GALGOTIAS UNIVERSITY

Syllabus of

B.Sc. Cardiovascular Technology

Name of School: School of Medical and Allied Sciences

Department: Department of Paramedical and Allied Health Sciences

Year: 2019-22

GALGOTIAS UNIVERSITY

(Under the Uttar Pradesh Private Universities Act No. 12 of 2019)

Syllabus (B.Sc. CVT) 2019-20

Curriculum and syllabus
2019-2020

School of Medical and Allied Sciences
Program: Cardiovascular Technology

Semester 1									
Sl. No.	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	BCVT1001	General Anatomy-I	3	0	0	3	10	20	70
2	BCVT1002	General Physiology-I	3	0	0	3	10	20	70
3	BCVT1003	Biochemistry-I	3	0	0	3	10	20	70
4	FENG1001	Functional English-I	3	0	0	3	10	20	70
5	ENVS1001	Energy & Environmental Science	3	0	0	3	10	20	70
6	BCVT1051	General Anatomy-I (Practical)	0	0	2	1	30		70
7	BCVT1052	General Physiology-I (Practical)	0	0	2	1	30		70
8	BCVT1053	Biochemistry-I (Practical)	0	0	2	1	30		70
9	FENG1002	Functional English-I (Practical)	0	0	2	1	30		70
		Total				19			

Semester II									
Sl. No.	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	BCVT2001	General Anatomy-II	3	0	0	3	10	20	70
2	BCVT2002	General Physiology-II	3	0	0	3	10	20	70
3	BCVT2003	Cardiac Pharmacology and Clinical Treatment	3	0	0	3	10	20	70
4	BCVT2004	Cardiopathophysiology-I	3	0	0	3	10	20	70
5	FENG1003	Functional English-II	3	0	0	3	10	20	70
6	BCVT2051	Cardiac Pharmacology and Clinical Treatment (Lab)	0	0	2	1	30		70
7	FENG1004	Lab Functional English II (Lab)	0	0	2	1	30		70
		Total				17			

Semester III									
Sl. No.	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	BCVT3001	Cardio Pathophysiology-II	3	0	0	3	10	20	70
2	BCVT3002	Microbiology	3	0	0	3	10	20	70
3	BCVT3003	Medical Electronics, biophysics and computer usage relevant to Cardiac Technology-I	3	0	0	3	10	20	70
4	BCVT3004	Basic Electrocardiography-I	3	0	0	3	10	20	70
5	COMP1111	Computer Fundamentals	3	0	0	3	10	20	70
6	BCVT3051	Microbiology (P)	0	0	2	1	30		70
7	BCVT3052	Medical Electronics, biophysics and computer usage relevant to Cardiac Technology-I (P)	0	0	2	1	30		70
8	BCVT3053	Basic Electrocardiography-I (P)	0	0	2	1	30		70
9	COMP1112	Computer Fundamentals (P)	0	0	2	1	30		70
		Elective (Theory) [Any one]							
10	BCVT3005	Infection Control and Prevention-I	2	0	0	2	10	20	70
11	BCVT3006	CPR/Cardiac Emergency-I							
		Total				21			

Semester IV									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	BCVT4001	Medical Electronics, biophysics and computer usage relevant to Cardiac Technology -II	3	0	0	3	10	20	70
2	BCVT4002	Basic Electrocardiography-II	3	0	0	3	10	20	70
3	BCVT4003	Advanced Electrocardiography-I	3	0	0	3	10	20	70
4	BCVT4051	Medical Electronics, biophysics and computer usage relevant to Cardiac Technology -II (P)	0	0	2	1	30		70
5	BCVT4052	Basic Electrocardiography-II (P)	0	0	2	1	30		70
		Elective (Theory) [Any one]							
6	BCVT4004	Infection Control and Prevention-II	2	0	0	2	10	20	70
7	BCVT4005	CPR/Cardiac Emergency -II							
		Elective (Online) [Any one]							
8	SWAYAM	Molecular Biology	0	0	0	0	0	0	0
9	edX	Introduction To Biomedical Imagery	0	0	0	0	0	0	0
		Total				13			

Semester V									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1.	BCVT5001	Treadmill exercise stress testing and 24 hour recording	3	0	0	3	10	20	70
2.	BCVT5002	Echocardiography	3	0	0	3	10	20	70
3.	BCVT5003	Advanced Electrocardiography-II	3	0	0	3	10	20	70
4.	LLLL1001	Universal Human Value and Ethics	3	0	0	3	10	20	70
5.	BCCT5004	Cardiac Care Technician-I	8	0	0	8	10	20	70
6.	BCVT5051	Treadmill exercise stress testing and 24 hour recording (P)	0	0	2	1	30		70
7.	BCVT5052	Echocardiography (P)	0	0	2	1	30		70
8.	BCCT5053	Cardiac Care Technician-I (P)	0	0	4	2	30		70
ELECTIVES(Theory)									
9.	BCVT5005	Ultrasonography	2	0	0	2	10	20	70
10.	BCVT5006	Doppler							

