SHARDA UNIVERSITY
Beyond Boundaries

Bachelor of Cardiovascular Technology (BCVT)

Program code: SAH0108

(2019 - 2023)

Program and Course Structure

School of Allied Health Sciences

1.1 Vision, Mission and Core Values of the University

Vision of the University

To serve the society by being a global University of higher learning in pursuit of academic excellence, innovation and nurturing entrepreneurship.

Mission of the University

1. Transformative educational experience
2. Enrichment by educational initiatives that encourage global outlook
3. Develop research, support disruptive innovations and accelerate entrepreneurship
4. Seeking beyond boundaries

Core Values

- Integrity
- Leadership
- Diversity
- Community

1.2 Vision and Mission of the School

Vision of the School

To steer the School of Allied Health Sciences towards excellence in academics, innovation and entrepreneurship by constant endeavors

Mission of the School

1. To create the state of the art facility for quality teaching learning, research & innovation
2. To incorporate the contemporary standards in teaching & learning
3. To inculcate in the students values of integrity and compassion towards the care of patients and society.

Core Values

- Critical Thinking and Observation
- Analytical Skills
- Creativity
- Skilled professional
- Multidimensional
- Compassion
- Management

1.3 BCVT Programme Educational Objectives (PEO)

A under graduate student having qualified the BSc Cardiovascular Technology course should be able to:

PEO1 : B.Sc CVT program enables students to become a trained, qualified cardiovascular technician capable of working independently or in association with a higher setup.

PEO2 : After the completion of program, candidates become well known in techniques such as Electrocardiography, Echocardiography, Treadmill test/Stress test, Doppler ultrasonography and contrast Echo.

PEO3 : Graduate will integrate knowledge and skills of cardiovascular technology to provide healthcare solutions for the benefit of the society.

PEO4 : After the completion of program, graduate become well-prepared for work associated with assisting cardiac surgeons, cardio -thoracic surgeons and cardiologists in tertiary care hospitals and others.

PEO5 : Graduate will be supportive, informative and providing in necessary information regarding good cardiac health for society and community and continuously improving his/ her knowledge and abilities.

PEO6 : Graduates will have a good leadership qualities and entrepreneur skills by working and communicating effectively in interdisciplinary environment, either independently or with a team.

1.3.2 BCVT Map PEOs with Mission Statements:

PEO Statements	**School Mission 1**	**School Mission 2**	**School Mission 3**
PEO1:	**2**	**2**	**2**
PEO2:	**3**	**2**	**3**

PEO3:	**3**	**3**	**3**
PEO4:	**2**	**2**	**3**
PEO5:	**2**	**3**	**3**
PEO6:	**2**	**2**	**3**

1.3.3 BCVT Program Outcomes (PO's)

PO1 : Define and describe human cardiovascular and its related system in relation to various disease.

PO2 : Distinguish and classify various cardiovascular disorder.

PO3 : Apply knowledge of human cardiovascular and its related system in the diagnosis, cardiovascular disorder, related disorder its management& apply the knowledge and skills to assess and solve societal and legal issues related to cardiovascular care of the patients

PO4 : Utilize modern tools and techniques in the field of cardiovascular technology for patient compliance.

PO5 : Tackle future challenges through lifelong learning and training process related to cardiac health.

PO6 : Evolve ethical practices and moral values in personal and professional endeavors.

PO7 : Regular learning the use of modern tools and techniques for the efficient management of cardiovascular diseases and related disorder.

PSO1 :B.Sc. CVT program enables students to understand disease, acquire skills regarding diagnosis and its management of various cardiac diseases.

PSO2 : The CVT's primary role is to perform maneuvers, diagnostic test according to direction

of a qualified physician and helping him/ her in the diagnosis and treatment of cardiovascular injury and disease.

PSO3 : After completion of the program students will be able to apply specialized occupational theory, skills and concepts to work independently as qualified cardiovascular technologist and becomes an integral member of the cardiac cath. lab and electrophysiology labteams.

1.3.4 Mapping of Program Outcome Vs Program Educational Objectives

	PEO1	PEO2	PEO3	PEO4	PEO5	PEO6
PO1	2	3	3	2	3	2
PO2	3	2	2	2	2	3
PO3	2	3	2	2	2	3
PO4	2	2	3	2	2	3
PO5	2	2	2	2	3	3
PO6	3	2	3	3	3	2
PO7	2	3	2	2	3	3

PSO1	**2**	**3**	**3**	**2**	**2**
PSO2	**3**	**3**	**2**	**3**	**2**
PSO3	**2**	**3**	**3**	**2**	**3**

1.3.5 BCVT Program Outcome Vs. Courses Mapping Table:

Program Outcome Courses	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
1st Year											
Course 101	Human Anatomy	2	3	2	3	3	2	3	2	2	2
Course 102	Physiology	2	2	3	3	2	3	3	2	2	1
Course 103	Biochemistry	3	2	3	2	3	2	3	3	2	2
Course 104	Pathology	3	2	2	3	3	2	2	1	3	3
	Microbiology	3	2	2	2	2	2	3	2	2	2
Course 105	Basics of Hospital and data management	2	3	2	2	3	2	2	2	2	3
2nd Year											
Course 201	Medicine relevant to cardiac care technology	3	2	2	2	3	3	2	2	2	3
Course 202	Section-A Applied Pathology	2	3	3	2	2	3	2	2	2	2
	Section-B Applied Microbiology	2	2	3	3	2	2	3	2	3	2
Course 203	Applied Pharmacology	3	2	2	2	2	3	3	3	2	2
Course 204	Introduction to Cardiac care Technology	2	3	3	2	2	2	3	2	2	2
3rd Year											

Course 301	Cardiac care Technology – Clinical	2	3	2	2	3	2	3	2	2	3
Course 302	Cardiac care Technology – Applied	2	3	3	2	3	2	3	3	2	2
Course 303	Cardiac care Technology Advanced	3	2	2	2	2	3	3	2	2	3
4th Year											
Course 303	Cardiovascular Technology Internship & Project work	2	2	2	2	2	2	2	2	2	2
Average:		**2.42**	**2.42**	**2.42**	**2.28**	**2.5**	**2.35**	**2.71**	**2.14**	**2.14**	**2.28**

1. Slight (Low) **2. Moderate (Medium)** **3. Substantial (High)**

SHARDA UNIVERSITY
School of Allied Health Sciences
Program: B.Sc in Cardiovascular Technology (BCVT)

Term.: 1
Session: 2019-2020

S. No.	Paper ID	Subject Code	Subjects	Teaching Load			Credit	Core/Elective Pre-Requisite/ Co Requisite	Type of Course[1]: 1. CC 2. AECC 3. SEC 4. DSE
				L	T	P			
THEORY									
1.	36000	BCT101	Human Anatomy	2	1	-	3	Core	CC
2.	36001	BCT102	Physiology	2	1	-	3	Core	CC
3.	36002	BCT103	Biochemistry	2	1	-	3	Core	CC
4.	36003	BCT104	Pathology & Microbiology	4	1	-	5	Core	CC
5.	36004	BCT105	Basics of Hospital and data management	2	0	-	2	Core	CC
6.		OPE	Open Elective course	2	-	-	2	Elective	AECC, SEC
Practical									
1.	36000	BCT101	Human Anatomy	-	-	1	1	Core	CC, AECC
2.	36001	BCT102	Physiology	-	-	1	1	Core	CC, AECC
3.	36002	BCT103	Biochemistry	-	-	1	1	Core	CC, AECC
4.	36003	BCT104	Pathology Microbiology	-	-	2	2	Core	CC, AECC
5.	36004	BCT105	Basics of Hospital and data management	-	-	-	-	-	-
TOTAL HOURS							**23**		

[1] CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

SHARDA UNIVERSITY
School of Allied Health Sciences
Program: B.Sc in Cardiovascular Technology (BCVT)

Term.: 2
Session: 2020-2021

S. No.	Paper ID	Subject Code	Subjects	Teaching Load			Credit	Core/Elective Pre-Requisite/ Co Requisite	Type of Course[2]: 5. CC 6. AECC 7. SEC 8. DSE
				L	T	P			
THEORY									
1	36010	BCT201	Medicine relevant cardiac care to technology	4	-	-	4	Core	CC
2	36011	BCT202	Section A Applied Pathology Section B Applied Microbiology	3 2	1 1	-	4 3	Core	CC
3	36012	BCT203	Applied Pharmacology	2	1	-	3	Core	CC
4	36013	BCT204	Introduction to Cardiac care Technology	3	1	-	4	Core	CC
		OPE	Open Elective course	2	-	-	2	Elective	AECC, SEC
Practical									
1	36010	BCT201	Medicine relevant cardiac care to technology	-	-	-	-	-	-
2	36011	BCT202	Section A Applied Pathology Section B Applied Microbiology	-	-	1 1	1 1	Core	CC, AECC
3	36012	BCT203	Applied Pharmacology	-	-	-	-	-	-
4	36013	BCT204	Introduction to Cardiac care Technology	-	-	2	2	Core	CC, AECC
TOTAL HOURS							**24**		

[2] CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

SHARDA UNIVERSITY
School of Allied Health Sciences
Program:B.Sc in Cardiovascular Technology (BCVT)

Term.: 3

Session: 2021-22

S. No.	Paper ID	Subject Code	Subjects	Teaching Load			Credit	Core/Elective Pre-Requisite/ Co Requisite	Type of Course[3]: 9. CC 10. AECC 11. SEC 12. DSE
				L	T	P			
THEORY									
1	35392	BCT301	Cardiac care Technology – Clinical	4	2	-	6	Core	CC
2	35393	BCT302	Cardiac care Technology – Applied	4	2	-	6	Core	CC
3	35394	BCT303	Cardiac care Technology – Advanced	4	2	-	6	Core	CC
		OPE	Open Elective course	2	-	-	2	Elective	AECC, SEC
Practical									
1	35392	BCT301	Cardiac care Technology – Clinical	-	-	4	4	Core	CC, AECC
2	35393	BCT302	Cardiac care Technology – Applied	-	-	4	4	Core	CC, AECC
3	35394	BCT303	Cardiac care Technology – Advanced	-	-	4	4	Core	CC, AECC
TOTAL HOURS							**32**		

SHARDA UNIVERSITY
School of Allied Health Sciences
Program:B.Sc in Cardiovascular Technology (BCVT)
Term.: 4
Session: 2022-23

S. No.	Paper ID	Subject Code	Subjects	Teaching Load			Credit	Core/Elective Pre-Requisite/ Co Requisite	Type of Course[4]: 13. CC 14. AECC 15. SEC 16. DSE
				L	T	P			
1		BCT401	Cardiovascular Technology Internship & Project work	-	-	40	40		

Note :

1) **Value added course is mandatory for each student of every year (List of VAC are enclosed in Annexure 1) and it is a non-graded course.**
2) **Open elective course is mandatory for each student of every year (List of approved open elective course offered by the University are enclosed as Annexure 2) and it will be audit mode.**
3) **In each academic session, project work/Clinical Posting/Community connect program will be provided to the students.**
4) **B.sc in cardiovascular technology 4 year (Clinical training & internship is non graded)**

Clinical training and internship: every student who has passed in all the theory and practical examination of all the years will have to undergo one year compulsory internship in at least 250 bedded hospital.

Course Structure
Of
BSC. CARDIOVASCULAR TECHNOLOGY
(BCVT)

BCT 101: Human Anatomy **- I &BCT 101:** Human Anatomy **- I (Lab)**

School: SAHS		**Batch : 2019-23**	
Program: BCVT		**Current Academic Year: 2019-20**	
Branch: Cardiovascular Technology		**Year: 1**	
1	Course Code	**BCT 101**	
2	Course Title	Human Anatomy	
3	Credit Hours	**3**	
4	Contact Hours (L-T-P)	**2-1-2**	
	Course Status	Compulsory	
5	Course Objective	• To provide students with a comprehensive overview of the morphology of human body • To provide students with a comprehensive overview of the functional anatomy of human body • Allow students to evaluate and analyze if there is any deviation or disruption from normal structure and function • Applying, understanding the theory while examining the specimen • Able to remember and recall the facts	
6	Course Outcomes	CO1: To understand the importance of Human body as whole and locomotion and support CO2: To understand the concepts of Cardiovascular system and gastrointestinal system and its applied CO3: To understand the concepts of Respiratory system and Peritoneum and its applied CO4: To understand the concepts of Urinary system and Reproductive system and its applied CO5: To understand the concepts of Endocrine gland, Nervous system, Sensory organs and its applied	
7	Course Description	• Introduction : Human body as a whole • Locomotion and support • Cardiovascular system • Gastrointestinal system • Respiratory system • Peritoneum • Urinary system	

