardium – innervation – transmission of cardiac impulse Events during cardiac cycle – cardiac output. Peripheral circulation: peripheral resistances – arterial blood pressure – measurements – factors regulation variations – capillary circulation – venous circulation. Special circulation: coronary cerebral – miscellaneous
Unit-5 8 hours
Mechanics of respiration – pulmonary function tests – transport of respiratory gases- neural and chemical regulation of respiration – hypoxia, cyanosis, dyspnoea – asphyxia.: Body fluids – distribution, measurement & exchange, Kidney – structure of nephron – mechanism of urine formation – composition of the urine and abnormal constituents – urinary Bladder & micturition.

Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Biochemistry-I				
Course Code	CVT103				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives:

To understand the basic biochemistry

Course outcome

On completion of this course, the students will be able to understand-scope and importance of cell, physiological laws, blood groups, blood transfusion and fundamentals of different organ systems.

CO1	To analyze and interpret carbohydrate metabolism
CO2	To analyze and interpret protein metabolism
CO3	To analyze and interpret lipid metabolism

CO4	To analyze and interpret vitamins
CO5	To analyze and interpret minerals

Text Books

1. Biochemistry U. Satyanarayana, U. Chakrapani
2. Lippincott's Illustrated Reviews: Biochemistry
3. Das, Debajyothi, Biochemistry, Academic, Publishers, Calcutta.
4. Kaplan, Clinical Chemistry

Reference Books

1. Harper's Illustrated Biochemistry by Robert K. Murray, Darryl K. Granner, Peter A. Mayes
2. Lippincott's Illustrated Reviews: Biochemistry
3. Varley, Clinical Chemistry.
4. Kaplan, Clinical Chemistry

Unit-1	8 hours
Carbohydrates: Glucose; fructose; galactose; lactose; sucrose; starch and glycogen (properties and tests, Structure and function)	
Unit-2	8 hours
Proteins: Amino acids, peptides, and proteins (general properties & tests with a few examples like glycine, trytophan, glutathione, albumin, hemoglobin, collagen)	
Unit-3	8 hours
Lipids: Cholesterol and triacyglycerol Phospholipids and plasma membrane Catabolism of lipids Digestion and absorption of lipids (properties, Structure and function).	
Unit-4	8 hours
Vitamins: General with emphasis on A,B2, C, E and inositol (requirements, assimilation and properties)	
Unit-5	8 hours
Minerals: Na, K, Ca, P, Fe, Cu and Se (requirements, availability and properties.	

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Communicative English
Course Code	ENG131
Prerequisite	
Corequisite	
Antirequisite	

	L	T	P	C
	2	0	0	2

Course Objectives:

The objective of the course is to:

1. Understand simple texts and a range of high frequency vocabulary in context
2. Describe aspects of personal and everyday life in both oral and written form
3. Produce short and simple connected texts on familiar topics
4. Basic understanding into pronunciation of English sounds

Course outcome

On the successful completion of the course, the student would be able to:

CO1	Develop the understanding into the communication and language as its medium
CO2	Develop the basic understanding of spoken English
CO3	Improve their reading fluency skills through extensive reading
CO4	Use and assess information from academic sources, distinguishing between main ideas and details
CO5	Compare and use a range official support through formal and informal writings

Text Books & Reference Books

Communication Skills by Dr. T. Ravichandran,Department of Humanities and Social Sciences (NPTEL)

English Language for Competitive Examinations By Prof. Aysha Iqbal (NPTEL)

Better Spoken English by Prof. Shreesh Chaudhary, Department of Humanities and Social Sciences, IIT Madras. (NPTEL)

Understanding Creativity and Creative Writing by Prof. Neelima Talwar(NPTEL)

Unit-1 • Communication: Definition, Types (Verbal and Non-verbal), Models, Language as a tool of communication • The flow of Communication, Communication Networks • Barriers to Communication • Professional Communication • Features of professional communication Importance of Business/Technical Communication

Unit-2 • Word Formation • Basic sentence structure • Common Errors: Subject- Verb agreement, prepositions, Articles, Place of adverb, Consistency of tenses, • Paragraph Writing: Methods, unity and coherence Reading Skills: Types, Strategies, Barriers,
Unit-3 : • Official Communication: Letter, Memo, Agenda and Minutes of meeting, notice and circular, and email Job Application,

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Energy and Environmental Sciences			
Course Code	EVS102			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To develop awareness about our environment.
2. To develop a concern about sustainable development.

Course Outcomes

CO1	Understand About environment and its components and Problems associated with natural resources and their sustainable use.
CO2	Chemical Toxicity of the chemicals in the environment and Sources of pollution in air , water and soil and Solid waste management and natural Disaster management.
CO3	Understanding about social issues.
CO4	Understanding of role of information technology to address environmental issues.
CO5	Application of sustained Chemistry.

Text Book (s):

1. Environmental Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2008,

2. Environmental Studies, Suresh K. Dhameja, S.K. Kataria and Sons .

3. Text Book of Environmental Studies, Erach Bharucha, University Press (India) Private Limited, 2005

Reference Book (s):

1. Environmental Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2008,
2. Environmental Studies, Suresh K. Dhameja, S.K. Kataria and Sons .
3. Text Book of Environmental Studies, Erach Bharucha, University Press (India) Private Limited, 2005

Unit-1	8 hours
Definition, scope, importance, need for public awareness, Environmental Management Systems its objectives, components, EIA, Natural Resources – forest resources – use, exploitation, deforestation, construction of multipurpose dams – effect on forests, Water resources – use of surface and subsurface water; effect of floods, drought, water conflicts, Mineral resources – Use and exploitation, environmental effects of extracting and using mineral resources, Food resources – food problems, advantage and disadvantage of fertilizers & pesticides, effect on environment, Energy resources – need to develop renewable energy, land resources – Land degradation, landslides, soil erosion, desertification & case studies.	
Unit-2	8 Hours
Chemical Toxicology Toxic chemicals in the environment, Impact of toxic chemicals on enzymes, biochemical effects of arsenic, cadmium, lead, chromium, mercury, biochemical effects of pesticides.	
Unit-3	8 hours
Environmental Pollution Definition – Causes, pollution effects and control measures of Air, Water, Soil, Marine, Noise, Thermal, Nuclear hazards. Solid waste management: causes, effects and control measures of urban and industrial wastes, pollution measures, case studies, Disaster management: floods, earthquake, cyclone and landslides.	
Unit-4	8 hours
Social Issues, Human Population and the Environment Urban problems related to energy & sustainable development, water conservation, problems related to rehabilitation – case studies, Consumerism and waste products - Environment Protection Act, Air, Water, Wildlife, Forest Conservation Act, Environmental legislation and public awareness. Population growth, variation among nations, Population explosion, Environment and human health, Value Education, Women and Child Welfare,	

Role of Information Technology – Visit to local polluted site /Case Studies.
Unit-5 8 hours
Green Chemistry Introduction, Basic principles of green technology, concept of Atom economy, Tools of Green technology, zero waste technology.

Continuous Assessment Pattern

Internal	End Term Test (ETE)	Total Marks
50	50	100

Name of The Course	General Anatomy-I (P)			
Course Code	CVT151			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives: To understand the basic human anatomy and its functions.

Course Outcomes

CO1	To understand the anatomy of different body systems.
CO2	To understand the functions exhibited by the systems in our body.
CO3	To understand the interrelationships among molecular, cellular, tissue and organ functions in each system.
CO4	To understand contributions of organs and systems to the human body.
CO5	To understand about the modern technology and tools used to study anatomy and physiology.

Text Book (s):

1. William Davis, Understanding Human Anatomy and Physiology, McGraw Hill.
2. Chaurasia's, Practical of Human Anatomy.

Reference Book (s):

1. Grey's Anatomy.

Unit-1 Introduction
The anatomy of different body systems.
Unit-2
The histology of different body systems.
Unit-3
The skeletal system.
Unit-4
The organ systems.
Unit-5
Modern technology and tools used to study anatomy and physiology.

Continuous Assessment Pattern

Internal Assessment (IA)	End Term Test (ETE)	Total Marks
30	70	100

Name of The Course	General Physiology-I				
Course Code	CVT152				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objectives: To understand the basic human physiology practicals.

Course Outcomes:

CO1	To analyze and estimate haemoglobin levels and total WBC.
CO2	To analyze and estimate red blood cell counts and identify blood groups.
CO3	To analyze and interpret differential WBC counts and PCV
CO4	To analyze ESR and blood indices.
CO5	Estimating and analyzing bleeding count,clotting time and blood pressure.

Text Book (s):

1. A.K Jain, Practical Handbook of Human Physiology.

Reference Book (s):

1. Guyton and Hall Text Book of Physiology.

Unit-1 Introduction 8hours
Haemoglobinometry, White Blood Cell Count, Red Blood Count.
Unit-2
Determination of Blood Groups, Leishman's staining and Differential WBC count,Determination of packed cell Volume. Erythrocyte sedimentation rate [ESR].
Unit-3
Calculation of blood indices, Determination of Clotting Time, Bleeding Time. Blood pressure Recording.
Unit-4
Auscultation for Heart Sounds,Artificial Respiration,Determination of vital capacity.
Unit-5
Spirometery to measure various lung capacities & volumes, Respiratory rate, tidal volume, VC, timed VC, IRV, IC, ERV, EC on Spirometery (demonstration only), auscultation and percussion.

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Basic Biochemistry-I (P)			
Course Code	CVT153			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives: The basic objective of this course is to get familiar with Medical Biochemistry practicals.

Course Outcomes

CO1	To understand analysis of normal urine and liver function test.
CO2	To understand and interpret renal function test and lipid profile.
CO3	To analyze and interpret, blood gases and electrolytes.
CO4	To interpret glucose levels with the glucometer and strips.
CO5	Estimating and analyzing special protiens and carbohydrates.

Text Book (s):

1. Biochemistry U. Satyanarayana, U. Chakrapani.
2. Lippincott's Illustrated Reviews: Biochemistry

Reference Book (s):

1. Harper's Illustrated Biochemistry, by Robert K. Murray, Darryl K. Granner, Peter A. Mayes
2. Lippincott's Illustrated Reviews: Biochemistry

Unit-1 Introduction
Analysis of Normal Urine, Liver Function tests.
Unit-2
Lipid Profile. Renal Function test.
Unit-3
Blood gas and Electrolytes, Demonstration of Glucometer with strips.
Unit-4
Reactions of monosaccharides, disaccharides and starch, Glucose, Fructose, Galactose, Maltose, lactose, Sucrose
Unit-5
Starch Analysis of Unknown Sugars, Estimation: Photometry Biofluid of choice – blood, plasma, serum Standard graphs ,Glucose,Proteins, Urea ,Creatinine, Bilirubin.