ELECTIVES (Online)									
11.	SWAYAM	Health care organisation & delivery	0	0	0	0	0	0	0
12.	edX	Nutrition Health & Macronutrients and over nutrition							
		Total				26			

Semester VI									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	BCVT6001	Cardiac catheterization laboratory basics	3	0	0	3	10	20	70
2	BCVT6002	Cardiac catheterization laboratory advanced	3	0	0	3	10	20	70
3	BCVT6003	Research Methodology and Biostatistics	3	0	0	3	10	20	70
4	BCCT6004	Cardiac Care Technician-II	8	0	0	8	10	20	70
5	BCVT6051	Cardiac catheterization laboratory basics (P)	0	0	2	1	30		70
6	BCVT6052	Cardiac catheterization laboratory advanced (P)	0	0	2	1	30		70
7	BCCT6053	Cardiac Care Technician-II (P)	0	0	4	2	30		70
8	BCVT6053 (Or)	Cardiology (Project)	0	0	2	1	30		70
	BCVT6054 (Or)	ECG (Project)							
	BCVT6055 (Or)	Stress testing (Project)							
	BCVT6056	Cardiac Output (Project)							
		Total				22			

Semester VII									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	BCVT7001	Clinical Internship including Project Work (06 Month)	0	0	40	20			100
		Total				20			
Semester VIII									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	BCVT8001	Clinical Internship including Project Work (06 Month)	0	0	40	20			100
		Total				20			

Detailed Syllabus

Name of The Course	**General anatomy-I**				
Course Code	**BCVT1001**				
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

Reference websites:

1. https://www.ncbi.nlm.nih.gov
2. https://www.sciencedirect.com
3. https://theodora.com
4. https://www.dummies.com
5. https://www.healthdirect.gov.au

Unit-1	**8 hours**
Introduction: Human body as a whole **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	**8 hours**
Locomotion and Support **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	**8 hours**
Cardiovascular System **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	**8 hours**
Gastro-intestinal System	

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 8 hours **Respiratory System** **Parts of RS, nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments, Histology of trachea, lung and pleura, Names of paranasal air sinuses.**
Unit 6: Recent advancement 8 hours **Respiratory epithelium, surface anatomy of thorax, surface anatomy of back**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	**General physiology-I**			
Course Code	**BCVT1002**			
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 and 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-Meiosis, Mitosis**

Unit-2 8 hours **The important physio-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 of estimation 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.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Biochemistry-I				
Course Code	BCVT1003				
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

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 Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	**20**	**70**	**100**

Name of The Course	**Functional English I**			
Course Code	**FENG1001**			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	**0**	**0**	**3**

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 Hours
• 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 Hours
• 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 Hours
• Official Communication: Letter, Memo, Agenda and Minutes of meeting, notice and circular, and email Job Application,

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	**20**	**70**	**100**

Name of The Course	**Energy and Environmental Sciences**
Course Code	**ENVS1001**
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 Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
10	**20**	**70**	**100**

Name of The Course	General Anatomy-I (P)			
Course Code	BCVT1051			
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)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	General Physiology-II (P)			
Course Code	BCVT1052			
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
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 Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	**Basic Biochemistry-I (P)**			
Course Code	**BCVT1053**			
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 Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Lab Functional English-I			
Course Code	FENG1002			
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)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	General anatomy-II			
Course Code	BCVT2001			
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 Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	General Physiology-II

Course Code	**BCVT2002**			
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 Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	**Cardiac Pharmacology and Clinical Treatment**			
Course Code	**BCVT2003**			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	**0**	**0**	**3**

Course Objectives: To understand the Cardiac 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 Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	**Cardio Pathophysiology-I**			
Course Code	**BCVT2004**			
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 Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Functional English II			
Course Code	FENG1003			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

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 Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	**Cardiac Pharmacology and Clinical Treatment (P)**			
Course Code	**BCVT2051**			
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 Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
30		70	100

Name of The Course	Lab Functional English-II			
Course Code	FENG1004			
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 Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
30		70	100

Name of The Course	**Cardio Pathophysiology-II**			
Course Code	**BCVT3001**			
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 Dis**
CO5	**To analyze and interpret Congenital heart disease**
CO6	**To improve and maximize the knowledge of recent advancement in disease and its treatment**

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

Reference websites:

1. https://dx.doi.org/10.1155/2015/138148
2. https://www.medicalnewstoday.com
3. https://www.who.int
4. https://www.ncbi.nlm.nih.gov

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	**8 hours**
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
Unit 6: 8 hours **Recent advancement: Coronavirus, COPD, Recent advancement on pathophysiology, diagnostic and therapeutic insights in cardiac dysfunction induced by antineoplastic drug.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	**20**	**70**	**100**