		• Reproductive system • Endocrine glands • Nervous system • Sensory organs	
8	Outline syllabus **Theory**		
	Unit 1	Introduction: Human body as a whole	
		Theory: a) Definition of anatomy and its divisions Terms of location, positions and planes	CO 1
		b) Cell and its organelles Epithelium-definition, classification, describe with examples, function	CO 1
		c) Glands- classification, describe serous & mucous glands with examples Basic tissues – classification with examples	CO 1
	Unit 2	Locomotion and support	
		a) Cartilage – types with example & histology Bone – Classification, names of bone cells, parts of long bone, microscopy of compact bone, names of all bones, vertebral column, intervertebral disc, fontanelles of fetal skull	
		b) Joints – Classification of joints with examples, synovial joint (in detail for radiology)	
		c) Muscular system: Classification of muscular tissue & histology Names of muscles of the body	
	Unit 3	Cardiovascular system	
		a) Heart-size, location, chambers, exterior & interior Blood supply of heart Systemic & pulmonary circulation	CO 2
		b) 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, portosystemic anastomosis Great saphenous vein Dural venous sinuses	CO 2
		c) Lymphatic system-	CO 2

		d) cisternachyli& thoracic duct Histology of lymphatic tissues Names of regional lymphatics, axillary andinguinal lymph nodesinbrief	CO 2
	Unit 4	Gastro-intestinal system	
		a) Parts of GIT, Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Waldeyer's ring)	CO 2
		b) Oesophagus, stomach, small and large intestine	CO 2
		c) Liver, gall bladder, pancreas	CO 2
	Unit 5	Respiratory system	
		a) Parts of RS, nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments	**CO 3**
		b) Histology of trachea, lung and pleura	**CO 3**
		c) Names of paranasal air sinuses	**CO 3**
	Unit 6	Peritoneum	
		Description in brief a) Structure b)Function c) ariations	**CO 3**
	Unit 7	Urinary system	
		a) Kidney, ureter, urinary bladder	**CO 4**
		b) Male and female urethra	**CO 4**
		c) Histology of kidney, ureter and urinary bladder	**CO 4**
	Unit 8	Reproductive system	
		a) Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology)	**CO 4**
		b) Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology)	**CO 4**

		c) Mammary gland – gross	**CO 4**
	Unit 9	Endocrine glands	
		a) Names of all endocrine glands in detail on pituitary gland b) Thyroid gland, parathyroid gland c) Suprarenal gland – (gross & histology)	**CO 5**
	Unit 10	Nervous system	
		a) Neurons, Classification of NS b) 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 c) Sympathetic trunk & names of parasympathetic ganglia	**CO 5**
	Unit 11	Sensory organs:	
		a) Skin: Skin-histology Appendages of skin b) Eye: parts of eye & lacrimal apparatus Extra-ocular muscles & nerve supply c) Ear: parts of ear- external, middle and inner ear and contents	CO 5
1	**Course Code**	**BCT 101**	
2	**Course Title**	**HUMAN ANATOMY (LAB)**	
3	**Credit Hours**	**1**	
4	**Contact Hours (L-T-P)**	**0-0-2**	
5	Course Outcomes	CO1: To understand tand differentiate the histology of various epithelium, glands, cartilage , bone and muscles CO2: To understand ,identify the artery, vein and predict the chest and abdomen radiograph CO3: To understand the wind pipe in detail and CXR and reflections CO4: To understand the structure, histology of Urinary system & Male and female reproductive system and radiographs related to this. CO5: To understand the structure, histology of glands, skin and other sense organ	
6	Course	• Introduction : Human body as a whole-Practical	

	Description	• Locomotion and support-Practical • Cardiovascular system-Practical • Gastrointestinal system-Practical • Respiratory system-Practical • Peritoneum-Practical • Urinary system-Practical • Reproductive system-Practical • Endocrine glands-Practical • Nervous system-Practical • Sensory organs-Practical	
	Practical		
	Unit 1	Practical: a) Histology of types of epithelium b) Histology of serous, mucous & c) mixed salivary gland	CO 1
	Unit 2	a) Histology of the 3 types of cartilage b) Demo of all bones showing parts, radiographs of normal bones & joints Histology of compact bone (TS & LS) Demonstration of all muscles of the body c) Histology of skeletal (TS & LS), smooth & cardiac muscle	CO 1
	Unit 3	a) Demonstration of heart and vessels in the body Histology of large artery, medium sized artery & vein, large vein b) Microscopic appearance of large artery, medium sized artery & vein, large vein pericardium Histology of lymph node, spleen, tonsil & thymus c) Normal chest radiograph showing heart shadows Normal angiograms	CO 2
	Unit 4	a) Radiographs of abdomen b) Normal c) Abnormal	CO 2

	Unit 5	a) Demonstration of parts of respiratory system. b) Normal radiographs of chest c) Histology of lung and trachea			CO 3
	Unit 6	a) Demonstration of reflections b) Normal c) variation			CO 3
	Unit 7	a)Demonstration of parts of urinary system b) Histology of kidney, ureter, urinary bladder c) Radiographs of abdomen-IVP, retrograde cystogram			CO 4
	Unit 8	a) Demonstration of section of male and female pelves with organs in situ b) Histology of testis, vas deferens, epididymis, prostate, uterus, fallopian tubes, ovary c) Radiographs of pelvis – hysterosalpingograph			CO 4
	Unit 9	a) Demonstration of the glands b) Histology of pituitary, c) &thyroid, parathyroid, suprarenal glands			CO 5
	Unit 10	a) Histology of peripheral nerve & optic nerve b) Demonstration of all plexuses and nerves in the body c) Demonstration of all part of brain Histology of cerebrum, cerebellum, spinal cord			CO 5
	Unit 11	a) Histology of thin and thick skin b) Demonstration and histology of eyeball c) Histology of cornea & retina			CO 5
	Mode of examination	Theory and Practical			
	Weightag	CA	MTE	ETE	

	e Distribution for Theory	20%		80%	
	Weightage Distribution for Practicals	CA	MTE	ETE	
		40%		60%	
	Text book/s*	Anatomy 1 William Davis (P) understanding Human Anatomy and Physiology MC Graw Hill 2. Chaursia –A Text book of Anatomy T.S. Ranganathan – A text book of Human Anatomy 3. Fattana, Human anatomy (Description and applied) Saunder's& C P Prism Publishers, Bangalore – 1991 4. ESTER . M. Grishcimer, Physiology & Anatomy with Practical Considerations, J.P. LippinCott. Philadelphia			

POs/ Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	1	3	2	1	2	2	2	3
CO2	3	3	2	2	3	2	3	2	3	2
CO3	2	3	2	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	3	2	2
CO5	2	2	2	2	2	2	2	2	2	2

BCT 102: PHYSIOLOGY**&BCT 102:** PHYSIOLOGY**(Lab)**

School: SAHS		**Batch : 2019-23**	
Program: BCVT		**Current Academic Year: 2019-2020**	
Branch: Cardiovascular Technology		**Year: 1**	
1	Course Code	**BCT 102**	
2	Course Title	PHYSIOLOGY	
3	Credit Hours	**3**	
4	Contact Hours (L-T-P)	**2-1-2**	
	Course Status	Compulsory	
5	Course Objective	1. Able to apply basis of physiological principles and their application in real life situations 2. Able to perform certain blood tests 3. Able to perform certain physical examination of patients/subjects 4. Providing basis for various scientific research related to physiology and for further study. 5. Knowledge to educate society about life style related problems.	
6	Course Outcomes	CO1: To understand the concepts of normal blood composition, hemostasis, blood grouping, blood transfusion, lymph and lymphatic system CO2: To understand the concepts of physiological anatomy of heart, nerve supply, cardiac cyacle,heart sounds, blood pressure and physiological variations and digestive system and its applied CO3: To understand the concept of functions of respiratory system, mechanism of normal respiration and rigourous respiration, lung volume and	

		capacities, applied physiology and respiration and Endocrine gland secretions and its applied CO4: To understand the concept of special sense, nervous system and its applied CO5: To understand the concept of mechanism of urine formation,properties and composition of urine,renal function tests, male and female reproductive system physiology and its applied, skin structure and its aaplied	
7	Course Description	• Blood • Cardiovascular system • Digestive system • Respiratory system • Endocrine systems • Special senses • Nervous system • Excretory systems • Male and female reproductive system • Skin	
8	Outline syllabus **Theory Blood-1**		
	Unit 1	a) Introduction – composition and function of blood Red blood cells – Erythropoiesis , stages of differentiation function , count physiological Variation. Haemoglobin –structure , functions , concentration physiological variation Methods of Estimation of Hb White blood cells – Production , function, life span, count, differential count Platelets – Origin, normal count, morphology functions. Plasma Proteins – Production, concentration , types, albumin, globulin, Fibrinogen, Prothrombin functions. b) Haemostasis & Blood coagulation Haemostasis – Definition, normal haemostasis, clotting factors, mechanism of clotting, disorders of clotting factors. c) Blood Bank Blood groups – ABO system, Rh system Blood grouping & typing, Crossmatching Rh system – Rh factor, Rh in compatibility. Blood transfusion – Indication, universal donor and recipient concept. Selection criteria of a blood donor. transfusion reactions Anticoagulants – Classification, examplesand uses	**CO1**
	Unit 2	**Blood -2**	
		a) Anaemias : Classification – morphological and etilogical. effects of anemia on body Blood indices – Colour index , MCH, MCV, MCHC Erythrocyte sedementation Rate (ESR) and Paced cell volume Normal values, Definition . determination,	**CO1**

		b) Blood Volume -Normal value ,determination of blood volume and regulation of blood volume Body fluid – pH, normal value, regulation and variation c) Lymph – lymphoid tissue formation, circulation, composition and function of lymph	
	Unit 3	**Cardiovascular system**	
		a) Heart – Physiological Anatomy, Nerve supply Properties of Cardiac muscle, Cardiac cycle-systole,diastole. Intraventricular pressure curves. Cardiac Output – only definition b) Heart sounds Normal heart sounds Areas of auscultation. Blood Pressure – Definition, normal value, clinical measurement of blood pressure. Physiological variations, regulation of heart rate, cardiac shock, hypotension, hypertension. c) Jugalar, radial pulse, Triple response Heart sounds – Normal heart sounds, cause characteristics and signification. Heart rate Electrocardiogram (ECG) –significance.	**CO2**
	Unit 4	**Digestive system**	
		a) Digestive System - Physiological anatomy of Gastro intestinal tract, Functions of digestive system Salivary glands Stucture and functions. Deglutination –stages and regulation Stomach – structure and fuctions Gastric secretion – Composition function regulation of gastric juice secretion b) <u>Pancrease</u> structure, function Composition Regulation of pancreatic juice <u>Liver</u> Functions of liver Bile secretion, composition, function regulation of bile secretion. Bilirubin metabolism types of bilirubin, Vandernberg reaction. Jaundice- types, significance. Gall bladder – functions c) <u>Intestine</u> Small intestine and large intestine Small intestine –Functions- Digestive, absorption ,movements. Large intestine – Functions, Digestion and absorption of Carbohydrates,Proteins, Fats, Lipids &Defecation	**CO2**
	Unit 5	<u>Respiratory system</u>	
		a) Functions of Respiratory system, Physiological Anatomy of Respiratory system, Respiratory tract, Respiratory Muscles, Respiratory organ-lungs, Alveoli, Respiratory membrane, stages of respiration.	**CO3**

		Mechanism of normal and rigorous respiration. Forces opposing and favouring expansion of the lungs. Intra pulmonary pleural pressure, surface tension, recoil tendency of the wall. H Transportation of Respiratory gases : b) Transportation of Oxygen : Direction, pressure gradient, Forms of transportation, Oxygenation of Hb. Quantity of Oxygen transported. Lung volumes and capacities c) Regulation of respiration what? Why? How? Mechanisms of Regulation, nervous and chemical regulation. Respiratory centre. Hearing Brier, Reflexes. Applied Physiology and Respiration : Hypoxia, Cyanosis, Asphyxia, Dyspnea, Dysbarism, Artificial Respiration, Apnoea.	
	Unit 6	Endocrine System	
		a) Definition Classification of Endocrine glands & their Harmones Properties of Harmones . Thyroid gland hormone – Physiological, Anatomy, Hormone scerated, Physiological function, regulation of secretion. Disorders – hypo and hyper secretion of hormone Parathyroid gland – function, action ,regulation of secretion of parathyroid hormone. Calcitonin – function and action b) Adrenal gland, Adrenal cortex physiologic anatomy of adrenal gland, Adrenal cortex, cortical hormones – functions and regulation Adrenal medulla – Hormones , regulation and secretion. Functions of Adrenaline and nor adrenaline c) Pituitary hormones – Anterior and posterior pituitary hormones, secretion ,function Pancreas – Hormones of pancreas Insulin – secretion, regulation ,function and action Diabetes mellitus – Regulation of blood glucose level	**CO3**
	Unit 7	Special senses	
		a) Vision – structure of eye. Function of different parts. b) Structure of retina c) Hearing structure and function of can mechanism of hearing Taste – Taste buds functions . Smell physiology, Receptors.	**CO4**
	Unit 8	Nervous system a)Functions of Nervous system, Neurone structure, classification and properties. Neuroglia, nerve fiber, classification ,conduction of impulses continuous and saltatory. Velocity of impulse transmission and factors affecting. Synapse – structure, types, properties. Receptors – Definition, classification ,properties. Reflex action – unconditioned properties of reflex action. Babinski's sign. Spinal cord nerve tracts. Ascending tracts, Descending tracts –	

		b)Pyramidal tracts – Extrapyramidal tracts. Functions of Medulla, pons, Hypothalamic disorders. Cerebral cortex lobes and functions, Sensory cortex, Motor cortex,Cerebellum functions of Cerebellum.Basal ganglion-funtions. EEG. Cerebro Spinal Fluid(CSF) : formation, circulation, properties, composition and functions lumbar puncture. c)Autonomic Nervous System : Sympathetic and parasympathetic distribution and functions and Comparison of functions.	
	Unit 9	**Excretory system**	
		a) Excretory System Excretory organs Kidneys: Functions of kidneys structural and functional unit nepron, vasarecta, cortical and juxtamedullary nephrons – Comparision, Juxta Glomerular Apparatus –Structure and function. Renal circulation peculiarities. b) Mechanism of Urine formation : Ultrafiltration criteria for filtration GFR, Plasma fraction, EFP, factors effecting EFR. Determination of GFR selective reabsorption – sites of reabsorption ,substance reabsorbed, mechanisms of reabsorption Glucose, urea. H + Cl aminoacids etc. TMG, Tubular lead, Renal threshold % of reabsorption of different substances, selective e secretion. c) Properties and composition of normal urine, urine output. Abnormal constituents in urine , Mechanism of urine concentration. Counter – Current Mechanisms : Micturition, Innervation of Bladder, Cysteurethrogram. Diuretics : Water, Diuretics, osmotic diuretics, Artificial kidney Renal function tests – plasma clearance Actions of ADH, Aldosterone and PTH on kidneys. Renal function tests	**CO4**
	Unit 10	**Reproductive system and Muscular system**	
		a) Reproductive system b) Function of Reproductive system, Puberty, male reproductive system. Functions of testes, spermatogenesis site, stages, factors influencing semen. Endocrine functions of testes Androgens – Testosterone structure and functions. Female reproducivesyustem. Ovulation, menstrual cycle. Physiological changes during pregnancy, pregnancy test. Lactation : Composition of milk factors controlling lactation. Muscle nerve physiology c) Classification of muscle, structure of skeletal muscle, Sarcomere contractile proteins, Neuromuscular junction. Transmission across, Neuromuscular junction. Excitation contraction coupling. Mechanism of muscle contraction muscle tone, fatigue Rigour mortis	**CO5**
	Unit 11	Skin	
		a) structure and function b) Body temperature measurement, Physiological variation c) Regulation of body Temperature by physical chemical and nervous mechanisms .Role of Hypothalamus, Hypothermia and fever.	CO5

