PONDICHERRY UNIVERSITY

Puducherry

Regulations and Syllabus

Bachelor of Science in
CATH LAB TECHNOLOGY
(B.Sc. CLT)

2024-2025

Index

PONDICHERRY UNIVERSITY

Puducherry

REGULATIONS OF THE UNIVERSITY

I. SHORT TITLE AND COMMENCEMENT

These regulations shall be called **"THE REGULATIONS FOR THE BACHELOR OF SCIENCE IN CATH LAB TECHNOLOGY OF PONDICHERRY UNIVERSITY,** Puducherry".

They shall come into force from the academic year 2024-25 Session.

The regulation and syllabi are subject to modifications by the standing Under Graduate Board of Studies for Cath Lab Technology courses from time to time.

II. COURSE PHILOSOPHY

Cath Lab Technology is the branch of medical science that focuses on the diagnostic and therapeutic procedures performed in a catheterization laboratory. This field involves the study of cardiovascular diseases and the advanced techniques used to diagnose and treat them. The course encompasses the study of the cardiovascular system, the technologies used in catheterization procedures, and the role of the Cath Lab technologist in the medical team.

The course in Cath Lab Technology is designed to provide a comprehensive understanding of the cardiovascular system and the technologies used to diagnose and treat cardiovascular diseases. Emphasis is placed on clinical pathology, interventional cardiology, and cardiovascular imaging. The curriculum also includes the study of the relationship between the human body and its environment, focusing on cardiovascular health, disease prevention, and treatment.

Aim and Objectives

Aim:

The aim of the undergraduate Cath Lab Technology program is to prepare graduates to be well versed – in techniques such as Cardiac catheterization, Electrocardiography, Echocardiography and Stress Testing. Graduates will integrate knowledge and skills of Cath Lab Technology to provide health care solutions for the benefit of the society.

Objectives:

On completion of Cath Lab Technology the graduates will be able to:

- Evolve into a fully trained, qualified Cath Lab Technologist capable of working independently.
- Integrate knowledge and skills of Cath Lab Technology to provide healthcare solutions for the benefit of the society.
- Utilize the latest trends and technology in providing cardiac care.
- Assess the clients for heart-related problem
- Monitor and care for those suffering from cardiovascular ailments

- Have good knowledge in medical equipment and tools used.
- Observe and understand the correct way of performing cardiac procedures before practicing them.
- Assist Cardiologists in techniques such as Cardiac catheterization, Electrocardiography, Echocardiography and Stress Testing.
- Learn and apply basic and advanced life support skills
- Work in a team with Cardiologists and Cardiac Surgeons in a high-pressure hospital environment.
- Conduct need-based research studies in various settings and utilize the research findings to improve the quality of care.
- Practice within code of ethics and professional conduct and acceptable standards of cardiac practices with the legal boundaries.

III. Program Outcome:

Clinical Expertise:

- Graduates will be skilled in carrying out and supporting a range of interventional and diagnostic cardiology treatments.
- They will be proficient with the tools and technologies used in cath labs.

Skills for Patient Care:

- Graduates will be qualified to give patients complete care before, during, and after procedures.
- They will be adept at monitoring patient vitals and managing any complications that arise.

Technical expertise:

- Graduates will be well-versed in the anatomy, physiology, and pathology of the heart.
- They will understand the fundamentals of cath lab equipment operating.

Problem-solving and Critical Thinking:

- Graduates will have the ability to evaluate circumstances fast and decide on the best course of action during procedures.
- They will be competent in effectively resolving procedural and equipment problems.

Communication and Professionalism:

- Graduates will communicate with patients, families, and healthcare teams in a professional manner.
- They will be able to collaborate with colleagues and educate patients since they will have strong communication abilities.

Legal and Ethical Knowledge:

- Graduates will comprehend the moral and legal issues surrounding cath lab technology.
- They'll be able to follow all applicable laws, guidelines, and best practices.

IV. REGULATIONS

ELIGIBILITY FOR ADMISSION:

1. ELIGIBILITY FOR ADMISSION:

The admission for B.Sc in Cath Lab Technology (CLT) is based on the CENTAC process. The reservation and other process are as per the Government norms. Candidates should have completed a minimum of 17 years of age as on 31st December of the year of admission. The upper age limit is 25 years. (Relaxation up to 5 years for SC/ST candidate and up to 3 years for MBC/OBC candidates.)

Candidates should have a pass in the Higher Secondary Examination conducted by the Board of Higher Secondary Examination of Tamil Nadu, or any other equivalent examination accepted by the University, thereto with a minimum of 50% marks (40% marks for SC, ST, MBC and OBC candidates) in aggregate of Science subjects (Physics, Chemistry, Biology/Botany & Zoology) and should have English as one of the subjects.

Candidate shall be medically fit to undergo the Cath Lab Technology program.

For Lateral entry: Lateral entry to second year for B.Sc CLT course for candidates who have passed diploma program in Cath Lab Technology/Cardiovascular Technology/Cardiac Technology/Cardiac Care Technology courses approved by the Government after completing 12th Class / 10 +2 of CBSE or equivalent with minimum aggregate of 50% marks (40% marks for SC, ST, MBC and OBC candidates) in Physics, Chemistry and Biology provided the candidate has passed in each subject separately. The age limit is 35 years. The Government service candidates will be exempted if approved by the committee or the Government.

Lateral entry to second year for B.Sc CLT course for candidates who have passed diploma program in Cath Lab Technology/Cardiovascular Technology/Cardiac Technology/Cardiac Care Technology from the Government Boards and recognized by State/Central University, fulfilling the conditions specified and these students are eligible to take admission on lateral entry system only if the same subject have been studied at 10+2 Scheme and diploma level. The admission process is as per the government rule and regulations from time to time. Students to be admitted under Lateral Entry shall be 10% over and above the sanctioned intake.

The lateral entry candidates have the direct entry into the second year (ie from III semester) are exempted from the first year (Semester – I and Semester – II) curriculum. For the grant of the university degree the lateral entry candidates have to complete the semester – III to Semester – VI, and the internship compulsory and mandatory.

2. DURATION OF THE COURSE AND COURSE OF STUDY:

The duration of the program shall be **Three years / Lateral entry two years** of full-time study and **One year of compulsory rotatory internship**.

3. MEDIUM OF INSTRUCTION:

English shall be the medium of instruction for all the subjects of study and for examinations of the Course.

4. PROGRAM DETAIL:

The program structure is shown in Table I.
The detailed syllabus in respect of the program is appended to this regulation.

5. ATTENDANCE

Examination will be conducted in both theory and practical, as prescribed.

Candidate will be permitted to appear for the University Examination in the subject only if they secure not less than 80% attendance (irrespective of the kind of absence) in each subject of that semester.

Condonation of shortage of attendance in aggregate upto 10% in each semester may be granted by the College Academic Committee and as per regulations of University. For Students internship offered during VII and VIII semesters, 100% attendance is compulsory. However, the students may be condoned upto 15%, under extraordinary situation, by the Dean/Principal based on the genuineness of the case upon the recommendation of the concern program teaching and Head of the Department.
The students failing to attend classes/examinations on non-official ground will be treated as absent. Student deputed for Sports, Cultural Meets, etc with prior permission of Dean/Principal of the College shall be given attendance for the period of absent.

6. INTERNAL ASSESSMENT:

Internal assessment will be done in each subject of study and the marks will be awarded to the candidates as detailed in the scheme of examinations.

The marks awarded will be on the basis of the candidate's performance in assessment, class tests, clinical/laboratory work, preparation and seminar presentation assessed by the concerned faculty.

The marks secured by the candidate during each semester in each subject shall be forwarded to the University at the end of the semester, i.e., before the commencement of the written examination.

7. EXAMINATIONS:

The University Examinations will be conducted in semester pattern for all the three years, each year consisting of two semesters.
The particulars of subjects for various examinations and distribution of marks are shown separately.
The examination for the main subjects will be conducted by the University and for the non-examination subjects by the college.
The maximum number of candidates for practical examination should not exceed 20 per day.
One internal and one external examiner should jointly conduct practical examination for each student.
An examiner should not be below the rank of an Assistant Professor or Tutor/Demonstrator.

8. PASSING MINIMUM

Candidate has to pass separately in theory + Viva voce and Practical by getting a minimum of 50% marks in combined internal assessment and University examination. A candidate should secure 50% of the marks in theory and 50% in practical (wherever prescribed)

If a candidate fails in either theory or practical, he/she has to re-appear for both theory and practical.

A candidate should secure 50% of total marks in the test conducted by the college for the non-examination subject.