Continuous Assessment Pattern

Internal	External	Total Marks
30	70	100

Name of The Course	Communicative English-I				
Course Code	ENG181				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	2	1

Course Objectives:

The objective of the course is to:

1. Understand simple texts and a range of high frequency vocabulary in context
2. Describe aspects of personal and everyday life in both oral and written form
3. Produce short and simple connected texts on familiar topics
4. Basic understanding into pronunciation of English sounds

Course outcome

On the successful completion of the course, the student would be able to:

CO1	Develop the understanding into the communication and language as its medium
CO2	Develop the basic understanding of spoken English
CO3	Improve their reading fluency skills through extensive reading
CO4	Use and assess information from academic sources, distinguishing between main ideas and details
CO5	Compare and use a range official support through formal and informal writings

Text Books & Reference Books

Communication Skills by Dr. T. Ravichandran,Department of Humanities and Social Sciences (NPTEL)

English Language for Competitive Examinations By Prof. Aysha Iqbal (NPTEL)

Better Spoken English by Prof. Shreesh Chaudhary, Department of Humanities and Social Sciences, IIT Madras. (NPTEL)

Understanding Creativity and Creative Writing by Prof. Neelima Talwar(NPTEL)

Course content:

The following activities will be conducted in lab classes:

Introduction
Extempore
Movie Review
Phonetics (Sounds)
Phonetics (Transcription)
Practice on Clear Pronunciation
Practice on Tense Buster
Role Play
Group Discussion
Group Presentation by Students

Continuous Assessment Pattern

Internal Assessment (IA)	End Term Test (ETE)	Total Marks
30	70	100

Name of The Course	General Anatomy-II			
Course Code	CVT104			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives: To understand the basic human anatomy and its functions.

Course Outcomes

CO1	Students will be able to interpret the anatomy of the urinary system.
CO2	Students will be able to interpret the action of antianginal drugs on a patient with angina.
CO3	Students will be able to interpret anatomy and functioning of the central nervous system.
CO4	Students will be able to interpret the basic anatomy and functioning of the reproductive system.
CO5	Students will be able to interpret the anatomy and functioning of the various sensory systems.

Text Book (s):

1. William Davis, Understanding Human Anatomy and Physiology, McGraw Hill.

2. B D Chaursia's, A Text Book of Anatomy.
3. Ranganathan, T.S., A Text Book of Human Anatomy.

Reference Book (s):

1. Fattana, Human Anatomy, (Description and Applied), Saunder's& C P Prism Publishers, Bangalore.
2. Ester. M. Grishcimer, Physiology & Anatomy with Practical Considerations, J.P. LippinCott. Philadelphia
3. Grey's Text Book of Anatomy

Unit-1 Introduction 8 hours
Urinary System Kidney, ureter, urinary bladder, male and female urethra, Histology of kidney, ureter and urinary bladder.
Unit-2 8 Hours
Endocrine Glands Names of all endocrine glands in detail on pituitary gland, thyroid gland, parathyroid gland, suprarenal glad (gross & histology).
Unit-3 8 Hours
Nervous System Neuron, Classification of NS, Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (gross & histology), Meninges, Ventricles & cerebrospinal fluid, Names of basal nuclei, Cranial nerves, Sympathetic trunk & names of parasympathetic ganglia.
Unit-4 8 Hours
Reproductive System Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology), Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology), Mammary gland-gross.
Unit-5 8 Hours
Sensory Organs Skin: Skin-histology, Appendages of skin, Eye: Parts of eye & lacrimal apparatus, Extra-ocular Muscles & nerve supply, Ear: parts of ear- external, middle and inner ear and contents.

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	General Physiology-II			
Course Code	CVT105			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives: The basic objective of this course is to get familiar with human physiology.

Course Outcomes

CO1	Students will be able to interpret the workings of individual human cell and the impact of the environment on the human body.
CO2	Students will be able to interpret the functioning of the central nervous system.
CO3	Students will be able to interpret the functioning of gastrointestinal system.
CO4	Students will be able to interpret the basic functioning of the endocrine system and its hormones.
CO5	Students will be able to interpret the functioning of the lymphatic and reproductive systems.

Text Book (s):

1. Essentials of Medical Physiology, Book by K. Sembulingam and Prema Sembulingam.
2. Guyton & Hall Textbook of Medical Physiology , by John E. Hall (Author), Mario Vaz (Author), Anura Kurpad (Author), Tony Raj (Author)

Reference Book (s):

1. Ganong's Review of Medical Physiology, Book by Heddwen Brooks, Kim E. Barrett, Scott Boitano, and Susan M. Barman.
2. Berne & Levy Principles of Physiology,Textbook by Bruce A Stanton, Bruce M Koeppen, and Matthew N. Levy

Unit-1 Introduction	8 hours
General principles of cell physiology, Physiology of skeletal muscle.Environmental Physiology Body temperature regulation (including skin Physiology).	
Unit-2	8 hours
Nervous System Neuron, Classification of NS, Cerebrum, cerebellum, midbrain, pons, medulla oblongata,	

spinal cord with spinal nerve (gross & histology), Meninges, Ventricles & cerebrospinal fluid, Names of basal nuclei, Blood supply of brain, Cranial nerves, Sympathetic trunk & names of parasympathetic ganglia.
Unit-3 8 Hours
Digestion: General arrangement ,Salivary digestion – functions & regulations Gastric digestion – functions & regulations Pancreatic digestion – functions & regulations Intestinal digestion – functions & regulations Liver & bile Absorption Motility Deglutition Vomiting Defecation Functions of large intestine Neurohumoral regulations of alimentary functions, summary.
Unit-4 8Hours
Endocrines: Hormone mechanism – negative feed backs – tropic action – permissive action – cellular action, hypothalamic regulation Thyroid - hormones, actions, regulations Adrenal cortex - hormones, actions, regulations Adrenal medulla – hormones, actions, regulations Parathyroid - hormones, actions, regulations Islets of pancreas – hormones, actions, regulations Miscellaneous hormones, actions, regulations Common clinical disorders.
Unit-5 8 Hours
Fundamentals of different Organ Systems i. Lymphatic System ii. Reproductive System

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Cardiac Pharmacology and Clinical Treatment			
Course Code	CVT106			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives: To understand the Cardio Pharmacology and Clinical Treatment.

Course Outcomes

CO1	Students will be able to interpret the mechanism of action of drugs on the body and its adverse reactions.
CO2	Students will be able to interpret the action of antianginal drugs on a patient with angina.
CO3	Students will be able to interpret and understand drugs for treating cardiac failure.
CO4	Students will be able to interpret the actions of antihypertensives and antiarrhythmic agents.
CO5	Students will be able to interpret the actions of antithrombotic agents, lipid-lowering agents, and anti-sclerotic drugs.

Text Book (s):

1. Tripathi K.D., Essentials of Medical Pharmacology, Jay Pee Publishers, New Delhi.
2. Rang M.P., Dale M.M., Riter J.M., Pharmacology, Churchill Livingstone.
3. Katzung, B.G., Basic & Clinical Pharmacology, Prentice Hall, International.
4. Barar F.S.K., Text Book of Pharmacology, Interprint, New Delhi.

Reference Book (s):

1. Laurence D.R. &Bannet P.N., Clinical Pharmacology, Churchill Livingstone.
2. Goodman & Gilman, The Pharmacological Basis of Therapeutics, Editors:-J.G Hardman, L.E. Limbird, P.B. Molinoss, R.W. Ruddon& A.G. Gil, Pergamon Press.
3. Pharmacology For Undergraduates , Agarwal S. L.
4. Pharmacology: Principles and Practice by Miles Hacker, William S. Messer, Kenneth A. Bachmann

Unit-1 Introduction 8 hours
General Pharmacology Introduction to pharmacology, dosage forms & routes of administration, mechanism of action, concept of receptors, ADME, Adverse drug reactions.
Unit-2 8 Hours
Anti-anginal agents: Beta blockers- propranolol, atenolol, metoprolol, bisoprololcarvedilol, esmolol; Nitrates-nitroglycerine, isosorbidedinitrate, isosorbidemononitrate, transdermal nitrate patches; Calcium channel blockers- nifedipine, verapamil, dilteazem, Amlodipine.
Unit-3 8 Hours
Anti-failure agents: Diuretics-furosemide, torsamide, thiazide diuretics, metolazone, spironolactone, combination diuretics; Angiotensin convertying enzyme (ACE) inhibitors – captopril Enalapril, ramipril, lisinopril, ACE inhibitors for diabetics and hypertensive renal disease; Digitalis and acute ionotropes– digoxin, doubutamine, dopamine, adrenaline, noradrenaline, isoprenaline.
Unit-4 8 Hours
Anti-hypertensive drugs: Diuretics, beta-blockers, ACE inhibitors, calcium antagonists, direct Vasodilators, centrally acting and peripherally acting vasodilators. Anti- arrhythmic agents: Amiodarone, adenosine, verapamil, diltiazem, lidocaine,

mexiletine, Phenytoin, flecainide, bretylium, atropine.
Unit-5 8 Hours
Antithrombotic agents: Platelet inhibitors: aspirin, clopidogrel; Anticoagulants: heparin, low molecular weight heparin, warfarin; Fibrinolytics: streptokinase, urokinase;Glycoprotein 2b3a antagonists: abciximab, tirofiban, eptifibatide. Lipid lowering and anti-atherosclerotic drugs: statins, exetimibe, niacin, fenofibrate.

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Cardio Pathology-I			
Course Code	CVT107			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives: The basic objective of this course is to get familiar with pathophysiology of human system.

Course Outcomes

CO1	The students will be able to understand, analyze and interpret various diseases of the heart valves.
CO2	The students will be able to understand, analyze and interpret essential and secondary hypertension.
CO3	The students will be able to understand, analyze and interpret coronary artery disease.
CO4	The students will be able to understand, analyze and interpret heart failure and its treatment.
CO5	The students will be able to understand, analyze and interpret various disease affecting the myocardium.

Text Book (s):

1. Robbins and Cotran Pathologic Basis of Disease,Textbook by Stanley L Robbins.
2. Textbook of Pathology,Book by Harsh Mohan.
3. A Textbook of Pathology, Nicholas Vardaxis.

Reference Book (s):

1. Essential Pathology, Third Edition Rubin and Farber's Pathology.
2. Essentials of Rubin's Pathology.Emanuel Rubin, Howard M. Reisner.
3. Oxford Textbook of Pathology: General Principles of Pathology.

Unit-1 Introduction	8 hours
Valvular heart disease: Etiology, Acquired valvular heart disease, Rheumatic fever and rheumatic heart disease, Aortic stenosis, Aortic regurgitation, Mitral valve disease, Mitral stenosis, Mitral regulation, Tricuspid valve disease, Infective endocarditis, Valvuloplasty and valve surgery.	
Unit-2	8 hours
Systemic hypertension: Essential and secondary hypertension.	
Unit-3	8 hours
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, Surgical treatment, Cardiac rehabilitation.	
Unit-4	8 hours
Heart failure: Surgical and medical treatment.	
Unit-5	8 hours
Myocardial diseases: Dilated cardiomyopathy, Hypertrophic cardiomyopathy, Myocarditis, Restrictive cardiomyopathy.	