1	**Course Code**	**BCT 102**			
2	**Course Title**	**PHYSIOLOGY (LAB)**			
3	**Credit Hours**	**1**			
4	**Contact Hours (L-T-P)**	**0-0-2**			
5	Course Outcomes	CO1: To understand the importance of Hemoglobinometry,WBC count, ,RBC count CO2: To understand the importance of blood grouping, PCV & ESR determination CO3: To understand the importance of calculation of blood indices, BT, CT. CO4: To understand the importance of bllod pressure recordings, auscultations of heart sounds CO5: To understand the importance of artificial respiration and determination of vital capacity			
6	Course Description	• Blood • Cardiovascular system • Respiratory system			
	Practicals				
	Unit 1 Blood	a) Haemoglobinometry White Blood Cell count Red Blood Cell count b) Determination of Blood Groups Leishman's staining and Differential WBC count Determination of packed cell Volume Erythrocyte sedimentation rate [ESR] c) Calculation of Blood indices Determination of Clotting Time, Bleeding Time			CO1
	Unit 2	a)Blood pressure Recording b)Auscultation for Heart Sounds-normal c) Auscultation for Heart Sounds-abnormal			CO2
	Unit 3	a)Artificial Respiration b)Determination of vital capacity c) Determination of lung capacities			CO2
	Mode of examination				
	Weightage		MTE	ETE	

	Distribution for Theory	CA			
		20%		80%	
	Weightage Distribution for Practicals	CA		ETE	
		40%		60%	
	Text book/s*	1. Guyton (Arthur) Text Book of Physiology. Latest Ed. Prism publishers 2. Chatterjee(CC) Human Physiology Latest Ed. Vol-1, Medical Allied Agency 3. Choudhari (Sujith K) Concise Medical Physiology Latest Ed. New Central Book, 4. Ganong (William F) Review of Medical Physiology. Latest Ed . Appleton			

POs Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	1	3	2	1	2	2	2	3
CO2	3	3	2	2	3	2	3	2	3	2
CO3	2	3	2	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	3	2	2
CO5	2	2	2	2	2	2	2	2	2	2

BCT 103: BIOCHEMISTRY (Theory and Practicals)

School: SAHS		**Batch : 2019-23**	
Program: BCVT		**Current Academic Year: 2019-20**	
Branch: Cardio vascularTechnology		**Year: 1**	
1	Course Code	**BCT 103**	
2	Course Title	**BIOCHEMISTRY**	
3	Credit Hours	**4 hour**	
4	Contact Hours (L-T-P)	**2-1-1**	
	Course Status	Compulsory	
5	Course Objective	• To trained the students in the management of medical laboratory along with handling a variety of laboratory chemicals and instruments including electronic and advanced equipment's used in modern medical laboratories. • To make the students able to do routine laboratory testing under stipulated conditions. • To prepare specimens and operate machines that automatically analyse samples. • To provide the conceptual basis for understanding biochemical and particularly address the fundamental mechanisms of the biomolecules to facilitate the life. • To develop diagnostic skills in clinical biochemistry and to provide an advanced understanding of the core principles and topics of Biochemistry and their experimental basis.	

6	Course Outcomes	CO1: To understand the importance of sampling techniques CO2: To understand the importance of different types of glassware's CO3: To understand the importance of different types of equipment's CO4: To understand the importance of acid, base and buffer CO5: To understand the importance of chemistry of carbohydrates and lipids	
7	Course Description	• Introduction of Glasswaresand Laboratory Equipments • Safety of measurements in Laboratory, Sampling technique and its preservation • Preparation of Solutions • Acid, Base and Indicators • Nutrition • Carbohydrate, Lipid, Proteinand Nucleotide Chemistry • Enzymes, minerals, vitamins and cell biology	
8	Outline syllabus **Theory**		CO mapping
	Unit 1	**Introduction of Glasswares and laboratory equipments**	CO1, CO2
		a. Pipettes, Burettes, Beakers, Petri dishes, depression plates; Flasks - different types ; Volumetric, round bottomed, Erlemeyer conical etc. b. Water bath: Use, care and maintenance. Oven & Incubators. c. Refrigerators, cold box, deep freezers.Colorimeter and spectrophotometer.	
	Unit 2	**Safety of measurements in Laboratory, Sampling technique and its preservation**	CO1, CO2
		a. Different types of samples such as urine, blood, stool, tissue etc and various techniques to preserve the samples. b. Preparation of percentageand normal	

		solution. c. Preparation of molar and molal solution.	
	Unit 3	**Acid, Base, Indicators and Nutrition**	CO1, CO3
		a. Acid- base indicators: Definition, concept, mechanism of action. b. Importance of nutrition: Calorific values, Respiratory quotient, Energy requirement of a person - Basal metabolic rate. c. Balanced diet, recommended dietary allowances, Role of carbohydrates, lipid and protein in diet.	
	Unit 4	**Carbohydrate Chemistry**	CO1, CO4
		1. Definition, general classification with examples. 2. Glycosidic bond, Structures, composition, sources, properties and functions of Monosaccharide's and Disaccharides. 3. Structures, composition, sources, properties and functions of Oligosaccharides and Polysaccharides.	
	Unit 5	**Lipid Chemistry**	CO1, CO5
		a. Definition, classification, properties and functions of Fatty acids. b. Triacylglycerol and Phospholipids. c. Cholesterol, Essential fatty acids and their importance, Lipoprotein.	
	Unit 6	**Amino-acid Chemistry**	CO1, CO2
		1. Amino acid chemistry: Definition, Classification, Peptide bonds. Peptides: Definition, Biologically important peptides. 2. Protein chemistry: Definition, Classification, Functions of proteins, 3. Primary, Secondary, tertiary and quartenary structure of proteins	

	Unit 7	**Enzymes**	CO1, CO2
		1. Definition, Active site, Cofactor (Coenzyme, Activator), Proenzyme. Classification with examples, Factors effecting enzyme activity. 2. Enzyme inhibition and significance, 3. Isoenzymes, Diagnostic enzymology (clinical significance of enzymes)	
	Unit 8	**Mineral metabolism**	CO1, CO3
		1. Definition, Sources, RDA, absorption, transport, and excretion of various minerals. 2. Functions of various minerals 3. Disorder of various minerals (Sodium, Potassium, Calcium, Phosphate, Sulphur, Iron, Magnesium, Fluoride, Selenium, Zinc and Copper)	
	Unit 9	**Vitamins**	CO1, CO4
		1. Definition, classification according to solubility, Sources and Coenzyme forms of different vitamins 2. Functions, RDA, digestion, absorption and transport of various vitamins. 3. Deficiency and toxicity of various vitamins	
	Unit 10	**Cell Biology, Nucleotide and Nucleic acid Chemistry**	CO1, CO5
		1. Cell structure, Cell membrane structure and function, various types of absorption. Intracellular organelles and their functions, briefly on cytoskeleton. 2. Nucleotide chemistry: Nucleotide composition,functions of free nucleotides in body. 3. Nucleic acid (DNA and RNA) chemistry: Differencebetween DNA and RNA, Structure of DNA (Watson and Crick model), Functions	

		of DNA. Structure and functions of tRNA, rRNA, mRNA.	
1	**Course Code**	**BCT 103**	
2	**Course Title**	**BIOCHEMISTRY (LAB)**	
3	**Hours**	**1hr/week**	
4	**Contact Hours (L-T-P)**	**0-0-1**	
5	Course Outcomes	CO1: To understand the importance of sampling techniques CO2: To understand the importance of different types of glass wares and equipments CO3: To understand the importance of different types of acid, base and buffers CO4: To understand the importance of carbohydrates CO5: To understand the importance of proteins	
6	Course Description	• Introduction of Glassware's • Introduction of Laboratory Equipment's • Safety of measurements in Laboratory, • Preparation of Solutions • Determination of strength of acids and bases • Qualitative analysis of Carbohydrates and proteins	
	Practicals		CO mapping
	Unit 1	a. Introduction to Laboratory apparatus -1 b. Introduction to Laboratory apparatus -2 c. Maintenance of Laboratory apparatus-3	CO1, CO2
	Unit 2	a. Introduction to Laboratory glassware's -1 b. Introduction to Laboratory glassware's -2 c. Maintenance of Laboratory glassware's	CO1, CO2
	Unit 3	a. Safety measurements in Biochemistry lab b. General laboratory protocols c. Awareness in a lab	CO1, CO2
	Unit 4	a. Preparation of acids of different	CO1, CO3

		concentration b. Preparation of bases of different concentration c. Preparation of solutions of different concentration	
	Unit 5	a. Determination of the strength of NaOH solution b. Determination of the strength of HCl solution c. Determination of the strength of NH_4OH solution	CO1, CO3
	Unit 6	a. Preparation of acids of different concentration-1 b. Preparation of acids of different concentration-2 c. Preparation of acids of different concentration-3	CO1, CO3
	Unit 7	a) Preparation of bases of different concentration-1 b) Preparation of bases of different concentration-2 c) Preparation of bases of different concentration-3	CO1, CO3
	Unit 8	a. Preparation of solutions of different concentration-1 b. Preparation of solutions of different concentration-2 c. Preparation of solutionsof different concentration-3	CO1, CO3
	Unit 9	a) Qualitative analysis of Carbohydrates-1 b) Qualitative analysis of Carbohydrates-2	CO1, CO4

		c) Qualitative analysis of Carbohydrates-3			
	Unit 10	a) Qualitative analysis of Proteins-1 b) Qualitative analysis of Proteins-2 c) Qualitative analysis of Proteins-3			CO1, CO5
Mode of examination		Theory and Practical			
Weightage Distribution for Theory		IA		UTE	
		20%		80%	
Weightage Distribution for Practical's		IA		UPE	
		40%		60%	
Text book/s*		1. A text book of Medical Biochemistry by Chatterjee &Shinde 2. Text book of biochemistry for Medical students by Vasudevan and Sreekumari 3. Biochemistry by Lehringer 4. Clinical chemistry by Varley 5. Harpers Illustrated Biochemistry by Robert K.M.			

POs Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	1	3	2	1	2	2	2	3
CO2	3	3	2	2	3	2	3	2	3	2
CO3	2	3	2	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	3	2	2
CO5	2	2	2	2	2	2	2	2	2	2

BCT 104: Pathology &BCT 104: Pathology (Lab)

School: SAHS		**Batch : 2019-23**	
Program: BCT		**Current Academic Year: 2019-2020**	
Branch: Cardiovascular Technology		**Term: 1**	
1	Course Code	**BCT 104**	
2	Course Title	**Pathology**	
3	Credit Hours	**4**	
4	Contact Hours (L-T-P)	**2-1-2**	
	Course Status	Compulsory	
5	Course Objective	1. Able to perform various techniques of histopathology and will have good concept of biomedical waste management. 2. Able to perform urine examination, body fluid examination, CSF examination, sputum examination, stool examination etc. 3. Aable to perform certain blood tests in hematology. 4. Able to apply knowledge of clinical pathology in the diagnosis 5. Able to apply knowledge of clinical pathology in the management of disease. •	
6	Course Outcomes	CO1: To understand the techniques of histopathology and biomedical waste management CO2: To understand the importance of various body fluid examinations CO3: To understand the importance of various blood test CO4: To understand the importance of correct diagnosis of disease by histopathological techniques CO5: To understand the importance of management of disease	
7	Course Description	• Histopathology • Clinical pathology • Hematology	
8	Outline syllabus **Theory**		
	Unit 1	**Histopathology-1**	
		a) Introduction to histopathology Receiving of specimen in the laboratory b) Grossing techniques Mounting techniques – various moutants	CO1

		c) Maintenance of records and filling of the slides	
	Unit 2	**Histopathology-2**	
		a) Use & care of Microscope b) Various Fixatives, Mode of action c) Preparation and Indication of fixatives	CO1
	Unit 3	**Histopathology-3**	
		Bio-Medical waste management a)Section Cutting b)Tissue processing for routine paraffin sections c)Decalcification of Tissues. Staining of tissues - H& E Staining	CO1, CO2
	Unit 4	**Clinical pathology-1**	
		a) Introduction to Clinical Pathology b) Collection, Transport, Preservation, and c) Processing of various clinical specimens	CO2, CO3
	Unit 5	**Clinical pathology-2**	
		a) Urine Examination – Collection and Preservation of urine. Physical, chemical, Microscopic Examination b) Examination of body fluids. c) Examination of cerebro spinal fluid (CSF) Sputum Examination. Examination of feces	CO2, CO3
	Unit-6	**Hematology-1**	
		a) Introduction to Haematology b) Normal constituents of Blood, their structure and function c) Applied	CO3, CO4
	Unit-7	**Hematology-2**	
		a) Collection of Blood samples b) Various Anticoagulants used in Haematology c) Various instruments and glassware used in Haematology, Preparation and use of glassware	CO3, CO4
	Unit-8	**Hematology-3**	
		a) Laboratory safety guidelines b) SI units and conventional units in Hospital Laboratory c) Hb,PCV,ESR	CO4, CO5
	Unit-9	**Hematology-4**	
		a) Normal Hemostasis, b) Bleeding time, Clotting time, Prothrombin time,	CO4, CO5