9. PROCEDURE FOR PASSING THE PROGRAME

The maximum period to complete the program successfully **should not exceed a period of eight years.**

10. INTERNSHIP

There shall be a compulsory full-time rotatory internship after the candidate having passed all the subjects prescribed in the scheme of examination.

The internship should be done for a period of one year, in an Institution/ Hospital approved.

No candidate shall be eligible for the award of the degree without successfully completing one-year internship.

Desirable: A Research study to be done and submit the report before the one year of Internship. One or more value added courses (like Swayam) during final year or Internship.

11. ELIGIBILITY FOR AWARD OF DEGREE:

The candidates shall be eligible for the ***Degree of B.Sc in Cath Lab Technology and / lateral entry*** when they have undergone the prescribed program of study for a ***period of three years / two years (for lateral entry)*** in an institution approved by the University and have ***passed the prescribed examinations in all subjects*** and ***have completed a compulsory internship over a period of one year*** in an approved institution.

12. DECLERATION OF CLASS:

A successful candidate obtaining **75% and more marks** in the grand total aggregate in the **First attempt** shall be declared to have passed these subjects with **Distinction**.

A successful candidate obtaining **60% and more but less than 74.9% marks** in the grand total aggregate in the **First attempt** shall be declared to have passed with **First Class**.

A successful candidate obtaining **50% and more but less than 59.9% marks** in the grand total aggregate in the **First attempt** and the candidate who passed with more than one attempt irrespective of the percentage of marks secured shall be declared to have passed these subjects with **Second Class.**

Ranks shall be declared on the basis of the aggregate marks obtained by a candidate in the University examination subjects of the program.

Only those candidates **who have passed all the subjects in all examinations in the First attempt shall be eligible for the Award of rank.**

V Program Structure–CATH LAB TECHNOLOGY

Table I

Year	Sem	Code	Subject Title	Hours			
				Theory	Practical	Clinical	Total
I Year	I Sem	BCLT– 001	Anatomy	60	30	-	90
		BCLT –002	Physiology	60	30	-	90
		BCLT - 003	Biochemistry	60	30		90
		BCLT –C01	Communication and Soft skill	60	-	-	60
			Library/Co-curricular	30			30
			Clinical Hours			140	140
			Total Hours	**270**	**90**	**140**	**500**
	II Sem	BCLT –004	Applied Pathology	60	30	-	90
		BCLT –005	Applied Microbiology	60	30	-	90
		BCLT –006	Applied Pharmacology	60	30	-	90
		BCLT –C02	Computer Application	30	30	-	60
			Library/Co-curricular	30			30
			Clinical Hours			240	240
			Total	**240**	**120**	**240**	**600**
		I Year Over all Total		**510**	**210**	**380**	**1100**
II Year	III Sem						
		BCLT –007	Basic Electrocardiography and Treadmill Exercise Stress Testing	60	30	-	90
		BCLT –008	Basic Echocardiography	60	30	-	90
		BCLT –009	Clinical Cardiology	60	30	-	90
		BCLT –010	Cardiac Catheterization Practical -I	-	-	270	270
		BCLT –C03	Medical Psychology	30			30
			Library/Co-curricular	30	-	-	30
			Total Hours	**240**	**90**	**270**	**600**
	IV Sem	BCLT –011	Advanced Electrocardiography and Exercise Stress Testing	60	30	-	90
		BCLT –012	Advanced Echocardiography	60	30	-	90
		BCLT –013	Patient Care in Intensive Coronary Care Unit	60	30	-	90
		BCLT –014	Cardiac Catheterization Practical -II	-	-	270	270
		BCLT –C04	Environmental Science	30			30
			Library/Co-curricular	30	-	-	30
			Total Hours	**240**	**90**	**270**	**600**
			II Year Over all Total	**480**	**180**	**540**	**1200**
III Year	V Sem	BCLT –015	Cardiac Emergencies and Management in Cardiac Catheterization Laboratory	60	30	-	90
		BCLT –016	Physics of X-rays, hardware, equipment, and sterility	60	30	-	90
		BCLT –017	Cardiac C atheterization L aboratory-I	60	30	-	90
		BCLT –018	Cardiac Catheterization Practical Practical -III	-	-	270	270
		BCLT –C05	Biostatistics & Research Methodology	30			30
			Library/Co-curricular	30	-	-	30
			Total	**240**	**90**	**270**	**600**
		BCLT –019	Cardiac Catheterization L aboratory-II	60	30	-	90
		BCLT –020	Electrophysiology and Cardiac	60	30	-	90

	VI Sem		Pacing				
		BCLT –021	Recent Advances in Interventional Cardiology	60	30	-	90
		BCLT –022	Cardiac Catheterization Practical - IV	-	-	270	270
		BCLT –C06	Medical Law & Ethics & Practice Management	30			30
			Library/Co-curricular	30	-	-	30
			Total	**240**	**90**	**270**	**600**
			III Year Over all Total	**480**	**180**	**540**	**1200**
VI Year	**Internship**						**1 Year**

Note : BCLT C01 to BCLT 06 are subsidiary subjects.

VI Scheme of Examination with mark details

TABLE - II

Sem	Code	Subject	University marks		Internal Marks		Viva		Total		Total Theory+Practical	
		Theory & Practical	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
I Sem	BCLT–001	Anatomy -Theory	80	32	25	-	20	10	125	63	200	100
		Anatomy -**Practical**	50	25	25	-			75	37		
	BCLT –002	Physiology - Theory	80	32	25	-	20	10	125	63	200	100
		Physiology - **Practical**	50	25	25	-			75	37		
	BCLT –003	Biochemistry-Theory	75	30	25	-			100	50	100	50
	BCLT –C01	Communication and Soft skills	-	-	50	25	-	-	50	25	50	25
II Sem	BCLT –004	Applied Pathology -Theory	80	32	25	-	20	10	125	63	200	100
		Applied Pathology - **Practical**	50	25	25	-			75	37		
	BCLT –005	Applied Microbiology -Theory	80	32	25	-	20	10	125	63	200	100
		Applied Microbiology - **Practical**	50	25	25	-			75	37		
	BCLT –006	Applied Pharmacology - Theory	75	30	25	-			100	50	100	50
	BCLT –C02	Computer application	-	-	50	25	-	-	50	25	50	25
III sem	BCLT –007	Basic Electrocardiography and Treadmill Exercise Stress Testing	75	30	25	-			100	50	100	50
	BCLT –008	Basic Echocardiography	75	30	25	-			100	50	100	50
	BCLT –009	Clinical Cardiology	75	30	25	-			100	50	100	50
	BCLT –010	Cardiac Catheterization Practical -I	50	25	25		25	13	100	50	100	50
	BCLT –C03	Medical Psychology	-	-	50	25	-	-	50	25	50	25
IV sem	BCLT –011	Advanced Electrocardiography and Exercise Stress Testing	75	30	25	-			100	50	100	50
	BCLT –012	Advanced Echocardiography	75	30	25	-			100	50	100	50
	BCLT –013	Patient Care in Intensive Coronary Care Unit	75	30	25	-			100	50	100	50
	BCLT –014	Cardiac Catheterization Practical Practical -II	50	25	25		25	13	100	50	100	50

	BCLT –C04	Environmental Science	-	-	50	25	-	-	50	25	50	25
V sem	BCLT –015	Cardiac Emergencies and Management in Cardiac Catheterization Laboratory	75	30	25	-			100	50	100	50
	BCLT –016	Physics of X-rays, hardware, equipment, and sterility	75	30	25	-			100	50	100	50
	BCLT –017	Cardiac C atheterization L aboratory-I	75	30	25	-			100	50	100	50
	BCLT –018	Cardiac Catheterization Practical Practical -III	50	25	25		25	13	100	50	100	50
	BCLT –C05	Biostatistics & Research Methodology	-	-	50	25	-	-	50	25	50	25
VI sem	BCLT –019	Cardiac Catheterization L aboratory-II	75	30	25	-			100	50	100	50
	BCLT –020	Electrophysiology and Cardiac Pacing	75	30	25	-			100	50	100	50
	BCLT –021	Recent Advances in Interventional Cardiology	75	30	25	-			100	50	100	50
	BCLT –022	Cardiac Catheterization Practical -IV	50	25	25		25	13	100	50	100	50
	BCLT –C06	Medical Law & Ethics & Practice Management	-	-	50	25	-	-	50	25	50	25

VII. COURSE DESCRIPTION

1. ANATOMY
Course Code: BCLT-001

Placement: IstYear (IstSemester) **Time:**Theory: 60 Hours
Practical:30Hours

Course Description: The course is designed to assists students to acquire comprehensive knowledge of the normal structure of human body, to facilitate understanding of anatomical basic health, identify alteration in structure with emphasis on clinical application to practice.