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Communicative English II				
Course Code	ENG281				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		2	0	0	2

Course Objectives:

The objective of the course is to:

1. Understand simple texts and a range of high frequency vocabulary in context

2. Describe aspects of personal and everyday life in both oral and written form

3. Produce short and simple connected texts on familiar topics

4. Basic understanding into pronunciation of English sounds

Course outcome

On the successful completion of the course, the student would be able to:

CO1	Develop the understanding into the communication and language as its medium
CO2	Develop the basic understanding of spoken English
CO3	Improve their reading fluency skills through extensive reading
CO4	Use and assess information from academic sources, distinguishing between main ideas and details
CO5	Compare and use a range official support through formal and informal writings

Text Books & Reference Books

Communication Skills by Dr. T. Ravichandran,Department of Humanities and Social Sciences (NPTEL)

English Language for Competitive Examinations By Prof. Aysha Iqbal (NPTEL)

Better Spoken English by Prof. Shreesh Chaudhary, Department of Humanities and Social Sciences, IIT Madras. (NPTEL)

Understanding Creativity and Creative Writing by Prof. Neelima Talwar(NPTEL

Unit-1 • Technical Writing: Meaning, Types, Style, Features • Report: Types, Format, Structure, Citation, Planning and writing, Project report Manual and user guide: general layout, planning and writing
Unit-2
• Proposal: Types, format, structure, planning and writing • Listening vs Hearing, Steps and Types of listening; Barriers of Listening, Methods to improve listening Group Discussion
Unit-3
• Spelling and Phonetic Inconsistencies in English • Basics of Pronunciation, Organs of speech, articulation, Introduction to Sounds (IPA) • Phonetic/Phonemic Transcription Presentation Strategies: Purpose, Audience and locale analysis, Non-verbal aspects, voice and pronunciation, effective PowerPoint preparation

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Cardiac Pharmacology and Clinical Treatment- (P)			
Course Code	CVT153			
Prerequisite				
Corequisite				
Antirequisite				
L	T	P	C	
0	0	2	1	

Course Objectives: The basic objective of this course is to get familiar with the experiments of pharmacology.

Course Outcomes:

CO1	To identify different animals used in the Pharmacology lab.
CO2	To demonstrate and understand different routes of administration of drugs in mice/rats.
CO3	To demonstrate and prepare different Physiological Salt solution.
CO4	To study the different instruments used in Pharmacology lab.
CO5	To study the different techniques used in Pharmacology lab.

Text Book (s):

1. Tripathi K.D., Essentials of Medical Pharmacology, Jay Pee Publishers, New Delhi.
2. Rang M.P., Date M.M., Riter J.M., Pharmacology, Churchill Livingstone.

Reference Book (s):

1. Katzung, B.G., Basic & Clinical Pharmacology, Prentice Hall, International.
2. Satoskar&Bhandarkar, Pharmacology &Pharmacotherapeutics, Popular Prakashan Pvt. Ltd. Bombay.

Unit-1 Introduction
Different routes of different drug administraton.
Unit-2
Preparation of different physiological solution.
Unit-3
Study of different animals in pharmacology lab.
Unit-4

Instruments used in pharmacology lab
Unit-5
Techniques used in pharmacology lab

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Communicative English-II			
Course Code	ENG283			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

The objective of the course is to:

1. Understand simple texts and a range of high frequency vocabulary in context
2. Describe aspects of personal and everyday life in both oral and written form
3. Produce short and simple connected texts on familiar topics
4. Basic understanding into pronunciation of English sounds

Course outcome

On the successful completion of the course, the student would be able to:

CO1	Develop the understanding into the communication and language as its medium
CO2	Develop the basic understanding of spoken English
CO3	Improve their reading fluency skills through extensive reading
CO4	Use and assess information from academic sources, distinguishing between main ideas and details
CO5	Compare and use a range official support through formal and informal writings

Text Books & Reference Books

Communication Skills by Dr. T. Ravichandran,Department of Humanities and Social Sciences (NPTEL)

English Language for Competitive Examinations By Prof. Aysha Iqbal (NPTEL)

Better Spoken English by Prof. Shreesh Chaudhary, Department of Humanities and Social Sciences, IIT Madras. (NPTEL)

Understanding Creativity and Creative Writing by Prof. Neelima Talwar(NPTEL)

Course content:

The following activities will be conducted in lab classes:

- Spin-a-yarn
- Drafting Catchphrases
- Picture Interpretation (Denotation and Connotation)
- Active Listening
- Reading between the lines
- Brief Biography of Female Personalities
- Rhythm and Intonation
- Public Speaking
- Mock Lecture
- Dialogue Writing
- Enacting scene(s) from critically appreciated movies

Continuous Assessment Pattern

Internal	External	Total Marks
30	70	100

Name of The Course	Cardio Pathophysiology-II			
Course Code	CVT201			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives: The basic objective of this course is to get familiar with pathophysiology of human system.

Course Outcomes

CO1	To analyze and interpret pericardial diseases
CO2	To analyze and interpret electrical disturbances of the heart
CO3	To understand Pulmonary hypertension
CO4	To analyze and interpret Peripheral Vascular Disease
CO5	To analyze and interpret Congenital heart disease

Text Book (s):

1. Chaurasia B.D, Human Anatomy, Regional & Applied Part I, II & III, CBS Publishers & Distributors, New Delhi.

2. Parmar N.S., Health Education & Community Pharmacy CBS Publishers, Delhi.

3. ShalyaSubhash, Human Physiology, CBS Publishers & Distributors.

4. Chatterjee C.C. Human Physiology, Medical Allied Agency, Calcutta.

5. Ross & Wilson, Anatomy & Physiology in Health & Illness, Churchill Livingstone.

6.Tortora GJ, &Anagnodokos NP, Principles of Anatomy & Physiology, Harper & Rave Publishers, New Delhi.

Reference Book (s):

1. Keele, C.A., Niel, E and Joels N, Samson Wright's Applied Physiology, Oxford University Press.
2. Dipiro JL, Pharmacotherapy – A Pathophysiological Approach, Elsevier.
3. Guyton AC, Hall JE., Text book of Medical Physiology, WB Saunders Company

Unit-1	**8 hours**
Pericardial Diseases: Pericardial effusion, Constrictive pericarditis, Cardiac tamponade	
Unit-2	**8 hours**
Electrical disturbances of the heart: Sinus node dysfunction, Arrhythmias and conduction Disturbances, Treatment of arrhythmias, pharmacological, radiofrequency ablation and surgery	
Unit-3	**8 hours**
Pulmonary hypertension: Primary pulmonary hypertension, Pulmonarythrombo-embolism	
Unit-4	**8hours**
Peripheral Vascular Disease: Atherosclerotic peripheral vascular disease, Aortic aneurysms, Aortic dissection, Takayasu arteritis	
Unit-5	**8 hours**
Congenital heart disease: (a) Acyanotic heart disease, Atrialseptal defect, Ventricular septal defect, Patent	

ductusarteriosus, Congenital valvular disease, Coarctation of aorta (b) Cyanotic congenital heart disease, Tetralogy of Fallot, Double outlet right ventricle, Pulmonary atresia, Transposition of great arteries, Truncusarteriousus, Total anomalous pulmonary venous connection

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Microbiology			
Course Code	CVT202			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives: To get familiar with microbiology.

Course Outcomes

CO1	To understand, analyze and interpret microrganisms and their characteristics with reference to bacteria.
CO2	To understand, analyze and interpret viruses and their characteristics
CO3	To understand and interpret techniques of sterilization
CO4	To understand, analyze and interpret fungi and parasites.
CO5	To understand and analzye different methods of cultivation and in identification of microbes.

Text Book (s):

1. Aneja K.R. Experiments in Microbiology, Plant Pathology, Tissue Culture & Mushroom Cultivation, VishwaPrakashan.

2. Gunasekaran P, Lab Mannual of Microbiology, New Age Publishers

3. Davis, Dulbetco, Eisen Microbiology.

4. Stanier R.Y., Ingraham, J.L., Wheelis M.L. & Painter P.R. General Microbiology, Macmillan Press Limited.

5. Hugo and Russell, Pharmaceutical Microbiology, Black Well Scientific Publication, Oxford. 6. Prescott L.M., Harley J.P. &Klien D.A. Microbiology, McGraw Hill.

7. Sykes, Disinfection and Sterilization.

Reference Book (s):

1. Pelczar& Reid, Microbiology, Tata McGraw Hill, Delhi.

2. Virella G. Microbiology and Infectious Diseases, William & Wilkins.

3. Ananthanarayan R &Paniker CKJ, Textbook of Microbiology, Orient Longman

Unit-1 **8 hours** **General characters and classification of Bacteria, Growth and Maintenance of Microbes** Bacterial division, Batch Culture, Continuous culture, bacterial growth- total count, viable count, bacterial nutrition, oxygen requirement, CO2 requirement, temperature, pH, light **Characteristics of Bacteria** Morphology - Shape, Capsule, Flagella, Inclusion, Granule, Spore. Bacteria affecting the heart.
Unit-2 **8 hours** **Virus** General Characteristics of viruses, Cultivation, Nomenclature of viruses, Interaction – virus-host, Bacteriophage, Viruses affecting the heart- adenovirus, CMV, coxsackievirus B,Enteric cytopathic human orphan viruses (ECHO), Human Parvo viorus B19, Rubella
Unit-3 **8 hours** **Sterilization and Disinfection.** Physical agents- Sunlight, Temperature less than 1000C, Temperature at 1000C, steam at atmospheric pressure and steam under pressure, irradiation, filtration Chemical Agents- Alcohol, aldehyde, Dyes, Halogens, Phenols, Ethylene oxide
Unit-4 **8 hours** **Mycology & Parasitology:** Mycology**:** Introduction, classification, Fungus affecting the heart- Candida and Histoplasmacapsulatum,Aspergillus sp.,Diagnosis. Parasitology: Introduction,classification, Diagnosis. It role in heart disease- trypanosome,toxoplasma,trichura, Chaga's disease,echinococcus,amoebiasis.
Unit 5 **8 hours** **Staining Methods & Culture media** Definition, uses, basic requirements, classification, Agar, Peptone, Transport Media, Sugar

Media, Anaerobic Media, Containers of Media, Forms of Media Simple, Grams staining, Ziehl-Neelsen staining or AFB staining, Negative Impregnation

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Medical electronics, biophysics and computer usage relevant to cardiac technology-I			
Course Code	CVT203			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives: To get familiar with microbiology.