		Activated Partial Thromboplastin Time **c)** Applied	
	Unit-10	**Hematology-5**	
		a) Blood bank introduction **b) Blood grouping and Rh types** **c) Cross matching**	CO5
1	**Course Code**	**BCT 104**	
2	**Course Title**	**Pathology (LAB)**	
3	**Credit Hours**	**1**	
4	**Contact Hours (L-T-P)**	**0-0-2**	
5	Course Outcomes	CO1: To understand the importance of histopathology techniques CO2: To understand the importance of use of microscope CO3: To understand the importance of clinicopathological techniques CO4: To understand the importance of haematological investigations CO5: To understand the importance of maintenance of blood bank	
6	Course Description	• Histopathology • Clinical pathology • Hematology	
	Practicals		
	Unit- 1	a)Grossing techniques b) Mounting techniques c)Maintenance of records and filling of the slides	CO1
	Unit-2	a) Use & care of Microscope b) Various Fixatives, Mode of action c) Preparation and Indication of fixatives	CO2
	Unit-3	a)Section Cutting b)Tissue processing for routine paraffin sections c)Decalcification of Tissues. Staining of tissues - H& E Staining	CO2, CO3
	Unit-4	a) Urine examination-Physical b) Urine examination-Chemical	CO3, CO4

		c) Urine examination-Microscopic			
	Unit 5	a) Practical-1 b) Practical-2 c) Practical-3			CO3, CO4
	Unit-6	a) Collection of blood samples – arterial b) Collection of blood samples – venous c) Safety procedure			CO4
	Unit-7	a) Preparation of glassware b) Use of glassware c) Handling of instruments			CO4
	Unit-8	a) Haemoglobin estimation b) PCV estimation c) ESR estimation			CO4
	Unit-9	a) Blood grouping b) Rh typing c) Safety measures			CO4, CO5
	Unit-10	a) Bleeding time estimation b) Clotting time estimation c) Prothrombin time and APTT estimation(understanding only)			CO4, CO5
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
		10%		40%	
	Weightage Distribution for Practicals	CA	MTE	ETE	
		20%		30%	
	Text book/s*	1. Culling Histopathology techniques 2. Bancroft Histopathology techniques 3. Koss – cytology 4. Winifred greg – Diagnostic cytopathology 5. Orell – Cyto Pathology 6. Todd & Sanford Clinical Diagnosis by laboratory method 7. Dacie& Lewis – Practical Haematology 8. RamanicSood, Laboratory Technology			

		(Methods and interpretation) 4th Ed. J.P. Bros, New Delhi –1996) 9. Satish Gupta Short text book of Medical Laboratory for technician J.P. Bros, New Delhi – 1998 10. Sachdev K.N. Clinical Pathology and Bacteriology 8th Ed, J.P. Bros 11. Krishna - Text book of Pathology, Orient Longman PVT Ltd. 12. Bacteriology 8th Ed, J.P. Bros, New Delhi-1991	

POs Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	1	3	2	1	2	2	2	3
CO2	3	3	2	2	3	2	3	2	3	2
CO3	2	3	2	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	3	2	2
CO5	2	2	2	2	2	2	2	2	2	2

BCT 104: Microbiology &BCT 104: Microbiology (Lab)

School: SAHS		**Batch : 2019-23**	
Program: BCT		**Current Academic Year: 2019-2020**	
Branch: Cardiovascular Technology		**Term: 1**	
1	Course Code	**BCT 104**	
2	Course Title	**Microbiology**	
3	Credit Hours	**4**	
4	Contact Hours (L-T-P)	**2-1-2**	
	Course Status	Compulsory	
5	Course Objective	1. Able to collect and dispatch specimen for routine investigation	

		2. Able to interpret commonly done bacteriological and serological investigations 3. Able to control hospital infections 4. Able to manage biomedical waste management 5. Able to understand immunisation schedule	
6	Course Outcomes	CO1: To understand the techniques of specimen collection CO2: To understand the importance of bacteriological and serological investigations CO3: To understand the importance of nosocomial infection complication CO4: To understand the importance of biochemical waste management CO5: To understand the importance microscopy and their handling techniques and staining procedures	
7	Course Description	• Classification, growth and nutrition of microorganism • Steriliation and disinfection • Immunology • Systemic bacteriology • Parasitology • Mycology • Virology • Hospital infection • Biomedical waste management	
8	Outline syllabus **Theory**		
	Unit 1	**Classification of microorganism**	
		a) Classification of microorgaisms, b) size, shape and structure of bacteria. c) Use of microscope in the study of bacteria	CO1
	Unit 2	Growth and nutrition	
		a) Nutrition of bacteria b) growth and multiplications of bacteria, c) use of culture media in diagnostic bacteriology	CO1, CO2
	Unit 3	Sterilisation and Disinfection	
		a) Principles and use of equipments of sterlization namely Hot Air oven, Autoclave and serum inspissrator. b) Pasteurization, Antiseptic and disinfectants. c) Antimicrobial test	CO1, CO2
	Unit 4	**Immunology**	
		a) Immunity vaccines, types of vaccine and immunization schedule	CO1, CO2, CO3

		b) Principles and interpretation of commonly done serological tests namely Wida, VDRL,ASLO,CRP,RF & ELISA c) Rapid tests for HIV and HbsAg	
	Unit 5	**Systemic Bacteriology**	
		a) Morphology, cultivation, diseases caused ,laboratory diagnosis includingspecimen collection of the following bacteria(the classification, antigenicstructure and pathogenicity are not to be taught) b) Staphyloccci, Streptococci, Pneumococci, Gonococci, Menigococci, c) C diphtheriae, Mycobacteria, Clostridia, Bacillus, Shigella, Salmonella, Esch coliKlebsiella, Proteus,vibriocholerae, Pseudomonas & Spirochetes	CO2, CO3
	Unit-6	**Parasitology**	
		a) Morphology, life cycle, laboratory diagnosis of following parasitesE. histolytica, b) Plasmodium, c) Tape worms, Intestinal nematodes	CO3, CO4
	Unit-7	**Mycology**	
		a) Morphology, diseases caused and lab diagnosis of following fungi , Candida, b) Cryptococcus, Dermatophytes , c) opportunistic fungi	CO3, CO4
	Unit-8	**Virology**	
		a) General properties of viruses, diseases caused, b) lab diagnosis and prevention of following viruses, Herpes, Hepatitis, c) HIV, Rabies and Poliomyelitis	CO3, CO4, CO5
	Unit-9	**Hospital infection**	
		a) Causative agents, transmission methods, b) investigation c) prevention and control Hospital infection	CO4, CO5
	Unit-10	**Biomedical waste management**	
		a) Principle b) Practice **c)** Applied	CO4,CO5
1	**Course Code**	**BCT 104**	
2	**Course Title**	**Microbiology (LAB)**	
3	**Credit Hours**	**1**	

4	**Contact Hours (L-T-P)**	**0-0-2**	
5	Course Outcomes	CO1: To understand the importance of compound microscopy CO2: To understand the importance of sterilizartion CO3: To understand the importance of serological tests CO4: To understand the importance of gram staining CO5: To understand the importance of biomedical waste management	
6	Course Description	• Microscopy • Clinical pathology • Hematology	
	Practicals		
	Unit- 1	a)Handling of microscope b) Use of microscope c) Safety measures	CO1
	Unit-2	a) Use of culture media b) Nutrient broth, nutrient agar,blood agar c) Chacolate agar, Mac conkey medium, LJ media, Robertson Cooked meat media, Potassium tellurite media with growth,	CO1,CO2
	Unit-3	a) Demonstration and sterlization of equipments – Hot Air oven, Autoclave, Bacterial filters b) Mac with LF & NLF, NA with staph Antibiotic susceptibility test c) Other	CO2
	Unit-4	Demonstration of common serological tests – a) Widal, b) VRDL, c) ELISA	CO2,CO3
	Unit 5	a) Gram staining b) Acid fast staining c) Applied	CO3,CO4
	Unit-6	Stool examination for a) Ova b) Cyst	CO3,CO4

		c) Parasite			
	Unit-7	Lab diagnosis of a) candida, Cryptococcus b) dermatophytes c) opportunistic fungi			CO4
	Unit-8	Lab diagnosis of a) Herpes b) Hepatitis, HIV, Rabies c) Poliomyelitis			CO4
	Unit-9	a) Visit to hospital for demonstration of biomedical waste management-1 b) Visit to hospital for demonstration of biomedical waste management-2 c) Visit to hospital for demonstration of biomedical waste management-3			CO4, CO5
	Unit-10	a) Anaerobic culture methods-1 b) Anaerobic culture methods-2 c) Anaerobic culture methods-3			CO4,CO5
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
		10%		40%	
	Weightage Distribution for Practicals	CA	MTE	ETE	
		20%		30%	
	Text book/s*	1. Anathanarayana&Panikar Medical Microbiology 2. RobertyCruckshank – Medical Microbiology – The Practice of Medical Mircrobiology 3. Chatterjee – Parasitology – Interpretation to Clinical medicine 4. Rippon – Medical Mycology 5. Emmons – Medical mycology 6. Basic laboratory methods in Parasitology, 1st Ed, J P Bros, New Delhi 7. Basic laboratory procedures in clinical bacteriology, 1st Ed, J P Brothers 8. Medical Parasitology – AjitDamle			

POs Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	1	3	2	1	2	2	2	3
CO2	3	3	2	2	3	2	3	2	3	2
CO3	2	3	2	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	3	2	2
CO5	2	2	2	2	2	2	2	2	2	2

BCT 105: Basics of Hospital and Data Management

School: SAHS		**Batch : 2019-23**	
Program: BCT		**Current Academic Year: 2019-2020**	
Branch: Cardiovascular Technology		**Term: 1**	
1	Course Code	**BCT 105**	
2	Course Title	**Basics of Hospital and Data management**	
3	Credit Hours	**2**	
4	Contact Hours (L-T-P)	**2-0-0**	
	Course Status	Compulsory	
5	Course Objective	1. Able to understand the techniques management and organizational behaviour 2. Able to understand the quality control and hospital information system 3. Able to understand the principle of CDM 4. Able to know data management 5. Able to manage material and inventory control,storage, equipment/operation .	
6	Course Outcomes	CO1: To understand the techniques management and organizational behaviour CO2: To understand the importance of quality control and hospital information system CO3: To understand the importance of CDM CO4: To understand the importance of documents in data management and material management and inventory control CO5: To understand the importance of storage techniques	

		and equipments/operation management	
7	Course Description	• Introduction to Management • Organizational behaviour • Quality Control • Hospital Information System • Introduction and Principles of CDM • Documents in data Management • Material management and Inventory Control • Storage • Equipment/ Operations management	
8	Outline syllabus **Theory**		
	Unit 1	**Introduction to Management:**	
		a) Definition, Concepts, b) Principles, various models, c) Management components i.e. Planning, Organizing, Staffing, Motivating, Leading, Co-ordination and Controlling.	CO1
	Unit 2	**Organizational behaviour**	
		a) Concept of Organizational Behaviour b) Major Components of organizational behaviour – Personality development, Motivation, Group, Leadership, c) Cooperation and Conflict	CO1
	Unit 3	**Quality Control:**	
		a)Definition of Quality, Dimensions of Quality, b) Basic concepts of Total Quality Management, c) Quality Awards	CO2
	Unit 4	**Hospital Information System:**	
		a) Hospital Information System b) Management and software applications in registration, billing, investigations, reporting, medical records management, information processing, c) Security and ethical challenges	CO2
	Unit 5	**Introduction and Principles of CDM:**	

		a) CDM Process; Data entry methods of CDM; b) SOPs on CDM; Data coding and decoding; c) Medical Dictionaries	CO3
	Unit-6	**Documents in data Management:**	
		a) Prescription,CaseReport form, Source documents**,** Informed consent form, Patient information sheet, b) Clinical study report, c) Log books, Master files	CO4
	Unit-7	**Material management and Inventory Control:**	
		a) Concept, Materials Planning, Classification of Materials-Consumable and Non consumable, working out quantities required, forecasting, b) Budgeting, various costs of inventory, c) Inventory techniques-ABC, SDE / VED Analysis, EOQ models.	CO4
	Unit-8	**Storage:**	
		a) Importance and functions of storage, b) Location and layout of stores, c) Management of receipts and issue of materials from stores, Warehousing costs, Stock verification	CO5
	Unit-9	**Equipment/ Operations management:-1**	
		a) hospital equipment repair and maintenance, types of maintenance, b) job orders, equipmentmaintenance log books, AMCS, **c)** outsourcing of maintenance services,	CO5
	Unit-10	**Equipment/ Operations management:-2**	
		a) quality and reliability, b) concept of failure, equipment history and documents, replacement policy, calibration tests, spare parts, c) stocking techniques and polices	CO5

1	**Course Code**	**BCT 105**			
2	**Course Title**	**Hospital and data management (LAB)**			
3	**Credit Hours**	**0**			
4	**Contact Hours (L-T-P)**	**0-0-0**			
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
		20%		80%	
	Weightage Distribution for Practicals	CA	MTE	ETE	

POs Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	1	3	2	1	2	2	2	3
CO2	3	3	2	2	3	2	3	2	3	2
CO3	2	3	2	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	3	2	2
CO5	2	2	2	2	2	2	2	2	2	2

BCT 201: Medicine Relevant to Cardiac care technology

School: SAHS		**Batch : 2019-2023**	
Program: BCT		**Current Academic Year: 2020-2021**	
Branch: Cardiovascular Technology		**Term: 2**	
1	Course Code	**BCT 201**	
2	Course Title	**Medicine Relevant to Cardiac care technology**	
3	Credit Hours	**4**	
4	Contact Hours (L-T-P)	**4-0-0**	
	Course Status	Compulsory	