UNIT- I (15 Hrs)

Introduction to Anatomy and Organization of the Human Body

- Introduction to Anatomical terms relative to position - anterior, ventral, posterior dorsal, superior, inferior, median, lateral, proximal distal superficial, deep, prone, supine, palmar and planter
- Anatomical planes (axial/ transverse /horizontal, sagittal /vertical plane and coronal/ frontal/ oblique plain)
- Movement (flexion, extension, abduction, adduction, medial, rotation lateral rotation, inversion, eversion, supination, pronation, plantar flexion, dorsi flexion and circumduction)
- Cell structure, cell division
- Tissues – Definition, types, characteristic, classification, location
- Membranes and glands -classification and structures
- Identify major surface and body landmarks in each body region organization of human body
- Hyaline, fibro cartilages elastic cartilages
- Features of skeletal, smooth and Cardiac muscles

UNIT-II (5Hrs)

The Respiratory System

- Structures of organ of Respiration
- Muscles of Respiratory System

UNIT-III (5Hrs)

The Digestive System

- Structures of alimentary canal and organs of digestion

UNIT-IV (5 Hrs)

The Circulatory and Lymphatic system

- Structures of blood components, anterior and venous system
- Position of heart related to Associated structures
- Chambers of heart, layers of heart
- Nerve supply to and blood supply to heart
- Veins used for IV injections
- Lymphatic tissues

UNIT-V (3 Hrs)

The Endocrine System

- Structures of hypothalamus, Pineal gland, Pituitary gland, Thyroid Parathyroid, Thymus, Pancreas and Adrenal gland.

UNIT-VI (3 Hrs)

The Sensory organ

- Structures of skin, eyes, ears, nose and tongue.

UNIT – VII (10 Hrs)

The Musculo Skeletal System

Muscular Systems

- Types and structures of muscles
- Muscle groups - Muscles of head, neck, thorax, abdominal, pelvis upper and lower Limb
- Principles of Muscles – deltoid, biceps, triceps, respiratory, abdominal, pelvic floor muscles gluteal muscle and vastus laterals
- Major muscles involved in procedure

Skeletal System

- Anatomical position
- Bones - type, structures, growth and ossification
- Axial and appendicular skeleton
- Joints – Classification, major joints and structures

UNIT-VIII (5 Hrs)

The Nervous Systems

- Review and structures of neurons
- Central Nervous system, Autonomic Nervous system, and Peripheral Nervous system
- Structures of brain, spinal cord, cranial nerve, spinal nerves, functional areas of cerebral cortex
- Ventricles of the brain- formation, circulation and drainage

UNIT-IX (4Hrs)

The Renal System

- Structures of Kidney, Ureters, bladder, urethra

UNIT-X (5Hrs)

The Reproductive System

- Structures of Male Reproductive Organs
- Structures of Female Reproductive Organs
- Structures of Breast

PRACTICAL'S:

- Histology of Types of Epithelium
- Histology of Serous, Mucous and Mixed Salivary gland
- Histology of the types of Cartilage
- Demo of all bones showing parts, radiographs of normal bones & Joints
- Histology of Skeletal (TS& LS), Smooth and Cardiac muscle
- Demonstration of Heart and Vessels of the body

- Histology of Large artery, Medium sized artery and vein, Large Vein
- Microscopic appearance of Large and Medium sized Artery and Vein, Large Vein
- Demonstration of all muscles of the body
- Pericardium
- Histology of Lymph node, Spleen, Tonsil and Thymus
- Demonstration of parts of Respiratory system
- Normal Chest radiograph showing Heart shadows
- Histology of Lung and Trachea
- Normal Angiograms
- Histology of Lymphatic tissues
- Radiographs of Abdomen – IVP, Retrograde cystogram
- Demonstration of parts of the Urinary system and Histology of Kidney, Ureter and Urinary bladder • Demonstration of Male and Female Pelvis with organs in situ.
- Histology of Male and Female Reproductive organs
- Histology of Pituitary, Thyroid, parathyriod and Suprarenal glands
- Histology of peripheral nerve and optic nerve.
- Demo of all parts of brain.

Reference Books:

1. Inderbir Singh, Textbook of Anatomy, Jaypee, 7th Edi, Vol I to III, 2019
2. Chaurasia, Human Anatomy, CBS Publisher, 5th Edi, Vol 1 to 3, 2010.
3. Ross and Wilson Anatomy and Physiology in Health and illness, Elsever, 13th Edi, 2018.

Examination Pattern

Subject		**Duration**
Theory exam:	80 marks	3 hours
Practical exam:	50 marks	3 hours
Oral exam	20 marks	
Internal assessment (Theory)	25 marks	
Internal assessment (Practical)	25 marks	
	200 marks	

The practical examination will have the following components:

Identification of Gross Spotters	30 marks
Identification of Histological slides	20 marks
	50 marks

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 80 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question - 2 X 10 = 20 marks
Short answer question - 8 X 5 = 40 marks
Very Short answer - 10 X 2 = 20 marks

2. PHYSIOLOGY
Course Code: BCLT-002

Placement: Ist Year (Ist Semester) **Time:** Theory: 60 Hours
Practical: 30 Hours(Lab)

Course Description: The course is designed to assist students to acquire comprehensive knowledge of the normal functions of the organ systems of the human body to facilitate understanding of physiological basis of health, identify alteration in functions and provide the student with necessary physiological knowledge to practice.

COURSE OUTLINE

UNIT - I (4 Hrs)

General Physiology – Basic concepts

- Cell physiology including transportation across cell membrane
- Body fluid compartments, Distribution of total body fluid, intracellular and extracellular compartments, major electrolytes and maintenance of homeostasis
- Cell cycle
- Tissue – formation, repair
- Membranes and glands – functions

UNIT - II (6 Hrs)

Respiratory system

- Functions of respiratory organs
- Physiology of respiration
- Pulmonary circulation – functional features
- Pulmonary ventilation, exchange of gases
- Carriage of oxygen and carbon-dioxide
- Exchange of gases in tissue
- Regulation of respiration
- Hypoxia, cyanosis, dyspnea, periodic breathing
- Respiratory changes during exercise

UNIT III (8 Hrs)

Digestive system

- Functions of the organs of digestive tract
- Saliva – composition, regulation of secretion and functions of saliva
- Composition and functions of gastric juice, mechanism and regulation of gastric secretion
- Composition of pancreatic juice, functions, regulation of pancreatic secretion
- Functions of liver, gall bladder and pancreas
- Composition of bile and functions
- Secretion and functions of small and large intestine
- Movements of alimentary tract
- Digestion in mouth, stomach, small intestine, large intestine, absorption of food

UNIT- IV (6 Hrs)

Circulatory and Lymphatic system

- Functions of heart, conduction system, cardiac cycle, Stroke volume and cardiac output
- Blood pressure and Pulse • Circulation – principles, factors influencing blood pressure, pulse
- Coronary circulation, Pulmonary and systemic circulation
- Heart rate – regulation of heart rate • Normal value and variations
- Cardiovascular homeostasis in exercise and posture

UNIT-V (5Hrs)

Blood

- Blood – Functions, Physical characteristics
- Formation of blood cells
- Erythropoiesis – Functions of RBC, RBC life cycle
- WBC – types, functions • Platelets – Functions and production of platelets
- Clotting mechanism of blood, clotting time, bleeding time, PTT
- Homeostasis – role of vasoconstriction, platelet plug formation in hemostasis, coagulation factors, intrinsic and extrinsic pathways of coagulation
- Blood groups and types
- Functions of reticuloendothelial system, immunity

UNIT-VI (5Hrs)
The Endocrine system

- Functions and hormones of Pineal Gland, Pituitary gland, Thyroid, Parathyroid, Thymus, Pancreas and Adrenal glands.
- Other hormones
- Endocrine Alterations in diseases

UNIT-VII (4Hrs)
The Sensory Organs

- Functions of skin
- Vision, hearing, taste and smell
- Errors of refraction, aging changes

UNIT-VIII (6Hrs)
Musculoskeletal system

- Bones – Functions, movements of bones of axial and appendicular skeleton, Bone healing
- Joints and joint movements
- Joint diseases
- Properties and Functions of skeletal muscles – mechanism of muscle contraction
- Structure and properties of cardiac muscles and smooth muscles

UNIT- IX (4Hrs)
Renal system

- Functions of kidney in maintaining homeostasis
- GFR
- Functions of ureters, bladder and urethra
- Micturition
- Regulation of renal functions