Name of The Course	**Microbiology**			
Course Code	**BCVT3002**			
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.**
CO6	**To develop an understanding of recent advances in Covid_19**

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

Continuous Assessment Pattern	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,Aspergillussp.,Diagnosis.** **Parasitology: Introduction,classification, Diagnosis. It role in heart disease- trypanosome,toxoplasma,trichura, Chaga'sdisease,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**
	Unit 6 **8 hours** **Covid_19: Recent advances on the Coronavirus, Characteristics, virus-host interactions, mode of transmission and possible treatments.**

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	**20**	**70**	**100**

Name of The Course	**Medical electronics, biophysics and computer usage relevant to cardiac technology-I**			
Course Code	**BCVT3003**			
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 transcuders
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
CO6 To understand the latest techniques HRCT (high resolution chest ct)

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.

4.PRINCIPLE & TECHNIQUES OF BIOPHYSICS BY N ARUMUGAM.

5.CARDIAC PACING &DEFIBRILLATION BY HAYES,DAVID

6..THE BLOOD PRESSURE BY CLVRISTIAN GOODMAN

Reference Book (s):

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

Unit-1 **8 hours** **Introduction to medical physics, concept, uses, Implications, trends in diagnosis.**	8 Hours
Unit-2 **Blood pressure recording, Pressure transducers, use in diagnosis and therapeutics.**	**8 hours**
Unit-3 **Defibrillators, Cathode ray tubes and physiological Monitors.**	**8 hours**
Unit-4 **Impedenceplethysmography: monitoring, Guidelines, Interpretation, Monitoring, implications in various circumstances.**	**8 hours**
Unit-5 **Pulse oximetry: monitoring, Guidelines, Interpretation, Monitoring, implications in various circumstances.**	**8 hours**
Unit-6 **Recent advances in:** **HRCT** **CLINICAL INDICATIONS** **THORACIC ANATOMY** **TYPES OF CT IMAGING**	**8 hours**

WINDOWS OF CT IMAGING FINDINGS OF HRCT

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	**20**	**70**	**100**

Name of The Course	**Basic Electrocardiography-I**				
Course Code	**BCVT3004**				
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**
CO6	**To understand the latest techniques in the ECG recordings**

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 Centralterminal, Augmented limb leads**
Unit-4 **8 hours** **The hexaaxial reference frame and electrical axis with reference to diagnosis and management of cardiovascular complications.**
Unit-5 **8 hours** **Recording adult and pediatric ECGs and its interpretation in the treatment of heart related illness.**
Unit-6 **8 hours** **Recent Advances in Remote ECG monitoring: Guidelines, Interpretation, Monitoring, implications in various specific circumstances with examples.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	**20**	**70**	**100**

Name of The Course	**Computer fundamentals**			
Course Code	**COMP1111**			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	]	C
	3	**0**	(	**3**

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, Reema Thareja
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 **8 hours** 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 **8 hours** **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 **8 hours** **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 **8 hours** **Computer applications in clinical studies.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	**20**	**70**	**100**

Name of The Course	**Microbiology (P)**			
Course Code	**BCVT3051**			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	l	C
	0	**0**	**2**	**1**

Course Objectives: **To familiar with practical aspects of microbiology.**

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

Name of The Course	**Medical electronics, biophysics and computer usage relevant to cardiac technology-I (P)**			
Course Code	**BCVT3052**			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	l	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 1. Manual, Semi Automatic 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 Assessment (IA)	MTE	End Term Test (ETE)	Total Marks
30		**70**	**100**

Name of The Course	**Electrocardiography (P)**			
Course Code	**BCVT3053**			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	1	C
	0	**0**	**2**	**1**

Course Objectives: **To get familiar with Basic Electrocardiography.**

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Course Outcomes

CO1	**To analyze and understand the ECG machine.**
CO2	**To analyze and understand 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. Donald S. 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, Manel Sabate, 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 Assessment (IA)	MTE	End Term Test (ETE)	Total Marks
30		**70**	**100**

Name of The Course	**Computer Fundamentals (P)**			
Course Code	**COMP1112**			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	I	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 & Priti Sinha

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
Unit-2
Unit-3
Unit-4
Unit-5

Continuous Assessment Pattern

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

Name of The Course	**Infection Control and prevention-I**			
Course Code	**BCVT3005**			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	2	**0**	**0**	**2**

Course Objectives :The basic objective of this course is to get familiar with infection control and prevention practices in health care practices.