5	Course Objective	1. Able to understand CVS disease 2. Able to understand concepts of Hematology 3. Able to understand concepts of Respiratory system 4. Able to understand concepts of Renal system & CNS 5. Able to understand problems of metabolic syndrome and age specified problem	
6	Course Outcomes	CO1: To understand the concepts of cardiovascular system CO2: To understand the importance of Hematology CO3: To understand the concepts of Respiratory sytem CO4: To understand the concepts of CNS CO5: To understand the importance of metabolic syndrome and age specified problems	
7	Course Description	• Cardiovascular system • Hematology • Renal system • CNS • Respiratory system • DM,obesity, pregnancy, elderly, paediatric	
8	Outline syllabus **Theory**		
	Unit 1	**Cardiovascular system-1**	
		a) Ischemic Heart Disease- General, Angina pectoris b) Ischemic Heart Disease- MI c) Rheumatic heart disease	CO 1
	Unit 2	**Cardiovascular system-2**	
		a) Congenital heart disease b) Hypertension c) Aortic Aneurysm	CO 1
	Unit 3	**Cardiovascular system-3**	
		a) Cardiomyopathy b) Peripheral vascular disease c) Pulmonary edema and LV failure	CO 1
	Unit 4	**Hematology**	
		a) Anaemia b) Bleeding disorders c) Laboratory tests used to diagnose bleeding disorders (in brief)	CO 2
	Unit 5	**Respiratory system**	

		a) Respiratory system – General b) Chronic obstructive airway diseases (COPD) c) Concept of obstructive versus restrictive pulmonary disease PFT and its interpretation			CO 3
	Unit-6	**Renal system**			
		a) ARF & CRF b) End stage renal disease c) Role of dialysis and renal transplantation in its management			CO 3
	Unit-7	**Central Nervous System**			
		a) Autonomic nervous system -Sympathetic b) ANS-Parasympathetic system c) Brief mention of CNS disorders & their etiology			CO 4
	Unit-8	**Others-1**			
		a) Diabetes mellitus-Type1&2 b) Other **c)** Obesity			CO 5
	Unit-9	**Others-2**			
		a) Pregnancy-physiological variation b) Pregnancy-nutritional requirements c) Pregnancy-complication			CO 5
	Unit-10	**Others-3**			
		a) Paediatric patient-Neonate b) Paediatric patient-Infant **c)** Elderly patient			CO 5
	Mode of examination	Theory			
	Weightage Distribution for	CA	MTE	ETE	
		20%		80%	

	Theory				
	Weightage Distribution for Practicals	CA	MTE	ETE	
	Text book/s*	1. Harrison principle of internal medicine 2. Davidson principle and practice of medicine			

POs Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	1	3	2	1	2	2	2	3
CO2	3	3	2	2	3	2	3	2	3	2
CO3	2	3	2	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	3	2	2
CO5	2	2	2	2	2	2	2	2	2	2

BCT 201: Applied Pathology &BCT 201: Applied Pathology(Lab)

School: SAHS		**Batch : 2019-23**	
Program: BCT		**Current Academic Year: 2020-2021**	
Branch: Cardiovascular Technology		**Term: 2**	
1	Course Code	**BCT 202**	
2	Course Title	**Applied Pathology**	
3	Credit Hours	**4**	
4	Contact Hours (L-T-P)	**3-1-2**	
	Course Status	Compulsory	
5	Course Objective	1. Able to understand the progression of diseases related to various system of body. 2. Able to identify, diagnose and describe the disease from specimen 3. Able to identify, diagnose and describe the disease from certain blood tests. 4. Able to understand basic pathological principle in course of diagnosis of disease 5. Able to relate pathological diagnosis with disease progression	
6	Course Outcomes	CO1: To understand the importance of disease progression mechanism CO2: To understand the importance of techniques of specimen collection CO3: To understand the importance of techniques of performing certain blood tests CO4: To understand the importance of diagnosing diseases CO5: To understand the importance of interrelating disease progression with pathological change	
7	Course Description	• Cardiovascular system • Hematology • Respiratory system • Renal system	
8	Outline syllabus **Theory**		
	Unit 1	**Cardiovascular system-1**	
		a) Atherosclerosis- Definition, risk factors,	CO1

		briefly Pathogenesis & morphology, clinical significance and prevention. b) Hypertension- Definition, types and briefly Pathogenesis and effects of Hypertension. c) Aneurysms – Definition, classification, Pathology and complications	
	Unit 2	**Cardiovascular system-2**	
		a) Pathophysiology of Heart failure. b) Cardiac hypertrophy – causes, Pathophysiology & Progression to Heart Failure. c) Ischaemic heart diseases- Definition, Types. Briefly Pathophysiology, Pathology & Complications of various types of IHD	CO1, CO2
	Unit 3	**Cardiovascular system-3**	
		a) Valvular Heart diseases- causes, Pathology & complication. b) Complications of artificial valves. c) Cardiomyopathy – Definition, Types, causes and significance	CO1, CO2, CO3
	Unit 4	**Cardiovascular system-4**	
		a) Pericardial effusion- causes, effects and diagnosis. b) Congenital heart diseases – Basic defect and c) effects of important types of congenital heart diseases.	CO2, CO3
	Unit 5	**Hematology-1**	
		a) Anaemia – Definition, morphological types and b) diagnosis of anaemia. c) Brief concept about Haemolytic anaemia and polycythaemia	CO3
	Unit-6	**Hematology-2**	
		a) Leukocyte disorders- Briefly leukaemia,leukocytosis, agranulocytosis etc., b) Bleeding disorders- Definition, classification, causes & effects of	CO3

		important types of bleeding disorders. c) Briefly various laboratory tests used to diagnose bleeding disorders	
	Unit-7	**Respiratory system-1**	
		a) Chronic obstructive airway diseases – Definition and types. b) Briefly causes, Pathology and complications of each type of COPD. c) Briefly concept about obstructive versus restrictive pulmonary disease	CO4
	Unit-8	**Respiratory system-2**	
		a) Pneumoconiosis- Definition, types, Pathology and effects in brief. b) Pulmonary congestion and edema. c) Pleural effusion – causes, effects and diagnosis.	CO4
	Unit-9	**Renal system-1**	
		a) Clinical manifestations of renal diseases. b) Briefly causes, mechanism, effects and laboratory diagnosis of ARF & CRS. c) Briefly Glomerulonephritis and Pyelonephritis	CO5
	Unit-10	**Renal system-2**	
		a) End stage renal disease – Definition, causes, effects and b) role of dialysis and renal transplantation in its management c) Brief concept about obstructive uropathy.	CO5
1	**Course Code**	**BCT 202**	
2	**Course Title**	**Applied pathology (LAB)**	
3	**Credit Hours**	**1**	
4	**Contact Hours (L-T-P)**	**0-0-2**	

5	Course Outcomes	CO1: To understand the importance of diagnosing disease from gross specimen CO2: To understand the importance of interpretation and diagnosis from haematological chart CO3: To understand the importance estmation of hemoglobin CO4: To understand the importance performing certain blood tests CO5: To understand the importance of pathological maneuver in diagnosing the disease	
6	Course Description	• Gross specimen – various disease • Diagnosis and interpretation by charts • Hematological tests	
	Practicals		
	Unit- 1	Atherosclerosis a) Description b) Diagnosis c) Interpretation	CO1
	Unit-2	Aortic aneurysm a) Description b) Diagnosis c) Interpretation	CO1
	Unit-3	Myocardial infaraction a) Description b) Diagnosis c) Interpretation	CO2
	Unit-4	Emphysema a) Description b) Diagnosis c) Interpretation	CO2
	Unit 5	Chronic glomerulonephritis a) Description b) Diagnosis c) Interpretation	CO2, CO3
	Unit-6	Chronic pyelonephritis a) Description	CO3

		b) Diagnosis c) Interpretation	
	Unit-7	Interpretation & diagnosis of a) Haematological chart – AML, CML, b) Haematological chart -Hemophilia c) Haematological chart- neutrophilia, eosinophilia	CO3, CO4
	Unit-8	Interpretation & diagnosis of a) Urine chart – ARF b) Urine chart – CRF c) Urine chart – Acute glomerulonephritis	CO4
	Unit-9	Estimation of haemoglobin a) Methods b) Errors c) Precautions	CO4, CO5
	Unit-10	Estimation of a) Bleeding time b) Clotting time c) Clinical relation	CO5
	Mode of examination	Theory and Practical	
	Weightage Distribution for Theory	CA: 10% / MTE: / ETE: 40%	
	Weightage Distribution for Practicals	CA: 10% / MTE: / ETE: 40%	
	Text book/s*	1. Culling Histopathology techniques 2. Bancroft Histopathology techniques 3. Koss – cytology 4. Winifred greg – Diagnostic cytopathology 5. Orell – Cyto Pathology 6. Todd & Sanford Clinical Diagnosis by laboratory method 7. Dacie& Lewis – Practical Haematology RamanicSood, Laboratory Technology	

POs Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3

CO1	2	3	1	3	2	1	2	2	2	3
CO2	3	3	2	2	3	2	3	2	3	2
CO3	2	3	2	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	3	2	2
CO5	2	2	2	2	2	2	2	2	2	2

BCT 202: Applied Micobiology&BCT 202: Applied Microbiology(Lab)

School: SAHS		**Batch : 2019-23**	
Program: BCT		**Current Academic Year: 2020-2021**	
Branch: Cardiovascular Technology		**Term: 2**	
1	Course Code	**BCT 202**	
2	Course Title	**Applied Microbiology**	
3	Credit Hours	**4**	
4	Contact Hours (L-T-P)	**2-1-2**	
	Course Status	Compulsory	
5	Course Objective	1. Able to understand health care associated infections, antimicrobial resistance, 2. Able to understand health care associated disease communicable to health care workers in hospital setup and its preventive measures. 3. Perform microbiological surveillance and sampling. 4. Able to understand the methodology of disinfection of instruments, patient care unit, ICU's, various methods of sterilization of room, 5. Able to understand the methodology of disinfection equipments, central supply department, sterilization techniques	
6	Course Outcomes	CO1: To understand the importance of health care associated infection and antimicrobial resistance CO2: To understand the importance of disease communicable in hospitals and preventive measures CO3: To understand the importance of microbiological surveillance and sampling CO4: To understand the importance of diagnosing diseases CO5: To understand the importance of sterilization	

		techniques	
7	Course Description	• Health care associated infections and Antimicrobial resistance • Disease communicable to Healthcare workers in hospital set up and its preventive measure • Microbiological surveillance and sampling • Sterilization and importance of sterilization • Preparation of materials for autoclaving	
8	Outline syllabus **Theory**		
	Unit 1	Health care associated infections and Antimicrobial resistance-1	
		Infections that patients acquire during the course of receiving treatment for other conditions within a healthcare setting like a) Methicillin Resistant Staphylococcus aureus infections, b)Infections caused by Clostridiuimdifficle, c)Vancomycin resistant enterococci etc	CO1
	Unit 2	Health care associated infections and Antimicrobial resistance-2	
		a) Catheter related blood stream infections, Ventilator associated pneumonia, Catheter Related urinary tract infections, b) Surveillance of emerging resistance and changing flora. c) The impact and cost attributed to Hospital Associated infection	CO1
	Unit 3	Disease communicable to Healthcare workers in hospital set up and its preventive measure-1	
		Occupationally acquired infections in healthcare professionals by respiratory route a) Tuberculosis, b) Varicella-zoster, c) Respiratory synctial virus etc	CO2
	Unit 4	Disease communicable to Healthcare workers in hospital set up and its preventive measure-2	
		Occupationally acquired infections in healthcare professionals by respiratory route a) Blood borne transmission (HIV, Hepatitis B, Hepatitis C, Cytomegalovirus, Ebola virus etc), b) Oro faecal route (Salmonella, Hepatitis A etc), c) Direct contact (Herpes Simplex Virus etc).	CO2, CO3

	Unit 5	Disease communicable to Healthcare workers in hospital set up and its preventive measure-3	
		Preventive measures to combat the spread of these infections by a) monitoring b) control c) Observation	CO3
	Unit-6	Microbiological surveillance and sampling-1	
		Required to determine the frequency of potential bacterial pathogens including a) Streptococcus pneumoniae, b) Haemophilus influenzae, and Moraxella catarrhalis and c) Also to assess the antimicrobial resistance	CO3
	Unit-7	Microbiological surveillance and sampling-2	
		Sampling: a) rinse technique, b) direct surface agar plating technique. c) other	CO4
	Unit-8	Importance of sterilization:	
		a. Disinfection of instruments used in patient care: Classification, different methods, advantages and disadvantages of the various methods b. Disinfection of the patient care unit c. Infection control measures for ICU's	CO4,CO5
	Unit-9	Sterilization	
		a) Rooms: Gaseous sterilization, one atmosphere uniform glow discharge plasma (OAUGDP) b) Equipments: classification of the instruments and appropriate methods of sterilization c) Central supply department: the four areas and the floor plan for instrumentCleaning, high-level	CO5

		disinfecting and sterilizing areas	
	Unit-10	Preparation of materials for autoclaving	
		a) Packing of different types of materials, b) loading, c) holding time and unloading.	CO5
1	**Course Code**	**BCT 202**	
2	**Course Title**	**Applied Microbiology (LAB)**	
3	**Credit Hours**	**1**	
4	**Contact Hours (L-T-P)**	**0-0-2**	
5	Course Outcomes	CO1: To understand the importance of autoclaving & quality control CO2: To understand the importance of Collection of specimen CO3: To understand the importance of sterility testing CO4: To understand the importance performing disinfection CO5: To understand the importance of Interpretation of results of sterility testing	
6	Course Description	1. Principles of autoclaving & quality control of Sterilization. 2. Collection of specimen from outpatient units, inpatient units, minor operation theater and major operation theater for sterility testing. 3. The various methods employed for sterility testing. 4. Interpretation of results of sterility testing. Disinfection of wards, OT and Laboratory	
	Practicals		
	Unit- 1	Principle of autoclaving a) Methods b) Observations c) Precautions	CO1
	Unit-2	Quality control of sterilization a) Methods b) Observations c) Recautions	CO1
	Unit-3	Collection of specimen-1 a) Methods b) Observations	CO2

		c) Precautions			
	Unit-4	Collection of specimen-2 a) Methods b) Observations c) Precautions			CO2
	Unit 5	The various methods employed for sterility testing a) Methods b) Observation c) Precautions			CO3
	Unit-6	Interpretation of result of sterility testing a) Interpretation b) Analysis c) Result			CO3
	Unit-7	Disinfection of wards a) Methods b) Observation c) Precaution			CO3, CO4
	Unit-8	Disinfection of OT d) Methods e) Observation f) Precaution			CO4
	Unit-9	Disinfection of Laboratory a) Methods b) Observation c) Precaution			CO5
	Unit-10	Equipments a) Observation b) Maintenance c) Sterilization			CO5
	Mode of examination	Theory and Practical			
	Weightage Distribution for	CA	MTE	ETE	
		10%		40%	