Course Outcomes

CO1	To undersand and analyze medical physics, and its uses in diagnostic imaging
CO2	To understand the concept of blood pressure and pressure transduders
CO3	To understand and interpret the concept of defibrillators, cathode ray tubes
CO4	To understand and interpret the concept of Impedence plethysmography
CO5	To understand and interpret the concept of pulse oximetry.

Text Book (s):

1. Dhanjoo N. GhistaNoninvasive Cardiac assessment technology.

2. Alberto Benchimol - Non-invasive diagnostic techniques in cardiology Williams & Wilkins, 1981

3. AtulLuthra ECG Made Easy JP Medical Ltd, 2012.

Reference Book (s):

1. Malcolm S. Thaler The Only EKG Book You'll Ever Need, Volume 365 Lippincott Williams & Wilkins, 2009

Unit-1 Introduction to medical physics	**8 hours**
Unit-2 Blood pressure recording, Pressure transducers	**8 hours**
Unit-3 Defibrillators, Cathode ray tubes and physiological monitors	**8 hours**
Unit-4 Impedence plethysmography	**8 hours**
Unit-5 Pulse oximetry	**8 hours**

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Basic Electrocardiography-I			
Course Code	CVT204			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives: To get familiar with Basic Electrocardiography.

Course Outcomes

CO1	To understand various principles of electrocardiography
CO2	To understand and apply the principles of electrocardiography
CO3	To understand and interpret Electrocardiographic lead systems
CO4	To understand and interpret hex axial reference frame and electrical axis
CO5	To understand and record adult and paediatric ECGs

Text Book (s):

1. Donald S. Baim Grossman's Cardiac Catheterization, Angiography, and Intervention, Volume 1 Lippincott Williams & Wilkins, 2005

2. Morton L. Kern, Morton J. Kern The Cardiac Catheterization Handbook Elsevier Health Sciences, 2011

Reference Book (s):

1. Patrick Kay, ManelSabate, Marco A. Costa Cardiac Catheterization and Percutaenous Interventions Taylor & Francis, 2004

Unit-1	**8 hours**
Fundamental principles of electrocardiography: Cardiac electrical field generation during activation, Cardiac wave fronts	
Unit-2	**8 hours**
Cardiac electrical field generation during ventricular recovery	
Unit-3	**8 hours**
Electrocardiographic lead systems: Standard limb leads, Precordial leads and the Wisdom Central terminal, Augmented limb leads	
Unit-4	**8 hours**
The hexaaxial reference frame and electrical axis	
Unit-5	**8 hours**
Recording adult and pediatric ECGs	

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
10	70	100

Name of The Course	Computer fundamentals				
Course Code	CVT108				
Prerequisite					
Corequisite					
Antirequisite					
	L	**T**	**P**	**C**	
	2	0	0	2	

Course Objectives: The basic objective of this course is to get familiar with computers and programming Language.

Course Outcomes

CO1	
CO2	
CO3	
CO4	
CO5	

Text Book (s):

1. Computer Fundamentals, Anita Goel
2. Computer Fundamentals, Rashmi Sharma
3. Computer Fundamentals and Programming in C, ReemaThareja
4. Computer Fundamentals (Book + CD-Rom), PradeepK.Sinha&PritiSinha

Reference Book (s):

1. Computer Fundamentals, Dr. SushilaMadan
2. Computer Fundamentals and Information Technology, Ramesh Bangia

Unit-1 **8 hours** Definition and Overview of Computer, Computer classification, Computer Organization, Computer code, computer classification of Boolean algebra. Input Devices Output devices, Storage devices. Computer Software, Types of software. Overview of Computer Networks,LAN, MAN, WAN, Internet, Intranet, network topology. Internetworking: Bridges, Repeaters and Routers
Unit-2 **Introduction:** Operating system and function, Evolution of operating system, Batch, Interactive, Time sharing and Real Time System. Single User Operating System and Multi-user Operating system, Compare MS-DOS vs. UNIX, Various window features. Internal and External commands in MS-DOS
Unit-3 Introduction to MS-OFFICE-2003, word 2003 Document creation, Editing, formatting table handling, mail merge, Excel-2003, Editing, working Retrieval, Important functions, short cut keys used in EXCEL
Unit-4 MS-Power point 2003-Job Profile, Elements of Power point , ways of delivering Presentation, concept of Four P's (Planning , Preparation, Practice and Presentation) ways of handling presentations e.g. creating, saving slides show controls, Adding formatting, animation and multimedia effects.
Unit-5 Computer applications in clinical studies.

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Microbiology (P)			
Course Code	CVT251			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	0	0	2	1

Course Objectives: To familiar with practical aspects of microbiology.

.

Course Outcomes

CO1	To understand and demonstrate the preparation of swabs/sterile tubes & bottles.
CO2	To understand and demonstrate the preparation of smear.
CO3	To understand and demonstrate Staining: Gram &Ziehl-Neelsen staining
CO4	Identification of Culture media andinstruments
CO5	Identification of common microbes.

Text Book (s):

1. Aneja K.R. Experiments in Microbiology, Plant Pathology, Tissue Culture & Mushroom Cultivation, VishwaPrakashan.

2. Gunasekaran P, Lab Mannual of Microbiology, New Age Publishers.

3. Davis, Dulbetco, Eisen Microbiology.

4. Stanier R.Y., Ingraham, J.L., Wheelis M.L. & Painter P.R. General Microbiology, Macmillan Press Limited.

5. Hugo and Russell, Pharmaceutical Microbiology, Black Well Scientific Publication, Oxford.

6. Prescott L.M., Harley J.P. &Klien D.A. Microbiology, McGraw Hill.

Reference Book (s):

1. Sykes, Disinfection and Sterilization.

2. Pelczar& Reid, Microbiology, Tata McGraw Hill, Delhi

3. Virella G. Microbiology and Infectious Diseases, William & Wilkins.

4. Ananthanarayan R &Paniker CKJ, Textbook of Microbiology, Orient Longman

Unit-1 1.Preparation of swabs/sterile tubes & bottles
Unit-2 2.Preparation of smear.
Unit-3 3. Staining.: Gram &Ziehl-Neelsen staining.
Unit-4 4. Identification of Culture media.
Unit-5 5.Identification of instruments.

Continuous Assessment Pattern

Internal	**External (ETE)**	**Total Marks**
30	70	100

Name of The Course	Medical electronics, biophysics and computer usage relevant to cardiac technology-I (P)			
Course Code	CVT252			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	0	0	2	1

Course Objectives: To get familiar with medical electronics, biophysics and computer usage relevant to cardiac
technology.

Course Outcomes

CO1	To understand, and interpret the usage BP monitoring devices.

CO2	To understand, and interpret the usage of Pressure transducers, Defibrillators,Cathode ray tubes
CO3	To understand, and interpret the usage plethysmography Pulse oximetry

Text Book (s):

1. Dhanjoo N. GhistaNoninvasive Cardiac assessment technology
2. Alberto Benchimol - Non-invasive diagnostic techniques in cardiology Williams & Wilkins, 1981
3. Atul Luthra ECG Made Easy JP Medical Ltd, 2012

Reference Book (s):

1Malcolm S. Thaler The Only EKG Book You'll Ever Need, Volume 365 Lippincott Williams & Wilkins, 2009

Unit-1 **hours**
1Manuual, Semi Auctomatic and Automatic use of Blood pressure recording
Unit-2
2.Pressure transducers, Defibrillators,Cathode ray tubes
Unit-3
3. Physiological monitors,plethysmography Pulse oximetry

Continuous Assessment Pattern

Internal	**External (ETE)**	**Total Marks**
30	70	100

Name of The Course	Basic Electrocardiography (P)				
Course Code	CVT253				
Prerequisite					
Corequisite					
Antirequisite					
	L	**T**	**P**	**C**	
	0	0	2	1	

Course Objectives: To get familiar with Basic Electrocardiography.

.

Course Outcomes

CO1	To analyze and understand the ECG machine.

CO2	To analyze andunderstand the standard limb leads,augmented, limb leads
CO3	To analyze and understand the chest leads and Wisdom central terminal

Text Book (s)&Reference Book (s):

1. DonaldS.Baim, Grossman's Cardiac Catheterization, Angiography, and Intervention, Volume Lippincott Williams & Wilkins, 2005

2. Morton L. Kern, Morton J. Kern. The Cardiac Catheterization Handbook Elsevier Health Sciences, 2011

3. Patrick Kay, ManelSabate, Marco A. Costa Cardiac Catheterization and Percutaenous Interventions Taylor & Francis, 2004

Unit-1 1.Electrocardiography, Electrocardiographic lead systems
Unit-2 2.Standard limb leads, Precordial leads and the Wisdom central terminal
Unit-3 3. Augmented limb leads Electrical axis and ECGs.

Continuous Assessment Pattern

Internal	**External (ETE)**	**Total Marks**
30	70	100

Name of The Course	Computer Fundamentals and programming (P)				
Course Code	CVT154				
Prerequisite					
Corequisite					
Antirequisite					
	L	**T**	**P**	**C**	
	0	0	2	1	

Course Objectives: The basic objective of this course is to get familiar with computers and programming Language.

Course Outcomes

CO1	
CO2	
CO3	

CO4	
CO5	

Text Book (s):

1. Computer Fundamentals, Anita Goel
2. Computer Fundamentals, Rashmi Sharma
3. Computer Fundamentals and Programming in C, ReemaThareja
4. Computer Fundamentals (Book + CD-Rom), PradeepK.Sinha&PritiSinha

Reference Book (s):

1. Computer Fundamentals, Dr. SushilaMadan
2. Computer Fundamentals and Information Technology, Ramesh Bangia

Software Lab to be used for the following:

1. Windows, Managing Windows, Working with Disk, Folders and files.
2. MS-Office 2003 (MS Word, MS Power point, MS Excel, MS Access).
3. Computer Operating System Like DOS and Windows.
4. Internet Features (E-mail, Browser etc.)

Unit-1	**8 hours**
Unit-2	
Unit-3	
Unit-4	
Unit-5	

Continuous Assessment Pattern

Internal	**External (ETE)**	**Total Marks**
30	70	100

Name of The Course	Medical electronics, biophysics and computer usage relevant to cardiac technology-II
Course Code	CVT205

Prerequisite					
Corequisite					
Antirequisite					
	L	**T**	**P**	**C**	
	3	0	0	3	

Course Objectives: The basic objective of this course is to get familiar with medical instruments and computer usage relevant with cardiac technology.

Course Outcomes

CO1	To understand and analyze medical ultrasound, doppler and Electrocardiography.
CO2	Understanding the Electrocardiographic processing and display system.
CO3	Understanding and analyzing Radiation physics.
CO4	Understanding and interpreting techniques of monitoring radiation exposure and measures to reduce radiation exposure.
CO5	Interpreting Computer use in medical care and data entry.