UNIT- X (4Hrs)

The Reproductive system

- Female reproductive system – Menstrual cycle, function and hormones of ovary, oogenesis, fertilization, implantation, Functions of breast
- Male reproductive system – Spermatogenesis, hormones and its functions, semen

UNIT- XI (8 Hrs)

Nervous system

- Overview of nervous system
- Review of types, structure and functions of neurons
- Nerve impulse
- Review functions of Brain-Medulla, Pons, Cerebrum, Cerebellum
- Sensory and Motor Nervous system
- Peripheral Nervous system
- Autonomic Nervous system
- Limbic system and higher mental Functions - Hippocampus, Thalamus, Hypothalamus
- Vestibular apparatus
- Functions of cranial nerves
- Autonomic functions
- Physiology of Pain-somatic, visceral and referred
- Reflexes
- CSF formation, composition, circulation of CSF, blood brain barrier and blood CSF barrier

Practical's :

- Hemoglobinometry
- White Blood Cell Count
- Red Blood Cell Count
- Determination of Blood Groups
- Leishman's Staining and Differential WBC Count
- Determination of Packed Cell Volume
- Erythrocyte Sedimentation Rate (ESR)
- Determination of Clotting Time, Bleeding Time
- Recording of Blood pleasure
- Auscultation for Heart sounds
- Artificial Respiration
- Determination of Vital capacity.

Reference Books :

1. Sembulingam (K), Essentials of Medical Physiology, Jaypee, 8th Edi, 2019.
2. Guyton & Hall, Textbook of Medical Physiology, Elsevier, 2nd Edi, 2018.
3. Pal (GK), Comprehensive Textbook of Medical Physiology, Jaypee, 2nd Edi, Vol I & II, 2019.
4. Surinder Singh, Principles of Human Physiology for Course in Nursing & Allied Health Sciences, CBS, 2017.
5. Ross and Wilson Anatomy and Physiology in Health and illness, Elsevier, 13th Edi, 2018.

Examination Pattern

Subject		**Duration**
Theory exam:	80 marks	3 hours
Practical exam:	50 marks	3 hours
Oral exam	20 marks	
Internal assessment (Theory)	25 marks	
Internal assessment (Practical)	25 marks	
	200 marks	

The practical examination will have the following components:

Practical Major	30 marks
Practical Minor/ Spotters	20 marks
	50 marks

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 80 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question	- 2 X 10 = 20 marks
Short answer question	- 8 X 5 = 40 marks
Very Short answer	- 10 X 2 = 20 marks

3. BIOCHEMISTRY
Course Code: BCLT-003

Placement: Ist Year (Ist Semester) **Time:** Theory: 60 Hours
Practical: 30 Hours (Lab)

Course Description: The course is designed to assist the students to acquire knowledge of the normal biochemical composition and functioning of human body, its alterations in disease conditions and to apply this knowledge in to practice.

COURSE OUTLINE

UNIT - I (3 Hrs)

- **Introduction to Biochemistry**

UNIT - II (3 Hrs)

- **Biophysical aspects of Biochemistry**

UNIT-III (7 Hrs)

Carbohydrates

- Chemistry of carbohydrates, Classification and biological importance
- Digestion and absorption, Glycolysis, glycogen metabolism, glucono-genesis, TCA cycle
- Regulation of blood glucose, Diabetes mellitus

UNIT-IV (7 Hrs)

Proteins

- Biological importance, Classification of amino acids & proteins
- Digestion and absorption
- Urea synthesis, Transamination

UNIT-V (7 Hrs)

Lipids

- Biological importance
- Classification of lipids, lipoproteins, Overview of lipid metabolism

UNIT-VI (6 Hrs)

Enzymes

- Classification, Factors affecting enzyme action
- Enzyme inhibition & Chemical enzymology

UNIT-VII (7 Hrs)

Endocrinology

- Hormones, Role of biological important hormones
- Pituitary, thyroid, adrenal cortex and medulla
- Sex hormones

UNIT-VIII (7 Hrs)

Mineral metabolism

- Regulation of blood level
- Consequences of excess and deficiency of calcium, Phosphate, iron, copper & zinc

UNIT-IX (7 Hrs)

Vitamins

- Fat soluble vitamins, Water soluble vitamins
- Biochemical function, Deficiency, Manifestation, Source & RDA

UNIT-X (6 Hrs)

Clinical Biochemistry

- LFT& RFT
- Urine analysis

Practical's:

- Simple Color reactions of Carbohydrates and Proteins
- Qualitative estimations of Glucose, Urea, Creatinine, Total Protein and Cholesterol
- Normal constituents of Urine
- Abnormal (pathological) Urine
- Glucose Tolerance Test and its significance
- Demonstration of Electrophoresis and Interpretation of important clinical conditions based on Electrophoresis appearance
- Demonstration of Paper Chromatography and its utility in the diagnosis of inborn errors of metabolism.

Reference Books:

1. Vasudevan (DM), Text Book of Biochemistry for Medical Students, Jaypee Pub,9th Edi, 2019.
2. Wilson & Walkers Principles & Techniques of Biochemistry & Molecular Biology, University Press, 8th Edi, 2018.
3. HarbansLal and Rajesh Pandey Textbook of biochemistry, CBS, 3rd Edi, 2017
4. Harold Varley, Practical Clinical Biochemistry, CBS, 4th Edi, 2010.

Examination Pattern

Subject		**Duration**
Theory exam:	75 marks	3 hours
Internal assessment (Theory)	25 marks	
	---	
	100 marks	

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 75 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question	- 2 X 10 = 20 marks
Short answer question	- 7 X 5 = 35 marks
Very Short answer	- 10 X 2 = 20 marks

COMMUNICATION AND SOFT SKILLS
Course Code: BCLT-C01

Placement: Ist Year (Ist Semester) **Time:** Theory: 60 Hours

Course Description: The course is designed to enable students to enhance their ability to speak and write the language (and use English) required for effective communication in their professional work. Students will practice their skills in verbal and written English during clinical and classroom experience.

UNIT - I (10 Hrs)

Review of Grammar

- Remedial study of Grammar
- Building Vocabulary
- Phonetics
- Public Speaking

UNIT - II (3 Hrs)

Communication

- What is communication?
- What are communication roles of listeners, speakers, readers and writers as health care professionals?

UNIT- III (5 Hrs)

Introduction to LSRGW

- L–Listening: Different types of listening
- S–Speaking: Understanding Consonants, Vowels, Word and Sentence Stress, Intonation
- R–Reading: Medical vocabulary
- Gr–Grammar: Understanding tenses, linkers
- W–Writing simple sentences and short paragraphs –emphasis on correct grammar

UNIT- IV (7 Hrs)

Attentive Listening

- Focusing on listening in different situations, announcements, descriptions, narratives ,instructions, discussions, demonstrations
- Reproducing Verbatim
- Listening to academic talks/lectures
- Listening to presentation

UNIT – V (12Hrs)

Effective Conversation

- Conversation situations–informal ,formal and neutral
- Factors influencing way of speaking–setting ,topic, social relationship ,attitude and language
- Greetings,introductions,requesting,askingforandgivingpermission,speaking personally and casual conversations
- Asking for information, giving instructions and directions
- Agreeing and disagreeing ,giving opinions

- Describingpeople,places,eventsandthings,narrating,reporting&reachingconclusions
- Evaluating and comparing
- Complaints and suggestions
- Telephone conversations
- Delivering presentation

UNIT-VI (8 Hrs)

Reading

- Reading strategies ,reading notes and messages
- Reading relevant articles and news items
- Vocabulary for everyday activities ,abbreviations and medical vocabulary
- Understanding visuals ,graphs, figures and notes on instructions
- Reading reports and interpreting them
- Using idioms and phrases, spotting errors, vocabulary for presentations
- Remedial Grammar

UNIT- VII (7 Hrs)

Writing Skills

- Writing patient history
- Note taking
- Summarizing
- Anecdotal records
- Letter writing
- Diary/Journal writing
- Report writing
- Paper writing skills
- Abstract writing

UNIT VIII (8 Hrs)

LSRW Skills

- Critical thinking strategies for listening and reading
- Oral reports ,presentations
- Writing instructions, letters and reports
- Error analysis regarding LSRW

Reference Books:

1. Clement, I,Essentials of English for Paramedical Courses, EMMESS,2nd Edi,2018.
2. LakshminarayananK.R.,English forTechnicalCommunication,Scitechpublication, 2nd Edi2015

4. APPLIED PATHOLOGY
Course Code: BCLT-004

Placement: I Year (II Semester)

Time: Theory: 60 Hours
Practical: 30 Hours

Course Description:
The course is designed to understand pathology laboratory reports, the normal ranges of investigations, severity and specificity of disease conditions which will help to perform International Classification of diseases to clinical pertinence.