	Theory				
	Weightage Distribution for Practicals	CA	MTE	ETE	
		10%		40%	
	Text book/s*	Microbiology 1. Anathanarayana&Panikar Medical Microbioloty 2. RobertyCruckshank – Medical Microbiology – The Practice of Medical Mircrobiology 3. Chatterjee – Parasitology – Interpretation to Clinical medicine. 4. Rippon – Medical Mycology 5. Emmons – Medical mycology 6. Basic laboratory methods in Parasitology, 1st Ed, J P Bros, New Delhi – 7. Basic laboratory procedures in clinical bacteriology, 1st Ed, J P Brothers, 8. Medical Parasitology – AjitDamle			

POs Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	1	3	2	1	2	2	2	3
CO2	3	3	2	2	3	2	3	2	3	2
CO3	2	3	2	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	3	2	2
CO5	2	2	2	2	2	2	2	2	2	2

BCT 203: Applied Pharmacology

School: SAHS		**Batch : 2019-23**	
Program: BCT		**Current Academic Year: 2020-2021**	
Branch: Cardiovascular Technology		**Term: 2**	
1	Course Code	**BCT 203**	

2	Course Title	**Applied Pharmacology**	
3	Credit Hours	**3**	
4	Contact Hours (L-T-P)	**2-1-0**	
	Course Status	Compulsory	
5	Course Objective	1. Able to understand the basic scientific concepts and principles related to pharmacokinetics, pharmacodynamics, 2. Able to understand the drug metabolism, drug-drug interaction, route of administration, drug action, drug efficacy and potency, drug toxicity etc. 3. Able to know various drugs and their action related to different systems of body 4. Able to perform certain experimental pharmacology procedure. 5. Able to understand use of drugs in various diseases	
6	Course Outcomes	CO1: To understand the concepts of paharmacological principles CO2: To understand the mechanism of action of ANS drugs, CVS drugs, anaesthetic drugs CO3: To understand the mechanism of action of analgesics, antihistaminic, antiemetics drugs CO4: To understand the mechanism of action of CNS stimulants,depressants, emergency drugs CO5: To understand the mechanism of action of diuretics, cheomtherpy, corticosteroids	
7	Course Description	• Pharmacological principles • Autonomic nerves system • Cardiovascular drugs • Anaesthetic drugs • Analgesics drugs • Antihistamine and Antiemetics • CNS stimulants and depressants and inhalational gas and emergency drugs • Pharmacotherapy of respiratory disorders • Corticosteroids, Diuretics, Chemotherapy of infections	
8	Outline syllabus **Theory**		
	Unit 1	**Pharmacological principles**	
		General concepts about a) Pharmacodynamic and b) Pharmacokinetic	CO1

		c) Principles involved in drug activity	
	Unit 2	Autonomic nerves system.	
		a) Anatomy & functional organisation. b) List of drugs acting an ANS including dose, route of administration, indications, c) contra indications and adverse effects	CO2
	Unit 3	**Cardiovascular drugs**	
		a) antihypertensives, antiarrhythmic, cardiac glycosides, sympathetic and nonsympathetic inotropic agents b) coronary vasodilators, antianginal and antifailure agents, lipid lowering &antiatherosclerotic drugs c) drugs used in hemostasis, cardioplegic drugs, primary solutions, drugs used in shock	CO2,CO3
	Unit 4	**Anaesthetic drugs**	
		a) Definition of general and local anaesthetics.,Classification of general anaesthetics. b) Pharmacokinetics and Pharmacodynamics of inhaled anaesthetic agents.Intravenous general anaesthetic agents. c) Local anaesthetics – classification mechanism of action, duration of action and methods to prolong the duration of action. Preparation, dose and routes of administration	CO3
	Unit 5	**Analgesics drugs**	
		a) Definition and classification b) Routes of administration, dose, frequency of administration, c) Side effects and management of non opioid and opiod analgesics	CO3
	Unit-6	**Antihistamine and Antiemetics**	
		a) Classification, Mechanism of action, b) adverse effects, c) Preparations, dose and routes and administration	CO3
	Unit-7	**CNS stimulants and depressants and inhalational gas and emergency drugs**	
		a) alcohol, Sedatives, hypnotics and narcotics,CNSstimulants,neuromuscular blocking agents and muscle relaxants b) pharmacological protection of organs during CPB	CO4

		c) inhalational gaes and emergency drugs	
	Unit-8	**Pharmacotherapy of respiratory disorders**	
		a) Introduction – Modulators of bronchial smooth muscle tone and pulmonary vascular smooth muscle tone b) Pharmacotherapy of bronchial asthma Pharmacotherapy of cough Mucokinetic and mucolytic agents c) Use of bland aerosols in respiratory care.	CO4
	Unit-9	**Corticosteroids, Diuretics, Chemotherapy of infections**	
		a) Corticosteroids-Classification, mechanism of action, adverse effects and complications. Preparation, dose and routes of administration b) Diuretics • Renal physiology • Side of action of diuretics • Adverse effects • Preparations, dose and routes of administrion c) Chemotherapy of infections • Definition • Classification and mechanism of action of antimicrobial agents • Combination of antimicrobial agents • Chemoperophylaxis. • Classification, spectrum of activity, dose, routes of administration and adverse effects of penicillin, cephalosporins, aminoglycosides, tetracyclines, chloramphenicol, antitubercular drugs.	CO5
	Unit-10	**Miscellaneous**	
		a) IV fluids- various preparations and their usage.Electrolyte supplements b) Immunosuppressive agents New drugs included in perfusion technology. c) Drugs used in metabolic and electrolyte imbalance	CO5
	Mode of examination	Theory and Practical	
	Weightage Distribution for	CA: 20% / MTE: / ETE: 80%	

	Theory				
	Weightage Distribution for Practicals	CA	MTE	ETE	

POs Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	1	3	2	1	2	2	2	3
CO2	3	3	2	2	3	2	3	2	3	2
CO3	2	3	2	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	3	2	2
CO5	2	2	2	2	2	2	2	2	2	2

BCT 204: INTRODUCTION TO CARDIAC CARE TECHNOLOGY

School: SAHS		**Batch : 2019-23**	
Program: BCVT		**Current Academic Year: 2020-2021**	
Branch: Cardiovascular Technology		**Year: 2**	
1	Course Code	**BCT 204**	
2	Course Title	Introduction to Cardiac Care Technology	
3	Credit Credits	**5**	
4	Contact Hours (L-T-P)	**3-1-2**	
	Course Status	Compulsory	
5	Course Objective	• To enables students to become a trained, qualified cardiovascular technician capable of working independently or in association with a higher setup. • To integrate knowledge and skills of cardiovascular technology to	

		provide health care solutionsfor the benefit of the society. • After the completion of program ,graduate become well- prepared for work associated with assisting cardiac surgeon's in tertiary care hospitals and others. • After the copletion of program, candidates become well known in teccniques such as Electrocardiography, Echocardiography,Treadmill Test/Stress test,Doppler Ultrasonography and contrast Echo. • Graduates will have a good leadership qualities and entrepreneur skills by working and communicating effectively in interdisciplinary environment, either independently or with a team.	
6	Course Outcomes	CO1: To apply knowledge of human cardiovascular and it's related system in the diagnosis,cardiovascular disorder & it's management. CO2: To plan and implement clinical & scientific activities related the profession of cardiovascular technology. CO3: To tackle future challenges through lifelong learning & training process related to cardiac health. CO4: To diagnose and solve complex problems arising during cardiovascular care of the patients. CO5: To utilize modern tools and techniques in the field of cardiovascular technology for patient compliance.	
7	Course Description	• Introduction of Electrocardiography. • Introduction of Echocardiography. • Safety measurements during Echocardiography procedures & Limitation. • Patient preparation during Electrocardiography, Echocardiography, Treadmill Test. • Introduction of different types of Pacemaker. • Introduction of (Valvular Heart Disease,Coronary Artery Disease, & Congestive Heart Disease. • Carbohydrate Chemistry • Lipid Chemistry	
8	Outline syllabus **Theory**		
	Unit 1	ECG Basic Principles.	
		Theory:	CO1

		d) Electrocardiography &its paper. b)BasicEcg and deflections & its ecg basic action. c)The leads: Standard Limb,Precardial Lead, 'V' lead & 'AV' lead Basic ECG Deflections .	
	Unit 2	Normal EG The 'p' wave.	
		d) The genesis of 'qrs'complex, T wave , the ST segment , The' U' wave. e) Rate & Rhythm. f) Morphology of 'P' wave .qrs complex, & T wave.	CO1, CO2
	Unit 3	Electric Axis.	
		e) Precardial Pattern of ECG. f) So called rotation of the heart –The QT interval. g) The Electric Field.	CO2, CO3
	Unit 4	Chamber Enlargement.	
		d) Atrial enlargement, LV Hypertrophy, RV Hypertrophy. e) Principles of Bundle Branch B locks, LBBB, RBBB. f) The Hemiblocks.	CO2, CO3, CO4
	Unit 5	Exercise Stress Testing.	
		d) Exercise & its protocols. e) Electrocardiography Measurements. f) Exercise Testing-Indications & Techniques.	**CO1, CO2, CO3**
	Unit 6	Echocardiography	
		a) Basic Principles of E chocardiography. b) Modalities of Echo (M- mode, 2D, Color Doppler). c) Transoesophageal Echocardiography.	**CO1, CO2, CO3**
	Unit 7	Instrumentations.	
		d) Basic pulse echo system & Transducer. e) Pulse generation & Echo Detection. f) Modalities, Display & Record.	**CO2, CO3. CO4**
	Unit 8	Echocardiographi	

		c Examination.	
		d) Selecting Transducer's, Position of the patient, Placement of the Transducer. e) Setting Control (M –mode Labelling, 2D Echo, Normal Variants, Terminology. f) Identification of Segments.	**CO3 , CO4**
	Unit 9	Doppler Echocardiography	
		d) Introduction to Doppler ColorEchocardiography the Doppler principles, Doppler ultrasound techniques, Color Doppler flow Imaging, Clinical application of Doppler Echocardiograph. e) Physical principles & Instrumentation in Spectral &ColorDoppler flow imaging, Physical principles & Doppler effect, The Doppler Echocardiography system. Blood Flow Pattern (Laminar & Non Laminar). f) Doppler Echo Modes (Continuous Doppler System, Pulsed Doppler System, High pulse repetition frequency).	**CO4 , CO5**
	Unit 10	Contrast Echocardiography	
		d) Echo measurements-' ASE ' recommendation. e) Types of dye's used. f) Nephrotoxic effect of dye used in contrast echo.	CO4, CO5
1	**Course Code**	**BCT204**	
2	**Course Title**	**INTRODUCTION TO CARDIAC CARE TECHNOLOGY (LAB)**	
3	**Credit Hours**	**1**	
4	**Contact Hours (L-T-P)**	**0-0-2**	
5	Course Outcomes	CO1: To understand the importance of Electrocardiography. CO2: To understand the importance of Echocardiography. CO3: To understand the importance of Treadmill Test. CO4: To understand the importance of different types of Stress Test. CO5: To understand the importance of different types of Pacemaker,	
6	Course Description	• Introduction of ECG. • Introduction of Echocardiography.	