Text Book (s):

1. The Essential Physics of Medical Imaging by Jerrold T. BushbergThe Essential Physics of Medical Imaging by Jerrold T. Bushberg
2. Radiologic Science for Technologists: Physics, Biology and Protection by Bushong

Reference Book (s):

1. Introduction to Medical Imaging-Nadine Barrie Smith and Andrew Webb,Publisher: Cambridge University Press,Genre: Technology & Engineering,ISBN: 9780521190657, 0521190657
2. The Essential Physics of Medical Imaging, Third Edition Third,
3. by Jerrold T. Bushberg (Author), J. Anthony Seibert (Author), Edwin M. Leidholdt Jr. (Author), John M. Boone (Author)
4. Medical Imaging: Principles and Practices
5. Mostafa Analoui, Joseph D. Bronzino, Donald R. Peterson

Unit-1	8 hours
Ultrasound- Medical ultrasound and Doppler Ionic currents and Electrocardiography	
Unit-2	8 hours
Electrocardiography- Electrocardiographic processing and display system	

Unit-3 Radiation- Radiation physics	8 hours
Unit-4 Radiation Techniques of monitoring radiation exposure Measures to reduce radiation exposure	8 hours
Unit-5 Computer use in medical care and data entry	8 hours

Continuous Assessment Pattern

Internal	**External (ETE)**	**Total Marks**
30	70	100

Name of The Course	Basic Electrocardiography-II			
Course Code	CVT206			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives: To get familiar with Basic Electrocardiography.

Course Outcomes

CO1	To analyze and interpret normal ECG
CO2	To interpret the P wave
CO3	To analyze atrioventricularconduction, PR and QRS intervals
CO4	To interpret ventricular repolarization and ST-T interval
CO5	To analyze and interpret rate and rhythm of heart through ECG

Text Book (s):

1. Guyton & Hall Text Book of Physiology
2. The ECG Made Easy Book by John R Hampton

3. Textbook of Clinical Electrocardiography S N Chugh
4. 12-Lead Ecg: The Art of Interpretation by Casimiro Garcia

Reference Book (s):

1. Clinical Electrocardiography: A Textbook by Antonio Bay's de Luna
2. ECG TEXTBOOK: Theory and Practical Fundamentals 2017 by OPRET (Author)

Unit-1	**8 hours**
Normal Electrocardiogram- The normal electrocardiogram, Atrial activation	
Unit-2	**8 hours**
P wave The normal P wave Atrial repolarization	
Unit-3	**8 hours**
Atrioventricular node Atrioventricular node conduction and the PR segment Ventricular activation and the QRS complex	
Unit-4	**8 hours**
Ventricular Repolarization Ventricular recovery and ST-T wave, U wave Normal variants	
Unit-5	**8 hours**
Rate and rhythm	

Continuous Assessment Pattern

Internal	**External (ETE)**	**Total Marks**
30	70	100

Name of The Course	Advanced Electrocardiography-I				
Course Code	CVT207				
Prerequisite					
Corequisite					
Antirequisite					
	L	**T**	**P**	**C**	
	3	0	0	3	

Course Objectives: To get familiar with Advanced Electrocardiography.

Course Outcomes

CO1	To analyze and interpret the abnormal ECG, left and right atrial abnormality
CO2	To analyze and interpret diseases associated with ventricles from the ECG
CO3	To analyze and interpret fasicular blocks
CO4	To analyze and interpret left and right bundle branch blocks from the ECG
CO5	To analyze and interpret various changes associated with myocardial infarction from the ECG

Text Book (s):

1. Guyton & Hall Text Book of Physiology
2. The ECG Made Easy Book by John R Hampton
3. Textbook of Clinical Electrocardiography S N Chugh
4. 12-Lead Ecg: The Art of Interpretation by Casimiro Garcia

Reference Book (s):

1. Practical electrocardiography Book by Henry J. L. Marriott
2. Clinical Electrocardiography: A Textbook by Antonio Bay's de Luna
3. ECG TEXTBOOK: Theory and Practical Fundamentals 2017 by OPRET (Author)
4. Ganong Text Book of Physiology

Unit-1	8 hour
Abnormalities of rate and rhythm The abnormal electrocardiogram, Left atrial abnormality, Right atrial abnormality	
Unit- 2	8 hours
Left ventricular hypertrophy and enlargement, Right ventricular hypertrophy and enlargement, Intraventricular conduction delays	
Unit-3	8 hours
Left anterior fascicular block, Left posterior fascicular block	
Unit-4	8 hours
Left bundle branch block, Right bundle branch block	
Unit-5	8 hours
Myocardial ischemia and infarction, Repolarization (ST-Twave) abnormalities, QRS changes	

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Medical electronics, biophysics and computer usage relevant to cardiac technology-II (P)			
Course Code	CVT254			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	0	0	2	1

Course Objectives: The basic objective of this course is to get familiar with medical instruments and computer usage relevant with cardiac technology.

Course Outcomes

CO1	To understand, and interpret the usage BP monitoring devices.
CO2	To understand, and interpret the usage of Pressure transducers,Defibrillators,Cathode ray tubes
CO3	To understand, and interpret the usage plethysmography Pulse oximetry

Text Book (s):

1 The Essential Physics of Medical Imaging by Jerrold T. BushbergThe Essential Physics of Medical Imaging by Jerrold T. Bushberg

2 Radiologic Science for Technologists: Physics, Biology and Protection by Bushong

Reference Book (s):

6. Introduction to Medical Imaging-Nadine Barrie Smith and Andrew Webb,Publisher: Cambridge University Press,Genre: Technology & Engineering,ISBN: 9780521190657, 0521190657
7. The Essential Physics of Medical Imaging, Third Edition Third,
8. by Jerrold T. Bushberg (Author), J. Anthony Seibert (Author), Edwin M. Leidholdt Jr. (Author), John M. Boone (Author)
9. Medical Imaging: Principles and Practices
10. Mostafa Analoui, Joseph D. Bronzino, Donald R. Peterson

Unit-1
Manual, Semi-automatic and Automatic use of Blood pressure recording

Unit-2 Pressure transducers, Defibrillators,Cathode ray tubes
Unit-3 Physiological monitors,plethysmography Pulse oximetry

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Basic Electrocardiography-II (P)				
Course Code	CVT255				
Prerequisite					
Corequisite					
Antirequisite					
		L	**T**	**P**	**C**
		0	0	2	1

Course Objectives: To get familiar with Basic Electrocardiography.

Course Outcomes

CO1	To analyze and understand the latest ECG machine.
CO2	To analyze and understand recording ECG in neonates
CO3	To analyze and understand the recordingof ECG in adults and elderly patients.

Text Book (s):

1. Guyton & Hall Text Book of Physiology
2. The ECG Made Easy Book by John R Hampton

Reference Book (s):

1. Practical electrocardiography Book by Henry J. L. Marriott
2. Clinical Electrocardiography: A Textbook by Antonio Bay's de Luna

Unit-1 To analyze the latest types of ECG machines available
Unit-2 Recording ECG in the neonate

Unit-3
Recording ECG in the elderly.

Continuous Assessment Pattern

Internal	**External (ETE)**	**Total Marks**
30	70	100

Name of The Course	Treadmill exercise stress testing and 24 hour Ambulatory ECG recording			
Course Code	CVT301			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:
To get familiar with Treadmill exercise stress testing and 24 hour Ambulatory ECG recording.

Course Outcomes

CO1	Analyze and understand Functioning of Treadmill
CO2	Analyze and understand ST segment changes
CO3	Analyze and understand the indications and contraindications in exercise testing
CO4	Analyze and understand cardiac arrhythmias and conduction disturbances during stress testing.
CO5	Analyze and understand Holter Monitoring

Text Book (s) & Reference Book (s)

1. Stress Testing: Principles and Practice By Myrvin H.Ellestad

Course Content

Unit-1	8 hours
Exercise physiology, protocols, Lead systems, Patient preparation	

Unit-2	8 hours
ST segment displacement – types and measurement, Non electrocardiographic observations	
Unit-3	
Exercise test indications, contra-indications and precautions.	
Unit-4	8 hours
Cardiac arrhythmias and conduction disturbances during stress testing, Emergencies in the stress testing laboratory.	
Unit-5	8 hours
Principles of Holter Recording, Connections of the Holter recorder, Holter Analysis for ambulatory electrocardiography.	

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	ECHOCARDIOGRAPHY			
Course Code	CVT302			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:
To get familiar with echocardiography

Course Outcomes

CO1	To analyze and interpret Fundamental principles of echocardiography
CO2	To analyze and interpret echocardiography of the heart.
CO3	To analyze and interpret valvular heart disease.

CO4	To analyze and interpret Atrial septal defect, Ventricular septal defect, Patent ductus arteriosus, Pulmonary stenosis, Tetralogy of Fallot, Coarctation of aorta, Left atrial thrombus, Left atrial myxoma
CO5	To analyze and interpret various changes associated with myocardial infarction from the Echocardiography

Text Book (s)

2. The Washington Manual of Echocardiography by Nishath Quader M.D. (Author)
3. Practice of Clinical Echocardiography 5th Edition by Catherine M. Otto MD (Author)
4. The Digital Echo Atlas: A Multimedia Reference by Stephen Clements M.D. (Author)

Reference Book (s)

1. The Washington Manual of Echocardiography by Nishath Quader M.D. (Author)
2. Practice of Clinical Echocardiography 5th Editionby Catherine M. Otto MD (Author)

Course Content

CO1	Unit 1 M- Mode and 2D transthoracic echocardiography, Views used in transthoracic echocardiography, Doppler echocardiography: pulsed, continuous wave and colour	8 hours
CO2	Unit 2 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	8 hours
CO3	Unit 3 Echocardiography in Valvular heart disease: Mitral stenosis, Mitral regurgitation, Mitral valve prolapsed, Aortic stenosis, Aortic regurgitation, Infective endocarditis Prosthetic valve assessment,	8 hours
CO4	Unit 4 Echocardiography in Cardiomyopathies: Dilated, Hypertrophic, Restrictive, Constrictive pericarditis, pericardial effusion and cardiac tamponade,	8 hours
CO5	Unit 5 Echocardiographic detection of congentital heart desease: Atrial septal defect,	8 hours

	Ventricular septal defect, Patent ductus arteriosus, Pulmonary stenosis, Tetralogy of Fallot, Coarctation of aorta, Left atrial thrombus, Left atrial myxoma, Transoesophageal echocardiography.

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	ADVANCED ELECTRO-CARDIOGRAPHY-II			
Course Code	CVT303			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:
To get familiar with advanced electro cardiography

Course Outcomes

CO1	To analyze and interpret the changes seen in the cardia after ischaemic damage.
CO2	To analyze and interpret diseases associated with electrolyte imbalances.
CO3	To analyze and interpret ventricular arrhythmias.
CO4	To analyze and interpret heart blocks.
CO5	To analyze and interpret cardioversions and defibrillators.