Course Outline

UNIT-I (3Hrs)
Basic Concepts in Cellular Adaption's

- Cell injury and Cell death
- Cellular response to stress and other stimuli
- Over view of Cell injury and Cell death

UNIT-II (5Hrs)
Basic Principles in Inflammatory Process

- General features including inflammatory mediators and Basic Mechanisms of disorders of Immunity, General features of the immune system, Disorders of the Immune System,
- Acute and Chronic inflammation

UNIT-III (5Hrs)
Infectious Diseases

- Infectious diseases, Bacterial Infections (Typhoid, Tuberculosis and Leprosy) Viral infections (HIV, HbSAg and Polio)
- Specific Examples of Fungal, Parasitic and Syphilis infections

UNIT-IV (3Hrs)
Neoplasia

- Neoplasia Nomenclature, Rudimentary aspects on Tumor growth and Metastasis
- Definition of Neoplasia, Differences between Benign and Malignant tumors
- Staging and Grading of Tumors (Basic Aspects), Oncogenes and Tumor Suppressor genes

UNIT-V (5Hrs)
Hematology

- Structure and functions of Formed elements
- Objective use of anticoagulants, Mechanisms of Hemostasis
- Tests to monitor Coagulation, Blood Grouping and Blood Bank (Basic aspects on Blood Components)
- Fixatives and Basic details in Cytology, Aspiration Cytology of Bone marrow
- Basic concepts in Anemia, Cellular aspects of Leukemia (Basic Concepts)

UNIT-VI (3Hrs)
Histopathology

- Use of Microscopes, Grossing and Mounting Techniques
- Processing of Biopsy specimen, Paraffin sections

UNIT-VII (3Hrs)

Biomedical Waste Management and Environmental Pathology

- Biomedical waste management from perspectives of Pathology
- Environment and Disease – Smoking hazards, Asbestosis and Silicosis & Occupational Exposure

UNIT-VIII (3Hrs)

Clinical Pathology

- Collection, transport, preservation and processing of Clinical Specimen
- Clinical Pathology of specialized Body Fluids (CSF), Synovial fluid, Pleural Fluid
- Urine Examination (Urinalysis)

UNIT-IX (20Hrs)

Overview of Systemic Pathology

- Rheumatic Heart Disease
- Lungs: Pneumonia, COPD, Asthma, ARDS
- Liver: Hepatitis, Cirrhosis
- Muscle: Myasthenia Gravis
- Brain: Meningitis, Aspergillosis, CNS Tumor – (Classification)

UNIT-X (10Hrs)

Practical Demonstration

- Demo of Coagulation Profile, Phlebotomy techniques Blood Grouping and Rh typing, Urine Routine, Hemogram, Fecal Examination Safety Precautions in Clinical Pathology

Practical's:

- Blood Grouping and Rh typing
- Urine Routine
- Hb, TLC, DLC
- Gross Specimens
- Slides

Reference Books:

1. Mohan (H), Textbook of Pathology, Jaypee Pub, 5th Edi, 2019.
2. Kumar, Robbins &Cotran Pathologic Basis of Disease, WB Saunders, 10th Edi, 2020.
3. Kawthalkar(S), Essentials of Clinical Pathology, Jaypee Brothers, 2nd edi, 2018.
4. Nayak (R), Essentials of Hematology & Clinical Pathology, Jaypee Brothers, 2nd Edi, 2017.
5. Sengupta, Synopsis of Clinical Pathology & Microbiology, CBS Pub, 8th Edi, 2017.

Examination Pattern

Subject		**Duration**
Theory exam:	80 marks	3 hours
Practical exam:	50 marks	3 hours
Oral exam	20 marks	
Internal assessment (Theory)	25 marks	
Internal assessment (Practical)	25 marks	
	200 marks	

The practical examination will have the following components:

Practical Major	30 marks
Practical Minor/ Spotters	20 marks
	50 marks

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 80 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question	- 2 X 10 = 20 marks
Short answer question	- 8 X 5 = 40 marks
Very Short answer	- 10 X 2 = 20 marks

5. APPLIED MICROBIOLOGY
Course Code: BCLT-005

Placement: I Year (II Semester)

Time: Theory: 60 Hours
Practical: 30 Hours

Course Description: The course is designed to assist students to acquire understanding of fundamentals of microbiology and identification of microorganisms. It also provides opportunities for practicing infection control measures in hospital setting.

Course Outline

UNIT-I (5Hrs)
Introduction:

- History of microbiology- (contribution of Louis Pasteur, Robert Koch, Joseph Lister, Edward Jenner, Alexander Fleming)
- Importance of Microbiology in clinical practice
- Microscope –Types & Uses

UNIT-II (5Hrs)
General Microbiology:

- Infection, parasite, host, vector, fomite, contagious disease, infectious disease, epidemic, endemic, pandemic, Zoonosis, Epizootic, Attack rate
- Routes of infection and spread, endogenous and exogenous infections at reservoir of infections
- Antimicrobials: mode of action, interpretation of susceptibility tests, resistance spectrum of activity
- Staining techniques: Gram staining, Acid fast staining, Culture methods Laboratory diagnosis of infection

UNIT-III (10Hrs)
Sterilization & Disinfection:

- Definition of Asepsis, Sterilization and Disinfection Hospital Acquired infection
- Universal safety precautions and Biomedical waste Disposal & Management

UNIT-IV (10Hrs)
Immunology:

- Antigen- Antibody-reaction & application for Diagnosis
- Immune response- Normal / Abnormal, Innate Immunity & acquired immunity (Vaccination)
- Hyper sensitivity & auto-immunity, Serological tests, Immunoprophylaxis

UNIT-V (10Hrs)
Bacteriology:

- Morphology, Classification according to the Pathogenicity,
- Mode of Transmission, methods of prevention,
- Collection and transport of samples for laboratory diagnosis, Interpretation of laboratory reports
- Staphylococci, Streptococci, & Pneumococci Neisseria, Mycobacterium: Tuberculosis, M.Leprae, Enterobacteriaceae, Escherichia Coli, Salmonella, Corynebacterium, Vibrosis, V. Cholerae and other medically important Vibrio's, Campylobacters and Helicobacters Pseudomonas, Mycoplasma, Rickettsiae, Chlamydia, Bacillus anthracis, Sporing&nonsporing anaerobes, Clostridium

UNIT-VI (10Hrs)
Virology:

- General Properties, Basic structure and broad Classification of Viruses.
- Pathogenesis and Pathology of viral infection (HIV, Hepatitis, Polio, Measles, Congenital viral infections, Rubella, CMV, Herpes)
- Immunity and Prophylaxis of viral Diseases, Principles of viral diseases
- List of commonly used antiviral agents

UNIT-VII (5Hrs)
Parasitology:

- Amoebiasis, Malaria, Filaria, Toxoplasma, cystisarcosis, Roundworm, Hookworm, &Echinococcus.

UNIT-VIII (5Hrs)
Mycology:

- General Properties of Fungi, Classification based on fungal infection Candidiasis, Cryptococcosis, Dermatophytosis, Mycetoma, Aspergillosis.

Practical's:

- Introduction & visit to microbiology lab + Morphology of bacteria + Identification of bacteria (Culture plates &Basic biochemical reactions)
- Gram stain,Acid fast Stain
- Spotters , Instruments, Culture media inoculated &uninoculated
- Applied Immunology (Bacterial) Serological tests – CRP, ASO, RPR, Widal Applied Immunology (Virology) Serological tests:HIV, HBsAg(Rapid Tests)
- Stool Examination for eggs + Parasitology specimens

Reference Books:

1. Ananthanarayanan (R), Textbook of Microbiology, Orient Longman Ltd.,10th Edi, 2017.
2. Mackie and McCartney Practical Medical Microbiology, Relx India Pvt ltd, 14th Edi, 2018.
3. Baveja CP, Textbook of Microbiology, APC, 6th edi, 2021.
4. Sriram Kumar (S), Textbook of Microbiology, All win Publication, 1st Edi, 2019

Examination Pattern

Subject		**Duration**
Theory exam:	80 marks	3 hours
Practical exam:	50 marks	3 hours
Oral exam	20 marks	
Internal assessment (Theory)	25 marks	
Internal assessment (Practical)	25 marks	
	200 marks	

The practical examination will have the following components:

Practical Major	30 marks
Practical Minor/ Spotters	20 marks
	50 marks

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 80 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question	- 2 X 10 = 20 marks
Short answer question	- 8 X 5 = 40 marks
Very Short answer	- 10 X 2 = 20 marks

6. APPLIED PHARMACOLOGY
Course Code: BCLT-006

Placement: I Year (II Semester)

Time: Theory: 60 Hours
Practical: 30 Hours

Course Description: This course is designed to enable students to acquire understanding of Pharmaco-dynamics, Pharmaco-kinetics, principles of therapeutics & possible implications.