		• Introduction of Treadmill Test & Safety Precautions. • Introduction of Pacemaker & its uses. • Introduction of Pulse Oximeter & its uses.	
	Practicals		
	Unit 1	Practical: a)Examine the cardiovascular System. b)Explain the different types of machines used to diagnose cardiovascular disease. c)Explain about the coronary artery disease.	CO1
	Unit 2	a) Explain about the procedure of ECG. b) Explain the different types of leads and electrodes present in ECG Device. c) Explain about the Einthoven's traingle.	CO1, CO2
	Unit 3	a) To study the Epicardial pacing technique. b) To study the working of pulse oximeter. c) To study about coronary heart disease.	CO2, CO3
	Unit 4	a) Explain the pretest preparation of a patient for Echocardiography. b) To demonstrate the Indication's & Contra-indication's of an Echocardoigraphy. c) Explain the different kind's of acoustic window's in Echocardiography.	CO1, CO2, CO3
	Unit 5	a) To demonstrate the different types of delivery routes in echocardiography b) Explain the procedure to do an Echocardiography with a neat labelled diagram. c) Explain about the different kind's of of view's in Echocardiography.	CO3, CO4
	Unit 6	a) Explain the procedure of Stress Echocardiography. b) Examine the different types of pharmacological drugs used during Stress Echocardiography. c) Explain the advantages and disadvantages of Stress Echocardiography.	CO1, CO2, CO3

	Unit 7	a)Explain the procedure of Transoesophageal E chocardiography. b)Explain about the working of Pacemaker. c)Explain about the Artificial Pacemaker.			CO2, CO3, CO4
	Unit 8	a) Demonstrate the procedure of Treadmill Test. b) To study about Indication's & Contra-indication's of treadmill. c) Explain about the procedure of Stress TMT.			CO3, CO4
	Unit 9	a) To Demonstrate the Bruce Protocol used in Treadmill Test. b) Explain about the types of Stress Testing along with indication's & contra-indication's. c) To Determine a study of V alvular Heart Disease.			CO3, CO4, CO5
	Unit 10	a) Explain about the types of Hypertension & the medication's used during Hypertension. b) Explain the different types of routs to administer drug's. c) Explain about Cardiac arrest & it's management.			CO4, CO5
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
	Weightage Distribution for Practicals	CA	MTE	ETE	
	Text book/s*				

POs Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	1	3	2	1	2	2	2	3
CO2	3	3	2	2	3	2	3	2	3	2

CO3	2	3	2	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	3	2	2
CO5	2	2	2	2	2	2	2	2	2	2

BCT 301: Cardiac Care Technology- Clinical**& BCT 301:** Cardiac Care Technology - Clinical-**(Lab)**

School: SAHS		**Batch : 2019-23**	
Program: BCVT		**Current Academic Year: 2021-202**	
Branch: Cardiovascular Technology		**Year: 3**	
1	Course Code	**BCT 301**	
2	Course Title	Cardiac Care Technology clinical	
3	Credit Hours	**8**	
4	Contact Hours (L-T-P)	**4-2-4**	
	Course Status	Compulsory	
5	Course Objective	• To trained the students in the understanding of cardiac disease development • To make the students able to do routine investigation to identy various cardiac disease • To prepare students for provind assistance to cardiologist • To provide the conceptual basis for understanding of various maneuver for diagnosis and interpretation of cardiac disease • To develop diagnostic skills in cardiovascular technology	
6	Course Outcomes	1. Graduates will be able to understand normal ECG, basic abnormalities of ECG in various disease, 2. Graduates will be able to understand findings of ECHO in various diseases 3. Graduates will be able to know equipment details, handling	

		and radiation hazards of cardiac catheterization lab. 4. Graduates will be able to know materials used in cath. lab and their sterilization technique 5. Graduates will be able to know different aspects of coronary angiography and peripheral angiogram.	
7	Course Description	• Interpretation of Normal ECG and Basic abnormalities of ECG in RHD, IHD & CHD • Echo in RHD,CHD,IHD, pericardial disease and other CVD • Assessment of cardiac function • **Cardiac catheterization and coronary angiogram**	
8	Outline syllabus **Theory**		
	Unit 1	Interpretation of Normal ECG and Basic abnormalities of ECG in RHD, IHD & CHD	
		a) Normal ECG b) Abnormalities c) Interpretation	CO1
	Unit 2	Echo in rheumatic heart disease	
		a) Echo in mitral stenosis, mitral incompetence, b) aortic stenosis, aorticincompetence, pulmonary hypertension. c) Post AVR, post MVR. Prosthetic valve malfunction, LA clot.	CO2
	Unit 3	Echo in congenitial heart disease	
		a) Echo in ASD, VSD, PDA, b) pulmonary stenosis, aortic stenosis, c) coarctation of aorta, TOF. dextrocardia.	CO2
	Unit 4	Echo in ischemic heart disease	
		a) Echo in acute myocardial infarction, old myocardial infarction and b) other ischemic heart disease related conditions, c) LV aneurysm	CO2, CO3
	Unit 5	Echo in other cardiovascular disease	
		a) Echo in various types of cardio myopathy infective endocardities diseases of aorta, b) Mitral valve prolapse,	**CO2, CO3**

		c) Myxoma and other cardio vascular diseases.	
	Unit 6	Assessment of Cardiac function	
		a) Measurements of all cardiac chambers b) Assessment of cardiac function c) Abnormalities	**CO2,CO 3**
	Unit 7	Echo in pericardial disease	
		a) Pericardial effusion, b) Cardiac temponade, c) Constructive pericarditis	**CO2,CO 3**
	Unit 8	Cardiac catheterisation laboratory	
		a) General details of cardiac catheterisation equipment; b) How to handle the machine, common problems one may come across; c) How to overcome it, radiation hazards.	**CO4**
	Unit 9	Materials used in the cathlab	
		a) All catheters, balloons, guidewires, pacemakers contrast material; b) Other material used in the cardiac catheterisation laboratory; c) Sterilization of all these materials	**CO4**
	Unit 10	Right heart catheterisation	
		a) Procedure;Cath position; b) Oxymetry at various levels; c) Angios done and its interpretation	**CO5**
	Unit 11	Left heart catheterisation	
		a) Procedure;Cath position; b) Oxymetry at various levels; c) Angios done and its interpretation	CO5
	Unit-12	Coronary angiogram	
		a) Procedure,Materials used,	CO5

		b) Type and amount dye used, Indications and contraindications, c) Various pictures recorded in various angles and gross interpretation.	
	Unit-13	Peripheral angiogram	
		a) Procedure,Materials used, b) Type and amount dye used, Indications and contraindications, Various pictures recorded in various angles and gross interpretation	CO5
1	**Course Code**	**BCT 301**	
2	**Course Title**	**Cardiac Care Technology-Clinical (LAB)**	
3	**Credit Hours**	**2**	
4	**Contact Hours (L-T-P)**	**0-0-4**	
5	Course Outcomes	1. Graduates will be able to understand normal ECG, basic abnormalities of ECG in various disease, 2. Graduates will be able to understand findings of ECHO in various diseases 3. Graduates will be able to know equipment details, handling and radiation hazards of cardiac catheterization lab. 4. Graduates will be able to know materials used in cath. lab and their sterilization technique 5. Graduates will be able to know different aspects of coronary angiography and peripheral angiogram.	
6	Course Description	• Interpretation of Normal ECG and Basic abnormalities of ECG in RHD, IHD & CHD • Echo in RHD,CHD,IHD, pericardial disease and other CVD • Assessment of cardiac function • Cardiac catheterization and coronary angiogram	
	Practicals		
	Unit 1	a) Normal ECG b) Abnormalities	CO1

		c) Interpretation	
	Unit 2	a) Echo in mitral stenosis, mitral incompetence, b) Echo in aortic stenosis, aorticincompetence, pulmonary hypertension. c) Echo in Post AVR, post MVR. Prosthetic valve malfunction, LA clot.	CO2
	Unit 3	a) Echo in ASD, VSD, PDA, b) pulmonary stenosis, aortic stenosis, c) coarctation of aorta, TOF. Dextrocardia	CO2
	Unit 4	a) Echo in acute myocardial infarction, old myocardial infarction and b) other ischemic heart disease related conditions, c) LV aneurysm	CO2
	Unit 5	a) Echo in various types of cardio myopathy infective endocardities diseases of aorta, b) Mitral valve prolapse, c) Myxoma and other cardio vascular disease	CO2
	Unit 6	a) Measurements of all cardiac chambers b) Assessment of cardiac function c) Abnormalities	CO3
	Unit 7	Echo a) Pericardial effusion, b) Cardiac temponade, c) Constructive pericarditis	CO2,
	Unit 8	a) General details of cardiac catheterisation equipment; b) How to handle the machine, common problems one may come across; c) How to overcome it, radiation hazard	CO3, CO4
	Unit 9	Materials in cath lab. a) All catheters, balloons, guidewires, pacemakers contrast material; b) Other material used in the cardiac catheterisation laboratory; c) Sterilization of all these materials	CO3, CO4

	Unit 10	Catheterisation a) Procedure;Cath position; b) Oxymetry at various levels; c) Angios done and its interpretation			CO5
	Unit 11	Angiogram a) Procedure,Materials used, b) Type and amount dye used, Indications and contraindications, c) Various pictures recorded in various angles and gross interpretation.			CO5
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
	Weightage Distributionf or Practicals	CA	MTE	ETE	
	Text book/s*				

POs Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	1	3	2	1	2	2	2	3
CO2	3	3	2	2	3	2	3	2	3	2
CO3	2	3	2	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	3	2	2
CO5	2	2	2	2	2	2	2	2	2	2

BCT 302: Cardiac Care Technology- Applied**&BCT 302:** Cardiac Care Technology Applied-**(Lab)**

School: SAHS		**Batch : 2019-23**	
Program: BCVT		**Current Academic Year: 2021-2022**	
Branch: Cardiovascular Technology		**Year: 3**	
1	Course Code	**BCT 302**	
2	Course Title	Cardiac Care Technology Applied	
3	Credit Hours	**8**	
4	Contact Hours (L-T-P)	**4-2-4**	
	Course Status	Compulsory	
5	Course Objective	• To trained the students in the understanding of cardiac disease development • To make the students able to do routine investigation to identiy various cardiac disease • To prepare students for provind assistance to cardiologist • To provide the conceptual basis for understanding of various maneuver for diagnosis and interpretation of cardiac disease • To develop diagnostic skills in cardiovascular technology	
6	Course Outcomes	1. Graduates will be able to understand normal ECG, basic abnormalities of ECG in various disease, 2. Graduates will be able to understand findings of ECHO in various diseases 3. Graduates will be able to know equipment details, handling and radiation hazards of cardiac catheterization lab. 4. Graduates will be able to know materials used in cath. lab and their sterilization technique 5. Graduates will be able to know different aspects of coronary angiography and peripheral angiogram.	
7	Course Description	• Interpretation of Normal ECG and Basic abnormalities of ECG in RHD, IHD & CHD • Echo in RHD,CHD,IHD, pericardial disease and other CVD	

		• Assessment of cardiac function • Cardiac catheterization and coronary angiogram	
8	Outline syllabus **Theory**		
	Unit 1	ECG in myocardial infarction	
		a) Definition of myocardial infarction, Diagnosis of myocardial infarction, b) ECG criteria for myocardial infarction, c) ECG in anterior wall, inferior wall, True posterior wall and sub endocardial infarction and RV infarction	CO1
	Unit 2	ECG in rheumatic heart disease	
		a) Definition of rheumatic heart disease, b) Valvularinvovement in rheumatic heart disease, c) ECG in mitral stenosis, mitral incompetence, aortic stenosis and aortic incompetenance	CO1
	Unit 3	ECG in hypertension	**CO1**
		a) Definition of hypertension, b) How to record blood pressure, c) ECG in hypertension	
	Unit 4	ECG in congenital heart disease	
		a) Common congenital heart disease ASD, VSD, PDA, b) pulmonary stenosisaortic stenosis, coarctation of aorta, c) TOF, definition of all these conditions , ECG changes in all these conditions	CO1
	Unit 5	ECG in other conditions	
		a) ECG in various types of cardiomyopathy, myxoedema, b) pericardial effusion, acute pericardities and other vascular diseases. c) Bundle branch block, WPW syndrome, dextrocardia	**CO1**
	Unit 6	Trans esophageal echocardiogram	
		a) Indications, Procedure, b) Usefulness, c) Complications one may encounter and its management	**CO2**

	Unit 7	Stress Echo	
		a) procedure **b)** indications **c)** Precautions	**CO2**
	Unit 8	Peripheral Doppler	
		a)Procedure and b) usefullness of peripheral Doppler c) indications and contraindications	**CO2**
	Unit 9	Coronary angioplasty	
		a) Procedure, b) Materials used, c) Complication one may encounter and how to manage it	**CO3, CO4**
	Unit 10	Peripheral angioplasty	
		a) Procedure, b) Materials used, c) Complication one may encounter and how to manage it	**CO3, CO4**
	Unit 11	Fetal echocardiogram	
		a) Procedure, b) Basic interpretation c) indications	CO2
	Unit-12	Contrast echocardiogram	
		a) procedure and b) usefullness of contrast echocardiogram c) indications	CO4, CO5
	Unit-13	Myocardial contrast echo	CO3,CO4 , CO5
		a) indications b) contraindications c) procedure	
1	**Course Code**	**BCT 302**	
2	**Course Title**	**Cardiac Care Technology-Applied(LAB)**	
3	**Credit**	**2**	

	Hours		
4	**Contact Hours (L-T-P)**	**0-0-4**	
5	Course Outcomes	1.Graduates will be able to understand normal ECG, basic abnormalities of ECG in various disease, 2.Graduates will be able to understand findings of ECHO in various diseases 3.Graduates will be able to know equipment details, handling and radiation hazards of cardiac catheterization lab. 4.Graduates will be able to know materials used in cath. lab and their sterilization technique 5.Graduates will be able to know different aspects of coronary angiography and peripheral angiogram.	
6	Course Description	• Interpretation of Normal ECG and Basic abnormalities of ECG in RHD, IHD & CHD • Echo in RHD,CHD,IHD, pericardial disease and other CVD • Assessment of cardiac function	
	Practicals		
	Unit 1	d) Normal ECG e) Abnormalities f) Interpretation	CO1
	Unit 2	d) Echo in mitral stenosis, mitral incompetence, e) Echo in aortic stenosis, aorticincompetence, pulmonary hypertension. f) Echo in Post AVR, post MVR. Prosthetic valve malfunction, LA clot.	CO2
	Unit 3	d) Echo in ASD, VSD, PDA, e) pulmonary stenosis, aortic stenosis, f) coarctation of aorta, TOF. Dextrocardia	CO2
	Unit 4	d) Echo in acute myocardial infarction, old myocardial infarction and e) other ischemic heart disease related conditions, f) LV aneurysm	CO2

	Unit 5	d) Echo in various types of cardio myopathy infective endocardities diseases of aorta, e) Mitral valve prolapse, f) Myxoma and other cardio vascular disease	CO2
	Unit 6	d) Measurements of all cardiac chambers e) Assessment of cardiac function f) Abnormalities	CO3, CO4
	Unit 7	Echo d) Pericardial effusion, e) Cardiac temponade, f) Constructive pericarditis	CO2
	Unit 8	d) General details of cardiac catheterisation equipment; e) How to handle the machine, common problems one may come across; f) How to overcome it, radiation hazard	CO3, CO4
	Unit 9	Materials in cath lab. d) All catheters, balloons, guidewires, pacemakers contrast material; e) Other material used in the cardiac catheterisation laboratory; f) Sterilization of all these materials	CO3, CO4, CO5
	Unit 10	Catheterisation d) Procedure;Cath position; e) Oxymetry at various levels; f) Angios done and its interpretation	CO4,CO5
	Unit 11	Angiogram d) Procedure,Materials used, e) Type and amount dye used, Indications and contraindications, f) Various pictures recorded in various angles and gross interpretation.	CO4,CO5