Course Outcomes

CO1	**Practice Standards of care in infection prevention and Guidelines for Infection Control in emergency Settings**
CO2	**Apply knowledge in Transmission and control of infection in health care settings**
CO3	**Apply knowledge in practice and use of engineering and work practice controls to reduce the opportunity for patient and healthcare worker exposure to potentially infectious material in all healthcare settings**
CO4	**Select and use of barriers and/or personal protective equipment for preventing patient and healthcare worker contact with potentially infectious material**
CO5	**Apply knowledge in principles and practices for cleaning, disinfection, and sterilization**

Text Book (s):

1. ICMR(2008) guidelines for good clinical laboratory practices. Computer Fundamentals, Rashmi Sharma
2. Hospital waste Management, Chapter 13,PARK'S Textbook of Preventive and Social Medicine,18th Edition

Reference Book (s):

1. NIH:DIADS guidelines for Good Clinical Laboratory Practice Standerds,2011
2. WHO: Good Clinical Laboratory Practice (GCLP),2009

Unit-1 **8 hours** **Standards of care in infection prevention - Guidelines for Infection Control in emergency Settings**
Unit-2 **8 hours** **Transmission and control of infection in health care settings** **Transmission of infections - Prevention: Breaking the "Chain of Transmission"**
Unit-3 **8 hours** **Use of engineering and work practice controls to reduce the opportunity for patient and healthcare worker exposure to potentially infectious material in all healthcare settings** **High risk practices and procedures (by exposure type) capable of causing healthcare acquired infection with bloodborne pathogens-Safe injection practices and procedures designed to prevent disease transmission from patient to patient and healthcare worker to patient-Evaluation/Surveillance of exposure incidents -Engineering controls -Work practice controls**
Unit-4 **8 hours** **Selection and use of barriers and/or personal protective equipment for preventing patient and healthcare worker contact with potentially infectious material** **Types of PPE and barriers and criteria for selection-Choosing PPE based on reasonably anticipate interaction-Choosing barriers / PPE based on intended need-Guidance on proper utilization of PPE / barriers**
Unit-5 **8 hours** **Principles and practices for cleaning, disinfection, and sterilization** **General Information-Potential for Contamination -Factors that have contributed to contamination -Points to reprocessing or handling where breaks in infection prevention practices can compromise the integrity of the equipment of devices-Sterilization Methods Advantages and Disadvantages**

Continuous Assessment Pattern

IA	CAT	ETE	Total Marks
10	**20**	**70**	**100**

Name of The Course	**CPR/Cardiac emergency-I**			
Course Code	**BCVT3006**			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	2	**0**	**0**	**2**

Course Objectives: **The basic objective of this course is to understand about basis life support and cardiac emergencies**

Course Outcomes

CO1	**To understand and demonstrate basic life support.**
CO2	**To understand and demonstrate handling of medical emergencies like breathing problems.**
CO3	**To understand, demonstrate and handle medical emergencies like hypoglycaemia**
CO4	**To understand, demonstrate and handle injuries.**
CO5	**To understand, demonstrate and handle environmental emergencies.**

Text Book (s):

1. Oxford Handbook of Accident and Emergency
2. Oxford Handbook of Emergency Medicine
3. BLS for Healthcare Providers Student Manual: Basic Life Support Handbook Book by Jane John-Nwankwo.
4. Advanced First Aid, CPR, and AED: Sixth Edition.American College of Emergency Physicians.

Reference Book (s):

1. Oxford Handbook of Cardiology (Oxford Medical Handbooks) by Punit Ramrakha (Author), Jonathan Hil
2. Oxford Handbook of Clinical Specialities
3. American Academy of Orthopaedic Surgeons. Jones & Bartlett Learning, The Textbook of Emergency Cardiovascular Care and CPR. Book by John M. Field

Reference websites:

1. https://www.bmj.com/content/314/7092/1462
2. https://www.sciencedirect.com/science/article/pii/S0735109708034074
3. https://www.ahajournals.org/

Unit-1 8 hours **Safety of the rescuer, basic life support, handling the airway, breathing and circulation**
Unit-2 8 hours **Breathing problems, Choking, Allergic reactions, Heart attack.**
Unit-3 8hours **Diabetes and low blood sugar, Stroke, Seizures, Shock, Infections.**
Unit-4 **6 hours** **Bleeding, Wounds, Head, neck and spine injuries, fractures and sprains. Burns and electrical injuries.**
Unit-5 8 hours **Bites and sting, Temperature-related emergencies, Poisoning and drug overdose.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	**20**	**70**	**100**

Name of The Course	**Medical electronics, biophysics and computer usage relevant to cardiac technology-II**			
Course Code	**BCVT4001**			
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.**
CO6	**To understand the latest techniques in MECT.**

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 monitoring: Guidelines, Interpretation.**
Unit-2 **8 hours** **Electrocardiography-** **Electrocardiographic processing and display system** **Monitoring, implications in various specific circumstances with examples.**
Unit-3 **8 hours** **Radiation-Radiation physics** **Guidelines, Interpretation, Monitoring, implications in various specific circumstances.**
Unit-4 **8 hours** **Radiation** **Techniques of monitoring radiation exposure** **Measures to reduce radiation exposure.**
Unit-5 **8 hours** **Computer use in medical care and data entry, special condition, uses inpatient data entry, patient record keeping etc.**
Unit-6 **8 hours** **Advances/Recent trends in MECT, Interpretation, Monitoring, implications in various specific circumstances with examples.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	**20**	**70**	**100**