Text Book (s)

1. Textbook of Clinical Electrocardiography S N Chugh
2. The ECG Made Easy Book by John R Hampton
3. Guyton & Hall Text Book of Physiology
4. 12-Lead Ecg: The Art Of Interpretation by Casimiro Garcia

Reference Book (s)

1. Practical electrocardiography Book by Henry J. L. Marriott
2. Clinical Electrocardiography: A Textbook by Antonio Bay's de Luna
3. ECG TEXTBOOK: Theory and Practical Fundamentals 2017 by OPRET (Author)
4. Ganong Text Book of Physiology

Unit-1	8 hours
Evolution of electrocardiographic changes, Localization of ischemia or infarction, Noninfarction,Q waves, Primary and seconday T wave change	
Unit-2	8 hours
Electrolyte and metabolic ECG abnormalities, Cardiac arrhythmias, Ventricular premature beats, Supra-ventricular, tachycardias, Atrial flutter/fibrillation.	
Unit-3	8 hours
Ventricular Tachycardia/Ventricular fibrillation, Atrio Ventricular block, Prolonged PR interval.	
Unit-4	8 hours
Mobitz type 1 and 2 block, Complete heart block, Direct Current (DC) shock.	
Unit-5	8 hours
Defibrillator, Monophasic and biphasic shock, Technique of cardioversion, Indications for cardioversion.	

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Universal Human Values and Ethics			
Course Code	LLL101			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

Course Outcomes

CO1	To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
CO2	To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession
CO3	To help students understand the meaning of happiness and prosperity for a human being.
CO4	To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
CO5	To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

Text Book (s)

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics..

Reference Book (s)

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
5. A Nagraj, 1998, JeevanVidyaEkParichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.

8. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
9. E G Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
10. M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow.Reprinted 2008.

Course Content

Unit-1	8 hours
Course Introduction - Need, Basic Guidelines, Content and Process for Value Education 1. Understanding the need, basic guidelines, content and process for Value Education 2. Self - Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self - exploration 3. Continuous Happiness and Prosperity- A look at basic Human Aspirations 4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority 5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario 6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.	
Unit-2	8 hours
Understanding Harmony in the Human Being - Harmony in Myself 1. Understanding human being as a co-existence of the sentient 'I' and the material 'Body' 2. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha 3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) 4. Understanding the characteristics and activities of 'I' and harmony in 'I' 5. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of physical needs, meaning of Prosperity in detail	

6. Programs to ensureSanyam and Swasthya

Unit-3 8 hours

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship -

1. Understanding harmony in the Family- the basic unit of human interaction
2. Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*;

   Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship
3. Understanding the meaning of *Vishwas*; Difference between intention and competence
4. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship
5. Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals
6. Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*)- from family to world family!

Unit-4 8 hours

Understanding Harmony in the Nature and Existence - Whole existence as Co –existence -

1. Understanding the harmony in the Nature
2. Interconnectedness and mutual fulfillment among the four orders of nature-recyclability and self-regulation in nature
3. Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space
4. Holistic perception of harmony at all levels of existence

Unit-5 8 hours

Implications of the above Holistic Understanding of Harmony on Professional Ethics

1. Natural acceptance of human values
2. Definitiveness of Ethical Human Conduct
3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order.
4. Competence in Professional Ethics:

   a) Ability to utilize the professional competence for augmenting universal human order,

   b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models
5. Case studies of typical holistic technologies, management models and production systems
6. Strategy for transition from the present state to Universal Human Order:

a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers b) At the level of society: as mutually enriching institutions and organizations

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
20	80	100

Name of The Course	Cardiac Care Technician- I			
Course Code	CCT304			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	10	0	0	10

Course Objectives:
The basic objective of this course is to get familiar with cardiac care technology

Course Outcomes

CO1	To analyze and interpret Healthcare Service Providers and sample collection
CO2	To develop understanding of the concept of Healthy Living, procedures of Hand Hygiene and vaccination against common Infectious Diseases.
CO3	To understand and analyze the importance of proper and safe disposal of bio-medical waste & treatment.
CO4	To interpret and analyze diseases & risk factors behind occurrence of cardiac abnormalities.
CO5	To analyze and interpret ECG, echocardiography and defibrilation.

Text Book (s)

1. Parmar N.S., Health Education & Community Pharmacy CBS Publishers, Delhi.
2. Morton L. Kern, Morton J. Kern The Cardiac Catheterization Handbook Elsevier Health Sciences, 2011
3. Cardiac Monitor Technician Textbook: Theory and Hands On Approach By: Sultan, et al. Khan (Author), Faisal Khan MD

Reference Book (s)

1. Cardiac Monitor Technician Textbook: Theory and Hands On Approach By: Sultan, et al. Khan (Author), Faisal Khan MD
2. Morton L. Kern, Morton J. Kern The Cardiac Catheterization Handbook Elsevier Health Sciences, 2011

Course Content

CO1	Unit I Basic understanding of Healthcare Service Providers (primary, secondary & tertiary), cardiac department in a hospital, Understanding different parts of body, functions to be performed by CCT • To understand various types of procedures carried out in the cardiac catheterization laboratory and other labs carrying out diagnostic. • To gain broad understanding regarding Type of Sample • Sample Handling • Different equipment useful & correct method for blood sample collection • Correct procedure of sample transportation. • To exhibit Ethical Behavior and understanding of administrative functions of CCT • To understand the need for counseling patient and family before, during and after the procedure (s)	16 hours
CO2	Unit 2 To develop understanding of the concept of Healthy Living, procedures of Hand Hygiene • To develop techniques of Grooming, use of PPE • To ensure vaccination against common Infectious Diseases. To understand regarding environmental safety and security requirement at a health care unit. • To develop an understanding for handling the hazardous situation safely. • Describe basics of first aid to develop understanding and precautions to ensure self safety. • To understand the role of an CCT in monitoring healthy and safe environment. • To understand the safety measures for disabled, pediatric & geriatric patients,	16 hours

	impact of medical negligence in clinical management and their different types • To understand Surgical Site Infection and measures to prevent them, strategies which can be initiated for minimizing risk for patients • To develop broad understanding regarding role of hospital on the occurrence of a disaster • To understand fire prevention strategies and electrical safety measures which should be known to health worker
CO3	Unit 3 16 hours To gain understanding of importance of proper and safe disposal of bio-medical waste & treatment • To gain understanding of categories of biomedical waste,disposal of bio-medical waste – colour coding, types of containers, transportation of waste, etc. • To gain broad understanding of standards for bio-medical waste disposal, means of biomedical waste treatment • To understand the role of an infection control team To develop an understanding of Cardiovascular System • Basic understanding regarding size, shape, location and different layers of the heart, SA node and its functional significance, coronary circulation, different sounds produced in the heart and what is its significance.
CO4	Unit 4 16 hours To understand cardiovascular diseases & risk factors behind occurrence of cardiac abnormalities • To develop an understanding regarding various diseases of heart • To understand the significance of coronary circulation, systemic circulation , types of vessels etc. • To Identify the warning signs and symptoms of heart related disease condition
CO5	Unit 5 16 hours To develop understanding regarding ECG & it's procedure, different wave forms in ECG & common interpretation, Tilt Table Testing • To develop an understanding regarding Echocardiography, position of

	transducers, role of CCT while assisting cardiologist during Echocardiography / cardiac ultrasound To understand the importance of hand washing and its steps • To understand; Needle Stick Injuries (NSI) • To gain understanding regarding transmission based precautions and & its types, meaning of ventilation and state it's clinical significance, principles of linen management • To understand the process of cleaning, sterilization and disinfection of equipment and lab along with its significance • To understand various occupational hazards for a health worker Sensitization & overview regarding Cardiac Arrest • To understand regarding fundamentals of early defibrillation • To understand principles of BLS (Adult chain of survival, CABD's of giving CPR), • To understand operation of AED • Principles of Adult BLS/Child BLS/Infant BLS

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Treadmill exercise stress testing and 24 hour Ambulatory ECG recording(P)				
Course Code	CVT351				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	4	2

Course Objectives:
To get familiar with Treadmill exercise stress testing and 24 hour Ambulatory ECG recording.

Course Outcomes

CO1	Analyze and understand Functioning of Treadmill
CO2	Analyze and understand the Exercise test indications, contra-indications
CO3	Analyze and understand the Holter Recording.

Text Book (s) & Reference Book (s)

Stress Testing: Principles and Practice By Myrvin H.Ellestad

Course Content
Functioning of Treadmill, Exercise test indications, contra-indications and precautions &Holter Recording.

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	ECHOCARDIOGRAPHY (P)			
Course Code	CVT352			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	4	2

Course Objectives:
To get familiar with echocardiography

Course Outcomes

CO1	Analyze and understand the echocardiography machine
CO2	Analyze and understand the Doppler echocardiography machine
CO3	Analyze and understand the Doppler echocardiography machine
CO4	Analyze and understand regional wall motion abnormalities
CO5	Understand and interpret stroke volume and cardiac output assessment.

Text Book (s) & Reference Book (s)

1. Echo Made Easy-Sam Kaddoura
2. Echocardiography – Feigenbaum

Course Content

Echocardiography, Doppler echocardiography: pulsed, continuous wave and colour, Evaluation of systolic and diastolic left ventricular function, Regional wall motion abnormalities, Stroke volume and cardiac output assessment,.