	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
	Weightage Distribution for Practicals	CA	MTE	ETE	
	Text book/s*				

POs Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	1	3	2	1	2	2	2	3
CO2	3	3	2	2	3	2	3	2	3	2
CO3	2	3	2	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	3	2	2
CO5	2	2	2	2	2	2	2	2	2	2

BCT 303: Cardiac Care Technology- Advanced**&BCT 303:** Cardiac Care Technology Advanced**- (Lab)**

School: SAHS		**Batch : 2019-23**	
Program: BCVT		**Current Academic Year: 2021-22**	
Branch: Cardiovascular Technology		**Year: 3**	
1	Course Code	**BCT 303**	
2	Course Title	Cardiac Care Technology - Advanced	
3	Credit Hours	**8**	
4	Contact Hours (L-T-P)	**4-2-4**	

	Course Status	Compulsory	
5	Course Objective	• To trained the students in the understanding of cardiac disease development • To make the students able to do routine investigation to identiy various cardiac disease • To prepare students for provind assistance to cardiologist • To provide the conceptual basis for understanding of various maneuver for diagnosis and interpretation of cardiac disease • To develop diagnostic skills in cardiovascular technology	
6	Course Outcomes	6. Graduates will be able to understand normal ECG, basic abnormalities of ECG in various disease, 7. Graduates will be able to understand findings of ECHO in various diseases 8. Graduates will be able to know equipment details, handling and radiation hazards of cardiac catheterization lab. 9. Graduates will be able to know materials used in cath. lab and their sterilization technique 10. Graduates will be able to know different aspects of coronary angiography and peripheral angiogram.	
7	Course Description	• Cardiac monitoring • Interpretation of TMT • Use of defibrillator • Management of cardiac arrest • Myocardial perfusion scan • Cardiac arrhythmias • Electrolyte disturbances • Holter monitoring • Valvoplasties • Coil closure and device closure of PDA • Device closure of ASD,VSD • Pressure recording, pacing, pregnancy, nuclear cardiology	
8	Outline syllabus **Theory**		

	Unit 1	Cardiac monitoring	
		a) Definition, b) Purpose of cardiac monitoring, c) How to Recognise various arrhythmias How to set up a intensive coronary care unit and usefullness of ICCU	CO1
	Unit 2	Interpretation of TMT	
		a) Criteria for TMT positive test contraindication for TMT conditions where TMT is not useful, b) Complications that may occur in TMT room and its management c) Others	CO1
	Unit 3	Use of defibrillator	
		a) Indications, b) How to use the defibrillator, c) Complications during the procedure and its management	CO1
	Unit 4	Management of cardiac arrest	
		a) Definition, b) Causes external cardiac massage, c) Artificial respiration and other drugs and procedures used in the management of Cardiac arrest	CO1, CO2
	Unit 5	Myocardial perfusion scan	
		a) Procedures and b) usefullness of myocardial perfusion scan c) precautions	**CO1, CO2**
	Unit 6	Cardiac arrhythmias	
		a) Bradyarrhythmia and Tachy arrhythmias and ECG diagnosis of all rhythm disturbances. b) Sinus arrhythmia, APC, FPC, VPC, VF, VT, AF, SVT, c) I^0HB, II^0HB, complete heart block	**CO1, CO2**
	Unit 7	Electrolyte disturbances	
		a) ECG in hypokelemia, **b)** hyperkelemia **c)** others etc	**CO1, CO2**
	Unit 8	Holter monitoring	
		a) Procedure and b) Usefulness c) precautions	**CO1, CO2**
	Unit 9	Valvoplasties	
		a) Procedure, b) Indications,	**CO2, CO3**

		c) Complications and treatment of ballons, mitral valvuloplasty, ballon aortic valvuloplastyballon pulmonary valvuloplasty and balloon tricuspid valvuloplasty.	
	Unit 10	Coil closure and device closure of PDA	
		a) Procedure, b) Indications ; c) Materials used for coil and device closure of PDA	**CO2, CO3, CO4**
	Unit 11	Device closure of ASD	
		a) Procedure, b) Indications; c) Materials used for device closure of ASD	CO2, CO3, CO4
	Unit-12	Device closure of VSD	
		a) Procedure, b) Indications; c) Materials used for device closure of ASD	CO2, CO3, CO4
	Unit-13	Electrophysiological studies	
		a) Basic knowledge of EP studies b) Mapping and c) Ablation	CO1, CO3, CO4
	Unit-14	Oxymetry	
		a) Handling of the instrument; b) Usefulness of the instrument, c) normal and abnormal values	CO1,CO3, CO4
	Unit-15	Pressure recording	
		a) Handling of the instrument; b) Pressures in various chambers, c) normal and abnormal values	CO4, CO5
	Unit-16	Temporary and permanent pacing	
		a) Materials used, b) Procedure,	CO1, CO3, CO4

		c) Complications one may encounter and management. Implantable Cardioverter defibrillator devices	
	Unit-17	CD recording and storage-	
		a) Recording b) and Storage of all the procedures over CD c) other	CO5
	Unit-18	Procedure during pregnancy	
		a) Precautions to be followed. b) Safety c) other	CO3,CO4, CO5
	Unit-19	Nuclear Cardiology	
		a) Instrumentation, b) Radiopharmaceuticals c) others	CO3, CO4, CO5
1	**Course Code**	**BCT 303**	
2	**Course Title**	**Cardiac Care Technology-Advanced (LAB)**	
3	**Credit Hours**	**2**	
4	**Contact Hours (L-T-P)**	**0-0-4**	
5	Course Outcomes	1.Graduates will be able to understand normal ECG, basic abnormalities of ECG in various disease, 2.Graduates will be able to understand findings of ECHO in various diseases 3.Graduates will be able to know equipment details, handling and radiation hazards of cardiac catheterization lab. 4.Graduates will be able to know materials used in cath. lab and their sterilization technique 5.Graduates will be able to know different aspects of coronary angiography and peripheral angiogram.	
6	Course		

	Description	• Cardiac monitoring • Interpretation of TMT • Use of defibrillator • Management of cardiac arrest • Myocardial perfusion scan • Cardiac arrhythmias • Electrolyte disturbances • Holter monitoring • Valvoplasties • Coil closure and device closure of PDA • Device closure of ASD,VSD • Pressure recording, pacing, pregnancy, nuclear cardiology	
	Practicals		
	Unit 1	Cardiac monitoring	
		d) Definition, e) Purpose of cardiac monitoring, f) How to Recognise various arrhythmias How to set up a intensive coronary care unit and usefullness of ICCU	CO1
	Unit 2	Interpretation of TMT	
		d) Criteria for TMT positive test contraindication for TMT conditions where TMT is not useful, e) Complications that may occur in TMT room and its management f) Others	CO1
	Unit 3	Use of defibrillator	
		d) Indications, e) How to use the defibrillator, f) Complications during the procedure and its management	CO1
	Unit 4	Management of cardiac arrest	
		d) Definition, e) Causes external cardiac massage, f) Artificial respiration and other drugs and procedures used in the management of Cardiac arrest	CO1, CO2
	Unit 5	Myocardial perfusion scan	
		d) Procedures and e) usefullness of myocardial perfusion scan f) precautions	**CO1, CO2**

	Unit 6	Cardiac arrhythmias	
		d) Bradyarrhythmia and Tachy arrhythmias and ECG diagnosis of all rhythm disturbances. e) Sinus arrhythmia, APC, FPC, VPC, VF, VT, AF, SVT, f) I^0HB, II^0HB, complete heart block	**CO1, CO2**
	Unit 7	Electrolyte disturbances	
		d) ECG in hypokelemia, **e)** hyperkelemia **f)** others etc	**CO1, CO2**
	Unit 8	Holter monitoring	
		d) Procedure and e) Usefulness f) precautions	**CO1, CO2**
	Unit 9	Valvoplasties	
		d) Procedure, e) Indications, f) Complications and treatment of ballons, mitral valvuloplasty, ballon aortic valvuloplastyballon pulmonary valvuloplasty and balloon tricuspid valvuloplasty.	**CO2, CO3**
	Unit 10	Coil closure and device closure of PDA	
		d) Procedure, e) Indications ; f) Materials used for coil and device closure of PDA	**CO2, CO3, CO4**
	Unit 11	Device closure of ASD	
		d) Procedure, e) Indications; f) Materials used for device closure of ASD	CO2, CO3, CO4
	Unit 12	Device closure of VSD	
		d) Procedure, e) Indications; f) Materials used for device closure of ASD	CO2, CO3, CO4
	Unit 13	Electrophysiological studies	

		d) Basic knowledge of EP studies e) Mapping and f) Ablation			CO1, CO3, CO4
	Unit 14	Oxymetry			
		d) Handling of the instrument; e) Usefulness of the instrument, f) normal and abnormal values			CO1,CO3, CO4
	Unit 15	Pressure recording			
		d) Handling of the instrument; e) Pressures in various chambers, f) normal and abnormal values			CO4, CO5
	Unit 16	Temporary and permanent pacing			
		d) Materials used, e) Procedure, f) Complications one may encounter and management. Implantable Cardioverter defibrillator devices			CO1, CO3, CO4
	Unit 17	CD recording and storage-			
		d) Recording e) and Storage of all the procedures over CD f) other			CO5
	Unit 18	Procedure during pregnancy			
		d) Precautions to be followed. e) Safety f) other			CO3,CO4, CO5
	Unit 19	Nuclear Cardiology			
		d) Instrumentation, e) Radiopharmaceuticals f) others			CO3, CO4, CO5
	Mode of examination	Theory and Practical			
	Weightage Distribution for Theory	CA	MTE	ETE	
	Weightage	CA	MTE	ETE	

	Distribution for Practicals				
	Text book/s*	The Complete Guide to ECGs Practical Cardiovascular Medicine The Cardiac Catheterization Handbook			

POs Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	1	3	2	1	2	2	2	3
CO2	3	3	2	2	3	2	3	2	3	2
CO3	2	3	2	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	3	2	2
CO5	2	2	2	2	2	2	2	2	2	2

BCT:Cardiovascular Technology Internship & Project work

School: SAHS		Batch : 2019-2023	
Program: BCVT		Current Academic Year: 2022-23	
Project duration		10 months	
1	Course Title	Internship	
2	Duration	12 months	
3	Course Status	Compulsory	
4	Course /Internship Objective	• To help the students to identify and understanding of cardiac disease development • To train the students for routine investigation of cardiac diseases. • To prepare students for providing assistance to cardiologists. • To provide the conceptual basis for understanding of various manoeuvre for diagnosis and interpretation of cardiac diseases. • To develop diagnostic skills in cardiovascular technology.	

5	Course /Internship Outcomes	11. Graduates will be able to understand normal ECG, basic abnormalities of ECG in various diseases. 12. Graduates will be able to understand findings of ECHO in various diseases 13. Graduates will be able to know equipment details, handling and radiation hazards of cardiac catheterization lab. 14. Graduates will be able to know materials used in cath. lab and their sterilization technique 15. Graduates will be able to know different aspects of coronary angiography and peripheral angiogram.	
6	Course /Internship Description	• Electrocardiography (ECG) • Cardiac monitoring • Interpretation of TMT • Echocardiogram • Use of defibrillator • Management of cardiac arrest • Myocardial perfusion scan • Cardiac arrhythmias • Electrolyte disturbances • Holter monitoring • Assessment of cardiac function • Cardiac catheterization and coronary angiogram/angioplasty • Valvoplasties • Coil closure and device closure of PDA • Device closure of ASD,VSD • Pressure recording, pacing, Procedure during pregnancy, nuclear cardiology	

1. The students will be posted to the following departments/section of the cardiology unit of a hospital in a span of 12 months.

S. No.	Department/Section
1.	Electrocardiography
2.	TMT & Holter monitor
3.	ECHO
4.	Cath Lab
5.	Cardiac OT

6.	ICU/CCU/Recovery Room

Guidelines for Project work

1. During internship and project work, students will have to maintain a file.
In the file, collected data & diagnostic procedure (or surgery) of patients should be recorded.
2. Project Work
On the given topic, student will collect the data of patients (as many as possible) and submit the project report before Viva Voce.
The project work will be taken up by a student on an area identified is the process of internship.
The assessment of the course will be done based on the following criteria:

i. Attendances
ii. Case Study
iii. Report
iv. Presentation

The report should base the following points:

i. Causes
ii. Risk Factors
iii. Prevalence
iv. Post Treatment Effects on Patients
v. Precautions Or Suggestions for Patients
vi. Conclusive Remarks (by Presenter)

Note - During the internship period, student must attend all mentioned departments for the given time period.

Clinical Training and internship: Every student who has passed in all the theory and practical examinations of all the three years will have to undergo 1 year compulsory clinical training in at-least 100 bedded hospital as rotatory inter departmental internship as per schedule finalized by the School of Allied Health Sciences authorities. No candidate shall be permitted to proceed to the internship of the course of study i.e. clinical training in hospital, unless he/she has passed in all the written theory and practical examinations conducted during the preceding three years of the course of study. Every student should attend his/her training in the associated training hospital as per the timings of those centers. The candidate shall maintain a **log book** forall the events of the respective posting. Logbook completed by the student in that training

Centre will have to be countersigned by the Faculty or In-charge of that Centre. The Regular participation of students in seminars / case presentations is mandatory and aimed to encourage them in learning research and development programs in Cardiovascular Technology. On completion of the training, the log book submitted by each candidate will be evaluated by authorities and declared to be ‘Satisfactory’ or ‘Not Satisfactory’.