Name of The Course	**Basic Electrocardiography-II**			
Course Code	**BCVT4002**			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**I**	**C**
	3	**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 atrioventricular conduction, 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**
CO6	**To develop relevance and need of recent trends in ECG devices and remote monitoring**

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 with real life examples and case studies.**
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: Interpretation, Monitoring, implications in various specific circumstances with case studies.**
Unit 6: **8 Hours**
Recent Trends in ECG devices and remote monitoring, Interpretation, Monitoring, implications in various specific circumstances with examples.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	**20**	**70**	**100**

Name of The Course	**Advanced Electrocardiography-II**			
Course Code	**BCVT4003**			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	I (	C
	3	**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**
CO6	**To develop an understanding of recent advances in ECG diagnosis for atrial, ventricular and MI abnormalities.**

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**
Unit-6 **8 hours** **Recent advances in the ECG diagnosis for various abnormalities for atrial, ventricular and MI abnormalities.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	**20**	**70**	**100**

Name of The Course	**Medical electronics, biophysics and computer usage relevant to cardiac technology-II (P)**			
Course Code	**BCVT4051**			
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 Assessment (IA)	MTE	End Term Test (ETE)	Total Marks
30		**70**	**100**

Name of The Course	**Basic Electrocardiography-II (P)**				
Course Code	**BCVT4052**				
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 Assessment (IA)	MTE	End Term Test (ETE)	Total Marks
30		**70**	**100**

Name of The Course	**Infection Control and prevention-II**			
Course Code	**BCVT4004**			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	2	**0**	**0**	**2**

Course Objectives: The basic objective of this course is to get familiar with infection control and prevention practices in health care practices.

Course Outcomes

CO1	**Acquire knowledge in Construction, renovation, repair and demolition in health care facilities**
CO2	**Practice prevention and control of infectious and Communicable diseases in health-care workers**
CO3	**Illustrate the characteristics,clinical syndromes,prevention of problems,transmission,infection preventive measures of Multi-Drug Resistant Organism (MDRO'S) in infection prevention**
CO4	**Illustrate the Multi-Drug Resistant Organism (MDRO'S) in infection prevention**
CO5	**Explain infection prevention as applied to nursing homes and long-term care facilities**

Text Book (s):

1. ICMR(2008) guidelines for good clinical laboratory practices.
2. Hospital waste Management: Chapter 13,PARK'S Textbook of Preventive and Social Medicine,18th Edition

Reference Book (s):

1. NIH:DIADS guidelines for Good Clinical Laboratory Practice Standerds,2011
2. WHO : Good Clinical Laboratory Practice (GCLP),2009

Unit-1 **8 hours** **Professional Responsibility for Infection Prevention-** **Construction, renovation, repair and demolition in health care facilities**
Unit-2 **8 hours** **Prevention and control of infectious and Communicable diseases in health-care workers-** **Overview of occupational health strategies for infection prevention-** **Prevention and control of blood borne pathogen transmission -** **Evaluation of HCWs infected with HIV, HBV, or other blood borne pathogens**
Unit-3 **8 hours** **Current topics in infection prevention-I** **Multi-Drug Resistant Organism (MDRO'S) to include:** **-Methicillin Resistant Staphylococcus Aureus (MRSA),** **- Vancomycin Resistant Enterococci (VRE),** **-Clostridium Difficile (CDIFF),** **-Multi-Drug Resistant Tuberculosis (MDRTB)** **-Extended Spectrum Beta-Lactamase (ESBL)**

Unit-4 **8 hours** **Current topics in infection prevention-II** **Multi-Drug Resistant Organism (MDRO'S) to include:** **-Carbapenem-resistant Enterobacteriaceae (CRE)** **-Severe Acute Respiratory Syndrome (SARS)** **-Creutzfeld Jacob Disease** **-Ebola Virus Disease (EVD) and Zika virus**
Unit-5 **8 hours** **Infection prevention in Nursing homes** **Infection prevention as applied to nursing homes and long-term care facilities**

Continuous Assessment Pattern

IA	CAT	ETE	Total Marks
30	**20**	**70**	**100**

Name of The Course	**CPR/Cardiac Emergency-II**			
Course Code	**BCVT4005**			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	l	C
	2	**0**	**(**	**2**

Course Objectives: **The basic objective of this course is to understand about basis life support and cardiac emergencies**

Course Outcomes

CO1	**To understand and demonstrate administration of CPR to an adult and child.**
CO2	**To understand and interpret cardiac emergencies like angina and myocardial infarction.**
CO3	**To understand and interpret cardiac emergencies like supraventricular tachycardia**
CO4	**To demonstrate and handle defibrillators.**
CO5	**To understand and interpret cardiac like cardiac tamponade and sudden cardiac death.**