Continuous Assessment Pattern

Internal	End Term Test (ETE)	Total Marks
30	70	100

Name of The Course	Cardiac Care Technician- I(Practical)				
Course Code	CCT353				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	6	3

Course Objectives:

The basic objective of this course is to get familiar with cardiac care technology

Course Outcomes

CO1	Analyze and understand sample collection
CO2	Analyze and understand safe medical practices
CO3	Analyze and understand safe waste disposal methods
CO4	Analyze and understand risk factors in cardiac diseases
CO5	To understand CPR/BLS

Text Book (s)

1. Principles and practice of Medicine by Davidson
2. Harrisons Text Book of Medicine

Course Content

Unit-1 Basic understanding of Healthcare Service Providers (primary, secondary & tertiary), cardiac department in a hospital, Understanding different parts of body, functions to be performed by CCT • To understand various types of procedures carried out in the cardiac catheterization laboratory and other labs carrying out diagnostic. • To gain broad understanding regarding Type of Sample • Sample Handling • Different equipment useful & correct method for blood sample collection • Correct procedure of sample transportation. • To exhibit Ethical Behavior and understanding of administrative functions of CCT • To understand the need for counseling patient and family before, during and after the procedure (s)
Unit-2 To develop understanding of the concept of Healthy Living, procedures of Hand Hygiene • To develop techniques of Grooming, use of PPE • To ensure vaccination against common Infectious Diseases. To understand regarding environmental safety and security requirement at a health care unit. • To develop an understanding for handling the hazardous situation safely. • Describe basics of first aid to develop understanding and precautions to ensure self safety. • To understand the role of an CCT in monitoring healthy and safe environment. • To understand the safety measures for disabled, pediatric & geriatric patients, impact of medical negligence in clinical management and their different types • To understand Surgical Site Infection and measures to prevent them, strategies which can

be initiated for minimizing risk for patients • To develop broad understanding regarding role of hospital on the occurrence of a disaster • To understand fire prevention strategies and electrical safety measures which should be known to health worker
Unit-3 To gain understanding of importance of proper and safe disposal of bio-medical waste & treatment • To gain understanding of categories of biomedical waste,disposal of bio-medical waste – colour coding, types of containers, transportation of waste, etc. • To gain broad understanding of standards for bio-medical waste disposal, means of biomedical waste treatment • To understand the role of an infection control team To develop an understanding of Cardiovascular System • Basic understanding regarding size, shape, location and different layers of the heart, SA node and its functional significance, coronary circulation, different sounds produced in the heart and what is its significance
Unit-4 To understand cardiovascular diseases & risk factors behind occurrence of cardiac abnormalities • To develop an understanding regarding various diseases of heart • To understand the significance of coronary circulation, systemic circulation , types of vessels etc. • To Identify the warning signs and symptoms of heart related disease condition
Unit-5 To develop understanding regarding ECG & it's procedure, different wave forms in ECG & common interpretation, Tilt Table Testing • To develop an understanding regarding Echocardiography, position of transducers, role of CCT while assisting cardiologist during Echocardiography / cardiac ultrasound To understand the importance of hand washing and its steps • To understand; Needle Stick Injuries (NSI) • To gain understanding regarding transmission based precautions and & its types, meaning

of ventilation and state it's clinical significance, principles of linen management • To understand the process of cleaning, sterilization and disinfection of equipment and lab along with its significance • To understand various occupational hazards for a health worker Sensitization & overview regarding Cardiac Arrest • To understand regarding fundamentals of early defibrillation • To understand principles of BLS (Adult chain of survival, CABD's of giving CPR), • To understand operation of AED • Principles of Adult BLS/Child BLS/Infant BLS

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
30		70	100

	Cardiac catheterization laboratory basics				
Course Code	CVT304				
Prerequisite					
Corequisite					
Antirequisite					
	L	T	P	C	
	3	0	0	3	

Course Objectives: To get familiar with Cardiac catheterization laboratory basics.

Course Outcomes

CO1	Students will be able to understand, differentiate and use different types of catheters, equipment used in a cathlab and their sterilization
CO2	Students will be able to understand how to record intra cardiac pressures and its application.
CO3	Students will be able to understand cardiac output determination methods and shunt detection.
CO4	Students will be able to understand Coronary angiography and its procedure.

CO5	Students will be able to understand the procedure of Left Ventriculography and right heart catheterization.

Text Book (s):

1. Donald S. Baim Grossman's Cardiac Catheterization, Angiography, and Intervention, Volume 1 Lippincott Williams & Wilkins, 2005

2. Morton L. Kern, Morton J. Kern The Cardiac Catheterization Handbook Elsevier Health Sciences, 2011

3 .Echocardiography – Feigenbaum

Reference Book (s):

1. Donald S. Baim Grossman's Cardiac Catheterization, Angiography, and Intervention, Volume 1 Lippincott Williams & Wilkins, 2005.
2. Morton L. Kern, Morton J. Kern The Cardiac Catheterization Handbook Elsevier Health Sciences, 2011

Unit-1 Introduction 8 hours
Catheters & Catheterization- Types of catheters, catheter cleaning and packing, Techniques of sterilization; advantages and disadvantages of each, setting up the cardiac catheterization laboratory for a diagnostic study, Table movement, Image intensifier movement, Image play back.
Unit-2 8 hours
Intracardiac Pressures- Intra cardiac pressures, Pressure recording systems, Fluid filled catheters versus catheter tipped manometers, artifacts, damping, ventricularization, Pressure gradient recording pullback, peak-to peak.
Unit-3 8 hours
Determination of Cardiac output- Cardiac output determination, Thermo dilution method, Oxygen dilution method, Principles of oximetry, Shunt detection and calculations.
Unit-4 8 Hours
Angiography- Coronary angiography, Coronary angiographic catheters, Use of the manifold, Angiographic views in coronary angiography, Laboratory preparation for coronary angiography.
Unit-5 8 Hours
Ventriculography- Left Ventriculography – catheters, views, use of the injector, Right heart catheterization and

Angiography

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	CARDIAC CATHETERIZATION LABORATORY ADVANCED			
Course Code	CVT305			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives: To get familiar with cardiac catheterization laboratory advanced.

Course Outcomes

CO1	Students will be able to identify and evaluate Fundamental principles of Aortic angiography, Coronary angioplasty, Balloon Mitral valvuloplasty.
CO2	Students will be able to identify and evaluate Fundamental principles of Coronary angioplasty.
CO3	Students will be able to identify and evaluate Techniques and hardware used in BMV, Setting up the laboratory for a BMV case Technique and equipment used for trans-septal puncture.
CO4	Students will be able to identify and evaluate Thromboembolic disease, Indications and use of venacaval filters, Techniques of thrombolysis.
CO5	Students will be able to identify and evaluate Catheters used in electrophysiology studies, Connection of catheters.

Text Book (s):

1. Donald S. Baim Grossman's Cardiac Catheterization, Angiography, and Intervention, Volume 1 Lippincott Williams & Wilkins, 2005.
2. Morton L. Kern, Morton J. Kern The Cardiac Catheterization Handbook Elsevier Health Sciences, 2011.
3. Echocardiography – Feigenbaum

Reference Book (s):

1. Donald S. Baim Grossman's Cardiac Catheterization, Angiography, and Intervention, Volume 1 Lippincott Williams & Wilkins, 2005.
2. Morton L. Kern, Morton J. Kern The Cardiac Catheterization Handbook Elsevier Health Sciences, 2011

Unit-1 Introduction 8 hours
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.
Unit-2 8 Hours
Coronary angioplasty (PTCA), Equipment and harware used in PTCA: Guiding cathetersGuidewires, 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 devices used, Sizing of devices, Coil.
Unit-3 8 Hours
Balloon Mitral valvuloplasty (BMV): Techniques and hardware used in BMV, Setting up the laboratory for a BMV case Technique and equipment used for trans-septal puncture, Recording of transmitral pressure gradients, Management of cardiac tamponade, Peripheral interventions, 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 counter pulsation, Indications for IABP use, setting up the IABP system.
Unit-4 8 Hours
Thromboembolic disease, Indications and use of venacaval filters, Techniques of thrombolysis – drug and catheters used, 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 patient.
Unit-5 8 Hours
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.

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Research Methodology & Biostatistics			
Course Code	CVT306			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives: This course deals with the study of Research Methodology & Biostatistics.

Course Outcomes

CO1	Students will be able to illustrate the basic principles of research.
CO2	Students will be able to interpret the research findings.
CO3	Students will be able to illustrate the basic of statistical methods.
CO4	Students will be able to illustrate the basic of biostatistics and research tools.
CO5	Help the students to apply research knowledge in presenting biological research.

Text Book (s):

1. The Analysis of Biological Data (2nd edition) by Whitlock & Schluter
2. TB of Biostatisics and Research methodology by Karthikeyan,R.M .Chathurvedi,R.M.Bhosale.

Reference Book (s):

1. Textbook of Methods in Biostatistics by B.K.Mahajan 7th Edition
2. Textbook of Biostatistics by B.Annadurai

Unit-1 Introduction	8 hours
Introduction to research methods , Identifying research problem.	
Unit-2	8 hours
Ethical issues in research, Research design.	
Unit-3	8 hours
Basic Concepts of Biostatistics, Types of Data, Research tools and Data collection methods.	
Unit-4	8 hours
Sampling methods, Probability rules & Probability distributions (Normal & Binomial).	
Unit-5	8 hours

Developing a research proposal.

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Cardiac Care Technician-II			
Course Code	CCT307			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	8	0	0	8

Course Objectives: To get familiar with Cardiac Care Technology.

Course Outcomes

CO1	To analyze and interpret the principles of ambulatory ECG, TMT and transesophageal echocardiography.
CO2	To analyze and interpret the principles of cardiac pacemakers.
CO3	To understand and analyze equipments used in the cardiac catheterization lab.
CO4	To understand difference between quality control and assurance.
CO5	Understand use and importance of records and consent. Understand abbreviations and symbols.

Text Book (s):

1. Cardiac Monitor Technician Textbook: Theory and Practical Fundamentals.
2. Morton L. Kern, Morton J. Kern The Cardiac Catheterization Handbook Elsevier Health Sciences, 2011.
3. Cardiac Monitor Technician Textbook: Theory and Hands On Approach By: Sultan, et al. Khan (Author), Faisal Khan MD.

Reference Book (s):

1. 1. Morton L. Kern, Morton J. Kern The Cardiac Catheterization Handbook Elsevier Health Sciences, 2011.
2. Cardiac Monitor Technician Textbook: Theory and Hands On Approach By: Sultan, et al. Khan (Author), Faisal Khan MD

Unit-1 Introduction	16 hours

To understand about ambulatory ECG and it's significance, types of Ambulatory ECG. To understand how to prepare and position the patient for ECG. Understand proper placement of leads on chest wall for ECG. To understand the various complications associated with Exercise ECG

Tread mill test
To develop an understanding regarding treadmill test, different type of Stress TEST, procedure for carrying out stress Echo including the placement of leads during the test. To understand how to prepare the patient for a cardiac stress echo, DSE, etc.

Understand various differences in the findings of a normal and an ischemic heart. To understand the working & procedure of an isotope stress test. To develop broad understanding regarding

necessary precautions which to be taken while performing an isotope stress test.

To understand regarding Trans esophageal echocardiography, it's types, scope, indication for procedure & associated complications. To gain broad understanding regarding findings which is to be expected during the procedure. To understand the safety & privacy aspect of this procedure for the patient. To understand the roles and responsibilities of a technician during the procedure.

To understand to whom to contact in case if there is a need of replenishing supplies. To understand the /guidelines for medical and diagnostic supplies and content of the kit. To develop an understanding regarding need of maintaining record of supplies

Unit-2	16 Hours

Introduction to Pacemaker & Leads

To gain understanding regarding the artificial pacemaker & temporary pacemakers, significance behind the implantation of an artificial pacemaker, cardioverter defibrillator and it's significance. To carry out initial assessment of patient before the implantation of a pace maker.

To understand factors which to be considered when the patient is on a pacemaker. To gain broad understanding regarding warning signs of pacemaker infection.

Role of CCT during Implant Of Temporary Pacemakers

To differentiate between artificial and temporary pacemaker implantation procedure. To understand regarding temporary trans venous pacing. To understand the common problems which may occur during the insertion of pacemaker, pace maker syndrome. To gain understanding regarding complications to be expected during the procedure.