COURSE OUTLINE

UNIT - I (5Hrs)
Introduction to Pharmacology

- Definitions & Branches
- Nature & Sources of drugs
- Dosage Forms and Routes of drug administration
- Terminology used
- Classification, Abbreviations, Prescription
- Drug Calculation, Weights and Measures
- Pharmacodynamics: Actions, Drug Antagonism, Synergism, Tolerance, Receptors, Therapeutic, adverse, toxic effects, pharmaco vigilance
- Pharmacokinetics: Absorption, Bioavailability, Distribution, Metabolism, Interaction, Excretion
- Review-Principles of drug administration and treatment individualization , Factors affecting dose, route etc
- Indian Pharmacopoeia: Legal Issues, Drug Laws, Schedule Drugs • Rational Use of Drugs • Principles of Therapeutics

UNIT - II(3Hrs)
Pharmacology of commonly used antiseptics and disinfectants

- Antiseptics and Disinfectants
- Composition, action, dosage, route, indications, contraindications, Drug interactions, side effects, adverse effects, toxicity

UNIT - III(4Hrs)
Drugs acting on G.I system

- Pharmacology of commonly used drugs - Emetics and Antiemetics , Laxatives and Purgatives, - Antacids and anti-peptic ulcer drugs ,Anti diarrhoea ,Fluid and electrolyte therapy, Furazolidone, dicyclomine.
- Composition, action, dosage, route, indications, contraindications, drug interactions, side effects, adverse effects, toxicity

UNIT - IV(4Hrs)
Drugs acting on respiratory system

- Pharmacology of commonly used - Anti-asthmatics - Bronchodilators (Salbutamol inhalers) - Decongestants - Expectorants, Antitussives and Mucolytics - Broncho-constrictors and Antihistamines

- Composition, action, dosage, route, indications, contraindications, drug Interactions, side effects, adverse effects, toxicity

UNIT - V(5Hrs)

Drugs used in treatment of Cardiovascular system and blood disorders

- Hematinic in treatment of anemia
- Cholinergic and anti-cholinergic
- Adrenergic Drugs for CHF, anti-adrenergic & vasodilators
- Anti-anginal
- Antiarrhythmic
- Antihypertensive
- Coagulants & Anticoagulants • Antiplatelet & thrombolytic
- Hypolipidemics
- Plasma expanders & treatment of shock
- Drugs used to treat blood disorders
- Composition, action, dosage, route, indications, contraindications, drug Interactions, side effects, adverse effects, toxicity

UNIT - VI(4Hrs)

Drugs used in treatment of endocrine system disorders

- Insulin & oral hypoglycemic agents
- Thyroid and anti-thyroid drugs
- Steroids, Corticosteroids, Anabolic steroids
- Calcitonin, parathormone, vit D3, calcium metabolism, Calcium salts

UNIT - VII(4Hrs)

Drugs used in treatment of integumentary system

- Antihistaminic and antipruritic
- Topical applications for skin Benzyl benzoate, Gamma BHC, Clotrimazole, Miconazole, Silver Sulphadiazine (burns)
- Composition, action, dosage, route, indications, contraindications, drug interactions, side effects, adverse effects toxicity

UNIT - VIII(4Hrs)

Drugs used in treatment of communicable diseases (common infections, infestations)

- General Principles for use of Antimicrobials
- Pharmacology of commonly used drugs: - Penicillin, Cephalosporin's, Aminoglycosides, Macrolide & broad-spectrum antibiotics, Sulfonamides, quinolones, Misc. antimicrobials
- Anaerobic infections
- Anti- tubercular drugs
- Anti-leprosy drugs
- Antimalarial
- Antiretroviral drugs
- Antiviral agents
- Anthelminthic, Anti scabies agents
- Antifungal agents
- Composition, action, dosage, route, indications, contraindications, Drug Interactions, side effects, adverse effects, toxicity.

UNIT - IX(3Hrs)

Drugs used in disorders of ear, nose, throat & Eye

- Antihistaminic
- Topical applications for eye (Chloramphenicol, Gentamycin eye drops), ear (Soda glycerin ear drops, boric acid ear drops, spirit boric ear drops), nose and buccal cavity-chlorhexidine mouthwash
- Composition, action, dosage, route, indications, contraindications, drug Interactions, side effects, adverse effects, toxicity.

UNIT - X(3Hrs)

Drugs used on urinary system

- Pharmacology of commonly used drugs Renin angiotensin system, Diuretics and antidiuretics Drugs toxic to kidney Urinary antiseptics Treatment of UTI – acidifiers and alkalinizers
- Composition, action, dosage, route, indications, contraindications, Drug Interactions, side effects, adverse effects,toxicity.

UNIT - XI (5Hrs)

Drugs acting on nervous system

- Basis & applied pharmacology of commonly used drugs
- Analgesics and anaesthetics Analgesics - Non steroidal anti-inflammatory (NSAID) drugs Antipyretics Opioids & other l analgesics, General (techniques of GA, preanesthetic medication) & local anesthetics Gases: oxygen, nitrous oxide, carbon-dioxide & others
- Hypnotics and sedatives,Skeletal muscle relaxants,Anti-psychotics,Mood stabilizers Antidepressants , Anti-Anxiety Drugs , Anticonvulsants
- Drugs for neurodegenerative disorders & miscellaneous drugs , Stimulants, ethyl alcohol and treatment of methyl alcohol poisoning
- Composition, action, dosage, route, indications, contraindications, drug Interactions, side effects, adverse effects toxicity.

UNIT - XII (3Hrs)

Drugs used for hormonal, disorders and supplementation, contraception and medical termination of pregnancy

- Estrogens and progesterone's
- Oral contraceptives and hormone replacement therapy
- Vaginal contraceptives
- Drugs for infertility and medical termination of pregnancy, Uterine stimulants and relaxants
- Composition, actions, dosage, route, indications, contraindications, drugs interactions, side effects, adverse, effects, adverse effects, toxicity.

UNIT - XIII (3Hrs)

Drugs used for pregnant women during antenatal, labor and postnatal period

- Tetanus prophylaxis
- Iron and Vit K1 supplementation
- Oxytocin, Misoprostol
- Ergometrine
- Methyl prostaglandin F2-alpha
- Magnesium sulphate
- Calcium gluconate

UNIT - XIV (5Hrs)

Miscellaneous

- Drugs used for de-addiction
- Drugs used in CPR and emergency-adrenaline, Chlorpheniramine, hydrocortisone, Dexamethasone
  • IV fluids & electrolytes replacement
- Common poisons, drugs used for treatment of poisoning Activated charcoal Ipecac Antidotes Anti-snake venom (ASV)
- Vitamins and minerals supplementation
- Vaccines & sera (Universal immunization program schedules)
- Anticancer drugs, Chemotherapeutic drugs commonly used
- Immuno-suppressants and Immunostimulants

UNIT - XV (4Hrs)

Introduction to drugs used in alternative systems of medicine:

• Ayurveda, homeopathy, unani and siddha etc.
• Drugs used

Reference Books:

1. PadmajaUdaykumar,Text book of Medical Pharmacology, CBS , 7th Edition, 2022.
2. Sharma.H.L&Sharma.K.K, Principles of Pharmacology, Paras Medical, 3rd Edi, 2017.
3. Tripathi.KD, Essentials of Medical Pharmacology, Jaypee Brothers, 8th Edition, 2018.

Examination Pattern

Subject		**Duration**
Theory exam:	75 marks	3 hours
Internal assessment (Theory)	25 marks	
	---	
	100 marks	

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 75 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question	- 2 X 10 = 20 marks
Short answer question	- 7 X 5 = 35 marks
Very Short answer	- 10 X 2 = 20 marks

COMPUTER APPLICATION
Course Code: BCLT-C02

Placement: IYear (IISemester) **Time:** Theory:30 Hours
Practical:30Hours(Lab)

Course Description:
The course is designed for student to acquire the knowledge, develop basic understanding, use of computer and its applications in clinical field.