Text Book (s):

1. Oxford Handbook of Accident and Emergency The ECG Made Easy Book by John R Hampton
2. Oxford Handbook of Clinical Specialities
3. Oxford Handbook of Cardiology (Oxford Medical Handbooks)by Punit Ramrakha (Author), Jonathan Hill
4. Oxford Handbook of Emergency Medicine

Reference Book (s):

1. Emergency Cardiology: An Evidence-Based Guide to Acute Cardiac Problems (Medicine) 1st Edition
2. Harrison's Cardiovascular Medicine
3. Emergencies in Cardiology by Saul G. Myerson (Editor), Robin P. Choudhury (Editor)
4. Cardiology: An Illustrated Textbook (Two Volume Set) by Kanuchatterje

Unit-1 **8 hours** **Cardio Pulmonary Resuscitation** **Give CPR to an adult, child and infant, usage of mask, bag-mask. Rescue breathing in adult, child and infant**
Unit-2 **8 hours** **Acute Coronary Syndrome** **Acute angina, unstable angina myocardial ischaemia, Q wave and Non-Q wave myocardial infarction**
Unit-3 **8 hours** **Supraventricular emergencies** **Supraventricular tachycardia, ventricular tachycardia, ventricular fibrillation**
Unit-4 **8 hours** **Defibrillators** **Types of defibrillators, uses, methods of using, types of electrodes, types of paddles.**

Unit-5 **8 hours** **Cardiorespiratory Arrest** **Causes of primary cardiac arrest, Cardiac tamponade and sudden cardiac death.**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	**20**	**70**	**100**

Name of The Course	**Treadmill exercise stress testing and 24 hour Ambulatory ECG recording**			
Course Code	**BCVT5001**			
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**
CO6	**To develop understanding regarding latest techniques used in stress test.**

Text Book (s) & Reference Book (s)

1. Stress Testing: Principles and Practice By Myrvin H.Ellestad
2. Ambulatory Monitoring, BY CSCT
3. Principle and practice of tmt,by Myrvin.
4. 12-Lead Ecg: The Art Of Interpretation by Casimiro Garcia

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	**8 hours**
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.	
Unit 6	**8 hours**
To develop understanding regarding latest techniques using in stress test.	

Different types of ambulatory ecg monitoring **Ambulatory real-time cardiac monitors** **Adhesive patch electrocardiographic monitors** **Implantable loop recorders** **Event monitors**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	**Echocardiography**			
Course Code	**BCVT5002**			
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**
CO6	**To develop understanding regarding recent advancement in echocardiography**

Text Book (s)

5. The Washington Manual of Echocardiography by Nishath Quader M.D. (Author)
6. Practice of Clinical Echocardiography 5th Edition by Catherine M. Otto MD (Author)
7. 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)
3. SN Chugh, ECG made easy

Course Content

Unit 1 **8 hours** **M- Mode and 2D transthoracic echocardiography, Views used in transthoracic echocardiography, Doppler echocardiography: pulsed, continuous wave and colour**
Unit 2 **8 hours** **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**

Unit 3 8 hours **Echocardiography in Valvular heart disease: Mitral stenosis, Mitral regurgitation, Mitral valve prolapsed, Aortic stenosis, Aortic regurgitation, Infective endocarditis Prosthetic valve assessment,**
Unit 4 8 hours **Echocardiography in Cardiomyopathies: Dilated, Hypertrophic, Restrictive, Constrictive pericarditis, pericardial effusion and cardiac tamponade,**
Unit 5 8 hours **Echocardiographic detection of congentital heart desease: Atrial septal defect, Ventricular septal defect, Patent ductus arteriosus, Pulmonary stenosis, Tetralogy of Fallot, Coarctation of aorta, Left atrial thrombus, Left atrial myxoma, Transoesophageal echocardiography.**
Unit 6 8 hours **Recent Advances in Echocardiography** **Contrast Echo Assessment of Myocardial Perfusion,** **Exercise stress echocardiography** **Using echocardiography to assess ischemia** **Adaptive contrast enhancement** **Tissue Doppler imaging** **Speckle-tracking echocardiography** **Three-dimensional speckle-tracking echocardiography**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	**ADVANCED ELECTRO-CARDIOGRAPHY-II**				
Course Code	**BCVT5003**				
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.**
CO6	**To understand the latest techniques in the management of cardiac arrhythmias.**

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

Reference websites:

1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4554791/
2. https://royalsocietypublishing.org/doi/10.1098/rsif.2017.0821
3. https://www.dicardiology.com/article/advances-ecg-technology
4. https://www.intechopen.com/books/advances-in-electrocardiograms-methods-and-analysis

Unit-1	**8 hours**
Evolution of electrocardiographic changes, Localization of ischemia or infarction, Q waves, Primary and secondary T wave changes	
Unit-2	**8 hours**
Electrolyte and metabolic ECG abnormalities, Cardiac arrhythmias , Supra-ventricular, tachycardia, Atrial flutter/fibrillation.	
Unit-3	**8 hours**
Ventricular Tachycardia/Ventricular fibrillation, Atrio Ventricular block, Ventricular premature beats, 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.	