To understand the significance of investigations which should be carried out pre and post implantation. To gain understanding regarding indication for a temporary pace making. To understand the significance of elective pace making. To understand procedure for applying an

External pacemaker, common complication during implantation of temporary pacemaker, emergency measures which is to be taken in case of pacemaker failure

Unit-3	16 hours

Introduction to Cardiac Related Equipment

To enlist the commonly used cath lab equipment, Use of following equipment C arm & u arm. x ray tube. X ray detecting device.x ray switching and pulse controller. Digital image processor, Fluoroscopic imaging system,• Physiologic recorder, Contrast powder injector ray table. Crash cart and defibrillator. Intubation equipment, Central vein catheter, Cardiac drugs' Sterile equipment and supplies, Liquid cooling system, etc.To develop broad understanding regarding major equipment used in the cath lab setting and its operating methods, technical specification of common equipment in cath lab. Understand the regulatory framework for medical equipment.

To develop an understanding regarding Pericardiocentesis and its types.

To develop an understanding regarding Pericardiocentesis and it's types .To understand procedure for Pericardiocentesis and requisite equipment, indications and complications of needle peri-cardiocentesis, indications and complications of open pericardiocentesis. To understand role of a technician while carrying out the procedure.

Unit-4 16 hours

Understand the meaning of relations and types of relationship. To understand effective working relationships with the people external to the team, with which the individual works on a regular basis. To understand the effect of boundary violation in technician client relationships.

To understand the code of ethics for cardiac care technicians.

To understand the types of team in health care organization. To understand the elements and principles of team work and team based health care. Understand how to manage the conflict in health care facility management of work so as to meet professional expectations. To understand the significance of keeping the hospital clean. To understand the significance of maintaining confidentiality in work environment, managing stress.

Unit-5 16 hours

Monitor And Assure Quality.

To understand the significance of quality, perception & its dimension, components of quality system, stages & elements quality system. Understand the process of quality system. To understand the significance of attending CME's for technician.

To develop a broad understanding regarding. (1) Hospital Information System. (2) Quality Improvement Plan. (3) Total Quality Management. To understand difference between quality control and assurance. To understand the factors which influences quality of care.

Consent, Documentation & Records.

Understand guidelines for documentation. Learn various types of records of importance for Cardiac Care Technician. Understand use and importance of records and consent. Understand abbreviations and symbols. Enter, transcribe, record, store, or maintain information in written or electronic/magnetic form.

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Cardiac Catheterization Laboratory Basics (Practical)			
Course Code	CVT353			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	4	2

Course Objectives:
To get familiar with Cardiac catheterization laboratory basics.

Course Outcomes

CO1	Students will be able to evaluate Fundamental principles of Aortic angiography, Coronary angioplasty, Balloon Mitral valvuloplasty etc.
CO2	Students will be able to evaluate Fundamental principles of Coronary angioplasty.
CO3	Students will be able to evaluate Fundamental principles of Aortic angiography, Balloon Mitral valvuloplasty etc.

Text Book (s):

1. Donald S. Baim Grossman's Cardiac Catheterization, Angiography, and Intervention, Volume 1 Lippincott Williams & Wilkins,
2. Morton L. Kern, Morton J. Kern The Cardiac Catheterization Handbook Elsevier Health Sciences, 2011.
3. Patrick Kay, Manel Sabate, Marco A. Costa Cardiac Catheterization and Percutaenous Interventions Taylor & Francis, 2004.
4. Echocardiography – Feigenbaum.

Reference Book (s):

1. Donald S. Baim Grossman's Cardiac Catheterization, Angiography, and Intervention, Volume Lippincott Williams & Wilkins, 2005.

Unit-1 Introduction
Identify and evaluate the techniques used for cardiac catheterization.
Unit-2
Identify and evaluate the techniques used for angiography
Unit-3
Identify and evaluate the techniques used for cardiac intervention

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks

30	70	100

Name of The Course	Cardiac Catheterization Laboratory Advanced (Practical)				
Course Code	CVT354				
Prerequisite					
Corequisite					
Antirequisite					
	L	T	P	C	
	0	0	4	2	

Course Objectives: To get familiar with cardiac catheterization laboratory advanced.

Course Outcomes

CO1	Students will be able to evaluate Fundamental principles of Aortic angiography, Coronary angioplasty, Balloon Mitral valvuloplasty.
CO2	Students will be able to evaluate Fundamental principles of Coronary angioplasty.
CO3	Students will be able to evaluate Fundamental principles of Aortic angiography,Balloon Mitral valvuloplasty.

Text Book (s):

1. Donald S. Baim Grossman's Cardiac Catheterization, Angiography, and Intervention, Volume 1 Lippincott Williams & Wilkins.
2. Morton L. Kern, Morton J. Kern The Cardiac Catheterization Handbook Elsevier Health Sciences, 2011.
3. Patrick Kay, Manel Sabate, Marco A. Costa Cardiac Catheterization and Percutaenous Interventions Taylor & Francis, 2004.
4. Echocardiography – Feigenbaum

Reference Book (s):

1. Donald S. Baim Grossman's Cardiac Catheterization, Angiography, and Intervention, Volume Lippincott Williams & Wilkins, 2005.

Unit-1 Introduction
Identify and evaluate the techniques used for cardiac catheterization.
Unit-2
Identify and evaluate the techniques used for angiography.
Unit-3
Identify and evaluate the techniques used for cardiac intervention.

Continuous Assessment Pattern

Internal	External (ETE)	Total Marks
30	70	100

Name of The Course	Cardiac Care Technician-II (P)				
Course Code	CCT355				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		0	0	12	6

Course Objectives: To get familiar with Cardiac Care Technology.

Course Outcomes

CO1	To understand the significance of various stress tests
CO2	To understand pacemakers.
CO3	To understand pericardiocentesis and hospital equipments
CO4	To understand the meaning of relations and types of relationship.
CO5	To understand documentation and consent

Text Book (s):

1. Cardiac Monitor Technician Textbook: Theory and Practical Fundamentals.
2. orton L. Kern, Morton J. Kern The Cardiac Catheterization Handbook Elsevier Health Sciences, 2011.
3. Patrick Kay, Manel Sabate, Marco A. Costa Cardiac Catheterization and Percutaenous Interventions Taylor & Francis, 2004.
4. Cardiac Monitor Technician Textbook: Theory and Hands On Approach By: Sultan, et al. Khan (Author), Faisal Khan MD.

Reference Book (s):

1. Donald S. Baim Grossman's Cardiac Catheterization, Angiography, and Intervention, Volume Lippincott Williams & Wilkins, 2005.

Unit-1 Introduction
To understand about ambulatory ECG and it’s significance, types of Ambulatory ECG.

To understand how to prepare and position the patient for ECG. Understand proper placement of leads on chest wall for ECG. To understand the various complications associated with Exercise ECG

Tread mill test

To develop an understanding regarding treadmill test, different type of Stress TEST, procedure for carrying out stress Echo including the placement of leads during the test. To understand how to prepare the patient for a cardiac stress echo, DSE, etc.

Understand various differences in the findings of a normal and an ischemic heart. To understand the working & procedure of an isotope stress test. To develop broad understanding regarding necessary precautions which to be taken while performing an isotope stress test.

To understand regarding Trans esophageal echocardiography, it's types, scope, indication for procedure & associated complications. To gain broad understanding regarding findings which is to be expected during the procedure. To understand the safety & privacy aspect of this procedure for the patient. To understand the roles and responsibilities of a technician during the procedure.

To understand to whom to contact in case if there is a need of replenishing supplies. To understand the guidelines for medical and diagnostic supplies and content of the kit. To develop an understanding regarding need of maintaining record of supplies

Unit-2

Introduction to Pacemaker & Leads

To gain understanding regarding the artificial pacemaker & temporary pacemakers, significance behind the implantation of an artificial pacemaker, cardioverter defibrillator and it's significance. To carry out initial assessment of patient before the implantation of a pace maker.

To understand factors which to be considered when the patient is on a pacemaker. To gain broad understanding regarding warning signs of pacemaker infection.

Role of CCT during Implant Of Temporary Pacemakers

To differentiate between artificial and temporary pacemaker implantation procedure. To understand regarding temporary trans venous pacing. To understand the common problems which may occur during the insertion of pacemaker, pace maker syndrome. To gain understanding regarding complications to be expected during the procedure.

To understand the significance of investigations which should be carried out pre and post implantation. To gain understanding regarding indication for a temporary pace making. To understand the significance of elective pace making. To understand procedure for applying an

External pacemaker, common complication during implantation of temporary pacemaker, emergency measures which is to be taken in case of pacemaker failure

Unit-3

Introduction to Cardiac Related Equipment

To enlist the commonly used cath lab equipment, Use of following equipment C arm & u

arm. x ray tube. X ray detecting device.x ray switching and pulse controller. Digital image processor, Fluoroscopic imaging system,• Physiologic recorder, Contrast powder injector ray table. Crash cart and defibrillator. Intubation equipment, Central vein catheter, Cardiac drugs' Sterile equipment and supplies, Liquid cooling system, etc.To develop broad understanding regarding major equipment used in the cath lab setting and its operating methods, technical specification of common equipment in cath lab. Understand the regulatory framework for medical equipment.

To develop an understanding regarding Pericardiocentesis and its types.

To develop an understanding regarding Pericardiocentesis and it's types .To understand procedure for Pericardiocentesis and requisite equipment, indications and complications of needle peri-cardiocentesis, indications and complications of open pericardiocentesis. To understand role of a technician while carrying out the procedure.

Unit-4

Understand the meaning of relations and types of relationship. To understand effective working relationships with the people external to the team, with which the individual works on a regular basis. To understand the effect of boundary violation in technician client relationships.

To understand the code of ethics for cardiac care technicians.

To understand the types of team in health care organization. To understand the elements and principles of team work and team based health care. Understand how to manage the conflict in health care facility management of work so as to meet professional expectations. To understand the significance of keeping the hospital clean. To understand the significance of maintaining confidentiality in work environment, managing stress.

Unit-5

Monitor And Assure Quality.

To understand the significance of quality, perception & its dimension, components of quality system, stages & elements quality system. Understand the process of quality system. To understand the significance of attending CME's for technician.

To develop a broad understanding regarding. (1) Hospital Information System. (2) Quality Improvement Plan. (3) Total Quality Management. To understand difference between quality control and assurance. To understand the factors which influences quality of care.

Consent, Documentation & Records.

Understand guidelines for documentation. Learn various types of records of importance for Cardiac Care Technician. Understand use and importance of records and consent. Understand abbreviations and symbols. Enter, transcribe, record, store, or maintain information in written or electronic/magnetic form.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
30		70	100

CVT401	Clinical internship including project work	20 credit	
Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
30		70	100

CVT402	Clinical internship including project work	20 credit	
Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
30		70	100