UNIT- I (10 Hrs)
Introduction to Computer

- Concepts of computers
- Hardware and Software
- Trends and Technology
- Applications of Computer

UNIT- II (10 Hrs)
Introduction to Disk Operating System (DOS)

- Windows(all version)
- MS Word
- MS Excel with Pictorial Presentation
- MS-Access
- MS-PowerPoint

UNIT- III (5 Hrs)
Statisticalpackages

- Types and their features

UNIT- IV (5 Hrs)
Hospital Management System

- Types and uses
- Electronic patient records

ReferenceBooks:

1. Bansal Surabhi, Computer Applications for Allied Health Sciences, AITBS, 1st Edi, 2022.
2. PriyankaRandhir, Computer for Paramedical,CBS, 1st Edi, 2020
3. Pooja Jain &NeelamKumari, Introduction to Computer, S.Vikas& Co, 5th edi, 2019
4. Shah Y.I, Paradkar A.R et.al, Introduction to Biostatistics and Computer Science, NiraliPrakashan Pub, 16th Edi, 2019.

7. BASIC ELECTROCARDIOGRAPHY AND TREADMILL EXERCISE STRESS TEST

Course Code: BCLT-007

Placement: II Year (III Semester) **Time**: **Theory**:60 Hours
Practical : 30 Hours

Course Description:

This course is designed to provide a foundational understanding of electrocardiography (ECG) and its clinical applications. Students will learn to interpret basic ECG tracings, recognize common cardiac arrhythmias, and understand the significance of various ECG findings in diagnosing cardiac conditions.

Basic Electrocardiography (35 Hrs)

1. Electrocardiography
2. Electrocardiographic processing and display system
3. Fundamental principles of electrocardiography: Cardiac electrical field generation during activation, Cardiac wave fronts
4. Cardiac electrical field generation during ventricular recovery
5. Electrocardiographic lead systems: Standard limb leads, Precordial leads and the Wisdom central termina, Augmented limb leads
6. The hexaxial reference frame and electrical axis
7. Axis Deviations-Interpretation
8. The normal electrocardiogram, Atrial activation
9. The normal P wave Atrial repolarization, Ventricular activation and the QRS Complex,Ventricular recovery and ST-T wave, U wave Normal variants
10. Segments and Intervals
11. Rate and rhythm-Calculation
12. ECG Paper-Interpretation
13. Atrial Abnormalities
14. Ventricular Hypertrophy
15. Bundle Branch Blocks-Right and Left Bundle Branch Blocks,Fascicular Blocks

Treadmill Exercise stress Testing (TMT) (25 Hrs)

1. Exercise Physiology
2. Exercise protocols
3. Exercise testing-Indication and Contra-Indications.
4. Lead Placement
5. Patient Preparation
6. Pecautions to be Followed
7. Complications
8 Termination
9. Duke's Score

PRACTICALS:

1. Electrocardiographic lead systems: Standard limb leads, Precordial leads and the Wisdom
2. central termina, Augmented limb leads
3. The hexaxial reference frame and electrical axis
4. Axis Deviations-Interpretation
5. The normal electrocardiogram, Atrial activation
6. The normal P wave Atrial repolarization, Ventricular activation and the QRS
7. Complex,Ventricular recovery and ST-T wave, U wave Normal variants
8. 10.Segments and Intervals

9. Rate and rhythm-Calculation
10. ECG Paper-Interpretation
11. Atrial Abnormalities
12. Ventricular Hypertrophy
13. Bundle Branch Blocks-Right and Left Bundle Branch Blocks,Fascicular Blocks
14. Exercise protocols
15. Exercise testing-Indication and Contra-Indications.
16. Lead Placement
17. Patient Preparation
18. Pecautions to be Followed
19. Complications
20. Termination
21. Duke's Score

TEXT BOOKS/ REFERENCE BOOKS:

1. Leo Schamroth-Wiley-8th Edition-Wiley
2. Marriots Practical Electrocardiography-Galen.S.Wagner David.G.Strauss-12th Edition-Wolters Kluwer/ Lippincott Williams And Wilkins
3. Chou's Electrocardiography In Clinical Practice-Surawicz Knilans-6th Edition-Saunders Elsevier
4. Textbook Of Clinical Electrography-S N Chung-3rd Edition-Jaypee
5. Leo Schamroth-Wiley-8th Edition-Wiley
6. Marriots Practical Electrocardiography-Galen.S.Wagner David.G.Strauss-12th Edition-Wolters Kluwer/ Lippincott Williams And Wilkins
7. Chou's Electrocardiography In Clinical Practice-Surawicz Knilans-6th Edition-Saunders Elsevier
8. Textbook Of Clinical Electrography-S N Chung-3rd Edition-Jaypee

Examination Pattern

Subject		**Duration**
Theory exam:	75 marks	3 hours
Internal assessment (Theory)	25 marks	
	100 marks	

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 75 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question	- 2 X 10 = 20 marks
Short answer question	- 7 X 5 = 35 marks
Very Short answer	- 10 X 2 = 20 marks

8. BASIC ECHOCARDIOGRAPHY
Course Code: BCLT-008

Placement: II Year (III Semester) **Time**:Theory: 60 Hours
Practical : 30 Hours

Course Description:

This course provides a comprehensive introduction to echocardiography, focusing on the fundamental principles and techniques used in the assessment of cardiac structure and function. Participants will learn to perform basic echocardiographic examinations and interpret standard echocardiographic images.

UNIT I: (10 Hrs)

Basics of Echocardiography

- Basic principles of ultrasound
- Transthoracic Echocardiographic Windows
- Transthoracic Echocardiographic Views
- Two dimensional Echocardiography
- M-Mode Echocardiography
- Doppler Echocardiography, colour flow
- Transoesophageal Echocardiography

UNIT II: (15 Hrs)

Instrumentation:

- Basic pulse Echo system
- Transducers
- Pulse generation
- Echo detection
- Echo displays
- A mode, B mode, M-mode
- Display & recording

UNIT III: (15 Hrs)

Echocardiographic Examination:

- Selecting transducers
- Position of the patient
- Placement of the transducer
- Setting control
- M-Mode labelling
- 2 D Echo
- Normal variants
- Anatomical Planes for viewing in Echocardiography
- Normal m-Mode Echo Study: Anatomy / Function
- Terminology
- Echo for Cardiac Function - systolic and diastolic
- Identification of segments

UNIT IV: (15)

Doppler Echocardiography

- Introduction to Doppler colour Echocardiography
- The Doppler principles
- Doppler ultrasound techniques
- Colour Doppler flow imaging
- Clinical application of Doppler Echocardiography
    a. Physical principles & instrumentation in spectral & color Doppler flow imaging.
    b. Physical principles and Doppler effect. The Doppler echocardiography system display.
    c. Blood flow pattern-Laminar & non-laminar flow.
    d. Doppler echo cardiographic modes
        * Continuous wave Doppler frequency
        * Pulsed Doppler system
        * High pulse repetition frequency
        *Problems of color- imaging

UNIT V: (5 Hrs)

- Contrast Echocardiography

PRACTICALS:

- Basic principles of ultrasound
- Transthoracic Echocardiographic Windows
- Transthoracic Echocardiographic Views
- Two dimensional Echocardiography
- M-Mode Echocardiography
- Position of the patient
- Placement of the transducer
- Setting control
- M-Mode labelling
- 2 D Echo
- Normal variants
- Anatomical Planes for viewing in Echocardiography
- Normal m-Mode Echo Study: Anatomy / Function
- Terminology
- Echo for Cardiac Function - systolic and diastolic
- Identification of segments
- Doppler echo cardiographic modes
- Contrast Echocardiography

TEXT BOOKS/ REFERENCE BOOKS:

1. Echo Made Easy-Atul Luthra-5th Edition-Jaypee
2. Feigenbaum's Echocardiography-William.F.Armstrong-8th Edition-Wolters Kluwer/ Lippincott Williams And Wilkins
3. Practice Of Clinical Echocardiography-Catheriine Otto-6th Edition-Elsevier
4. Textbook Of Clinical Echocardiography-Catheriine Otto-7th Edition-Elsevier
5. Textbook Of Echocardiography-V Amuthan -Sathish K Parashar-2nd Edition-Jaypee
6. Echo Made Easy-Atul Luthra-5th Edition-Jaypee
7. Feigenbaum's Echocardiography-William.F.Armstrong-8th Edition-Wolters Kluwer/ Lippincott Williams And Wilkins
8. Practice Of Clinical Echocardiography-Catheriine Otto-6th Edition-Elsevier
9. Textbook Of Clinical Echocardiography-Catheriine Otto-7th Edition-Elsevier
10. Textbook Of Echocardiography-V Amuthan -Sathish K Parashar-2nd Edition-Jaypee

Examination Pattern

Subject		**Duration**
Theory exam:	75 marks	3 hours
Internal assessment (Theory)	25 marks	
	---	
	100 marks	

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 75 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question	- 2 X 10 = 20 marks
Short answer question	- 7 X 5 = 35 marks
Very Short answer	- 10 X 2 = 20 marks

9. CLINICAL CARDIOLOGY
Course Code: BCLT-009

Placement: II Year (III Semester) **Time**: **Practical**: 60 Hours
Clinical : 60 Hours

Course Description:

This comprehensive course is designed for healthcare professionals seeking to enhance their knowledge and skills in clinical cardiology. The course covers a broad range of topics, from the fundamentals of cardiovascular medicine to the latest advancements in diagnosis, treatment, and management of cardiac conditions. Participants will gain in-depth understanding and practical experience necessary to provide high-quality care to patients with cardiovascular diseases.