Unit 6: Recent trends in electrocardiography	**8 h**
Remote ECG monitoring systems, Computational tec interpretation, non contact heart monitoring.	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	**Universal Human Values and Ethics**			
Course Code	**LLLL1001**			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	**0**	**0**	**3**

Course Objectives:

1. **To help students distinguish between values and skills, and understand th e need, basic guidelines, content and proce ss of value education.**
2. **To help students initiate a pr ocess of dialog within themselves to know w at they 'really want to be' in their life and p rofession**
3. **To help students understand the meaning of happiness and prosperity for a human being.**
4. **To facilitate the students to u nderstand harmony at all the levels of h uman living, and live accordingly.**
5. **To facilitate the students in a plying the understanding of harmony in existence in their profession and lead an ethica 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
9 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
9 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 Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	**Cardiac Care Technician- I**			
Course Code	**BCCT5004**			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	8	**0**	**0**	**8**

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.**
CO6	**To develop understanding regarding recent advancement in health care technologies**

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

Reference websites:

1. https://www.who.int/
2. https://www.gminsights.com/blogs/PPE-market-trends
3. https://www.ifc.org/
4. https://www.beckershospitalreview.com/

Course Content

CO1	**Unit I** **hours** **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**	**16**
	• 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)**	
CO2	**Unit 2** **hours** **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.**	**16**

	• 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
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**
CO6	**Unit 6** **8 hours** **Recent advancement in health care technologies** • **To develop understanding regarding recent advancement in personal protective equipment & benefits** • **To develop understanding regarding enviromental, health and safety guidelines** • To develop understanding regarding technological advancement for health care

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	**Treadmill exercise stress testing and 24 hour Ambulatory ECG recording (P)**				
Course Code	**BCVT5051**				
Prerequisite					
Corequisite					
Antirequisite					
	L	**T**	**P**	**C**	
	0	**0**	**2**	**1**	

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

Name of The Course	Echocardiography (P)			
Course Code	BCVT5052			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

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 Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Cardiac Care Technician-I(Practical)			
Course Code	BCCT5053			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	4	2

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

Name of The Course	**Ultrasonography**			
Course Code	**BCVT5005**			
Prerequisite				
Corequisite				
Antirequisite				
L	T	I	C	
2	**0**	**(**	**2**	

Course Objectives: **To get familiar with ultrasonography.**

Course Outcomes

CO1	**To interpret and analyze the principles of ultrasonography.**
CO2	**To analyze and understand Sonographic Phenomenons and Artefacts, Examination Techniques**
CO3	**To understand and interpret ultrasound of thorax and heart.**
CO4	**To understand and anlyze the vascular system.**
CO5	**To understand and analyze interventional ultrasonography.**

Text Book (s):

1. Diagnostic Imaging Ultrasound by Anil T. Ahuja (Author), James F. Griffith (Author), K. T. Wong (Author), Gregory E., M.D. Antonio (Author).
2. Manual Of Ultrasound Paperback –by Garkal G
3. Textbook of Diagnostic Sonography: 2-Volume
4. by Sandra L. Hagen-Ansert MS RDMS RDCS FASE FSDMS (Author)

Reference Book (s):

1. Diagnostic Imaging Ultrasound by Anil T. Ahuja (Author), James F. Griffith (Author), K. T. Wong (Author), Gregory E., M.D. Antonio (Author).
2. Manual Of Ultrasound Paperback –by Garkal G
3. Textbook of Diagnostic Sonography: 2-Volume
4. by Sandra L. Hagen-Ansert MS RDMS RDCS FASE FSDMS (Autho

Reference websites:

1. www.radiopedia.org
2. https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/ultrasonography
3. https://www.expresshealthcare.in/specials/in-imaging-specials/recent-advances-in-ultrasound-imaging-technology/248386/

Unit-1 **6 hours** **Principles of ultrasonography** **Terminology, Physical and Technical Principles**
Unit-2 **6 hours** **Examination Techniques** **Sonographic Phenomenons and Artefacts,**
Unit-3 **6 hours** **Ultrasound of the Thoracic Cavity and Heart** **Diaphragm, Echocardiography - normal heart, Echocardiography - heart disease**
Unit-4 **6 hours** **Ultrasonography of Vascular system** **Carotid vessels, vertebral artery, Aorta, Blood vessels of the lower limb**
Unit-5 **6 hours** **Special Diagnostic Procedures** **Ultrasound Guided biopsy ,Monitoring Bone Healing ,Three-dimensional Ultrasonography, Interventional Ultrasonography**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	**20**	**70**	**100**

Name of The Course	**Doppler**
Course Code	**BCVT5006**

Prerequisite				
Corequisite				
Antirequisite				
	L	T	]	C
	2	0	(	2

Course Objectives: **To get familiar with doppler.**

Course Outcomes

CO1	**To interpret and analyze the principles of doppler.**
CO2	**To analyze and understand sonographic phenomenons and Artefacts, Examination Techniques**
CO3	**To understand and interpret doppler of thorax and heart.**
CO4	**To understand and analyse the vascular system.**
CO5	**To understand and analyze interventional doppler.**

Text Book (s):

1. Diagnostic Imaging Ultrasound by Anil T. Ahuja (Author), James F. Griffith (Author), K. T. Wong (Author), Gregory E., M.D. Antonio (Author).
2. Manual Of Ultrasound Paperback –by Garkal G
3. Textbook of Diagnostic Sonography: 2-Volume
4. by Sandra L. Hagen-Ansert MS RDMS RDCS FASE FSDMS (Author)

Reference Book (s):

1. Diagnostic Imaging Ultrasound by Anil T. Ahuja (Author), James F. Griffith (Author), K. T. Wong (Author), Gregory E., M.D. Antonio (Author).
2. Manual Of Ultrasound Paperback –by Garkal G
3. Textbook of Diagnostic Sonography: 2-Volume
4. by Sandra L. Hagen-Ansert MS RDMS RDCS FASE FSDMS (Author)

Reference websites:

1. www.radiopedia.org
2. https://medlineplus.gov/lab-tests/doppler-ultrasound/
3. https://www.radiologyinfo.org/en/glossary/glossary1.cfm?gid=96

Unit-1	**6 hours**
Terminology, Physical and Technical Principles Principles of doppler	
Unit-2	**6 hours**
Sonographic Phenomenons and Artefacts, Examination Techniques	
Unit-3	
Doppler of the Thoracic Cavity and Heart Diaphragm, Echocardiography - normal heart, Echocardiography - heart disease	
Unit-4	**6 hours**
Doppler of Vascular system Carotid vessels, vertebral artery, Aorta, Blood vessels of the upper and lower limbs	
Unit-5	**6 hours**
Special Diagnostic Procedures Doppler -Guided biopsy, Monitoring Bone Healing,Three-dimensional doppler, Interventional Doppler.	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	**20**	**70**	**100**

Name of The Course	**Cardiac catheterization laboratory basics**			
Course Code	**BCVT6001**			
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.**
CO6	**Student will able to develop relevance and need of recent trends in cath laboratory**

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
Unit VI: Recent Trends in Cath Lab practices 8 Hours
Recent Trends in Cath Lab practices, Newer concept and devices used in the treatment and diagnosis of cardiovascular diseases.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	**CARDIAC CATHETERIZATION LABORATORY ADVANCED**			
Course Code	**BCVT6002**			
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.**
CO6	**To understand the latest trends in the management of blocks and valve disorders.**

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 patients.
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.
Unit-6 Recent trends in interventional cardiology 8 Hours
ECHO pixel created live 3D holograms, Polymer drug eluting stents, transcatheter aortic valve replacement.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	**Research Methodology & Biostatistics**			
Course Code	**BCVT6003**			
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.**
C06	**Recent Trends in biostatistics.**

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.
Unit-6 **8 hours**
Advances/Recent trends in biostatistics.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	**Cardiac Care Technician-II**			
Course Code	**BCCT6004**			
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.**
CO6	**To understand pandemics and the role played by WHO in their management.**

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 **16hours**
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 **16hours**
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.**
Unit-6 Recent Trends **12 hours**
Role of hospital in a pandemic (Various diseases) WHO and the role it plays in world health.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	**CARDIAC CATHETERIZATION LABORATORY BASICS (Practical)**				
Course Code	**BCVT6051**				
Prerequisite					
Corequisite					
Antirequisite					
	L	**T**	**P**	**C**	
	0	**0**	**2**	**1**	

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

Name of The Course	**CARDIAC CATHETERIZATION LABORATORY ADVANCED (Practical)**			
Course Code	**BCVT6052**			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	0	**0**	**2**	**1**

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

Name of The Course	**Cardiac Care Technician-II (P)**
Course Code	**BCCT6053**
Prerequisite	
Corequisite	

Antirequisite				
	L	T	P	C
	0	0	4	2

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.**
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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

BCVT6053 BCVT6054 BCVT6055 BCVT6056	**Project**	**1 credit**	
Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
30		**100**	**100**

BCVT7001	**Clinical internship including project work**	**20 credit**	
Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
		100	**100**

BCVT8001	**Clinical internship including project work**	**20 credit**	
Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
		70	**100**