UNIT I:

Basic anatomy and physiology of the heart

- Anatomy of the heart
- Lymphatic system, Arterial and venous supply of the heart
- Conduction system and Basic Electrophysiology

UNIT II:

History and symptoms

- Importance of history taking.
- Causes of cardinal symptoms(Cardio vascular and non-cardiovascular)
- Assessment:-
    1. NYHA functional Classification-
    2. CCS functional classification: Specific activity scale, Chest Pain, Dyspnea, Shortness of breath, Palpitation, Fatigue, Syncope.
- Other symptoms: Hemoptysis, Hoarseness, Cyanosis, Fever.

UNIT III:

General Examination:

- Facial appearance-Gesture and signs-
- Oral cavity-Skin, Extremities-Peripheral edema

Arterial pulse

- Definition,
- Genesis
- Wave pattern
- Examination of arterial pulse
- Characteristic features of pulse in common clinical conditions

TEXT BOOK REFERENCE:

1. Essentials of clinical cardiology –Jayant C B halerao

Examination Pattern

Subject		**Duration**
Theory exam:	75 marks	3 hours
Internal assessment (Theory)	25 marks	
	---	
	100 marks	

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 75 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question	- 2 X 10 = 20 marks
Short answer question	- 7 X 5 = 35 marks
Very Short answer	- 10 X 2 = 20 marks

10. CARDIAC CATHETERIZATION PRACTICAL - I
Course Code – BCLT-010
(270 Hours)

- Electrocardiographic lead systems: Standard limb leads, Precordial leads and the Wisdom
- central termina, Augmented limb leads
- The hexaxial reference frame and electrical axis
- Axis Deviations-Interpretation
- The normal electrocardiogram, Atrial activation
- The normal P wave Atrial repolarization, Ventricular activation and the QRS
- Complex, Ventricular recovery and ST-T wave, U wave Normal variants
- 10.Segments and Intervals
- Rate and rhythm-Calculation
- ECG Paper-Interpretation
- Atrial Abnormalities
- Ventricular Hypertrophy
- Bundle Branch Blocks-Right and Left Bundle Branch Blocks, Fascicular Blocks
- Exercise protocols
- Exercise testing-Indication and Contra-Indications.
- Lead Placement
- Patient Preparation
- Pecautions to be Followed
- Complications
- Termination
- Duke's ScoreBasic principles of ultrasound
- Transthoracic Echocardiographic Windows
- Transthoracic Echocardiographic Views
- Two dimensional Echocardiography
- M-Mode Echocardiography
- Position of the patient
- Placement of the transducer
- Setting control
- M-Mode labelling
- 2 D Echo
- Normal variants
- Anatomical Planes for viewing in Echocardiography
- Normal m-Mode Echo Study: Anatomy / Function
- Terminology
- Echo for Cardiac Function - systolic and diastolic
- Identification of segments
- Doppler echo cardiographic modes
- Contrast Echocardiography

The practical examination will have the following components: (Time 3 hrs)

Practical Major	30 marks
Practical Minor/ Spotters	20 marks
Viva – Voce	25 marks
	75 marks
Practical Internal Assessment	25 marks
Total Marks	100 marks

C4. MEDICAL PSYCHOLOGY
COURSE CODE : BCLT-C03

Placement: II Year (III Semester) **Time**: **Practical**:30 Hours

Course Description:

Medical Psychology is a multidisciplinary field that integrates the principles of psychology and medicine to understand and address the psychological aspects of health, illness, and healthcare. This course provides a comprehensive overview of the theoretical foundations, research methodologies, and clinical applications of medical psychology.

MEDICAL PSYCHOLOGY:

1. Introduction to Psychology -Definitions - Schools of thought; fields of Psychology.
2. Man in society.
3. Emotions and feelings.
4. Motivation - Human motivation.
5. Personality - what it is; concept of body image.
6. Normality and abnormality - major and minor psychiatric entities.
7. Why Medical Psychology ?
8. The patient in his mileu - socio-economic aspects.
9. The patient-therapist relationship - The initial encounter - basic principles of the therapist.
10. Illness - it’s impact on the patient.

11. ADVANCED ELECTROCARDIOGRAPHY AND EXERCISE STRESS TESTING
COURSE CODE: BCLT-011

Placement: II Year (IV Semester) **Time**:**Theory**:60 Hours
Practical : 30 Hourse

Course Description:
This course provides an in-depth exploration of electrocardiography (ECG) and exercise treadmill testing, focusing on advanced techniques and interpretation skills essential for healthcare professionals.

ADVANCED ELECTROCARDIOGRAPHY (30Hrs)

1. AV Blocks
    - I degree AV Block
    - II degree AV Block
        1. Mobitz Type-I
        2. Mobitz Type-II
    - III degree AV Block

2. ECG in myocardial infarction :
    - Stages and Phases of Myocardial Infarction
    - ST-T Changes
    - STEMI & NSTEMI – ECG changes
    - ECG changes in - Anterior wall, Inferior wall, Lateral Wall, True posterior wall and sub endocardial infarction and RV infarction

3. ECG in Arrhythmias
4. Electrolytic and Metabolic Abnormalities -ECG Diagnosis
5. ECG in rheumatic heart disease–ECG in mitral stenosis, mitral incompetence, aortic stenosis and aortic incompetence.
6. ECG in hypertension
7. ECG in congenital heart disease-common congenital heart disease-ASD,VSD, PDA, pulmonary stenosis, aortic stenosis, coarctation of aorta, TOF, definition of all these conditions, ECG changes in all these conditions.
8. ECG in other conditions-ECG in various types of Cardiomyopathy, Myxodema, pericardial effusion, acute pericarditis and other vascular diseases.
9. Dextrocardia.

ADVANCED EXERCISE STRESS TESTING (30Hrs)

1. Exercise ECG : Identifying ST-segment changes and other significant ECG findings
2. Exercise ECG
    - Measurements of ST segment Depression
    - Measurement of ST Elevation
3. Non-Electrocardiographic Observations
4. Non-Coronary Causes of ST segment depression
5. Interpretation of TMT Report:
    - Negative TMT
    - Mildly Positive TMT
    - True Positive TMT
    - Strongly Positive TMT
    - False Positive TMT
    - Inconclusive TMT/Un-Interpretable TMT
6. Post Exercise ECG : Observation, Instructions

PRACTICALS:

- Interpretation of AV Blocks
- Interpretation of ECG in myocardial infarction
- Interpretation of ECG in Arrhythmias
- Interpretation of ECG in Electrolytic and Metabolic Abnormalities
- Interpretation of ECG in hypertension
- Interpretation of ECG in congenital heart disease.
- Interpretation of ECG in Valvular Heart Disease
- Interpretation of ECG in various types of Cardiomyopathy,Pericardial Diseases and Myxodema
- Interpretation of ECG in Dextrocardia
- Interpretation of TMT report
- Interpretation of ST segment Abnormalities in TMT
- Interpretation of Arrhythmias in TMT

TEXT BOOKS/ REFERENCE BOOKS:

1. Leo Schamroth-Wiley-8th Edition-Wiley
2. Marriots Practical Electrocardiography-Galen.S.Wagner David.G.Strauss-12th Edition-Wolters Kluwer/ Lippincott Williams And Wilkins
3. Chou's Electrocardiography In Clinical Practice-Surawicz Knilans-6th Edition-Saunders Elsevier
4. Textbook Of Clinical Electrography-S N Chung-3rd Edition-Jaypee
5. Leo Schamroth-Wiley-8th Edition-Wiley
6. Marriots Practical Electrocardiography-Galen.S.Wagner David.G.Strauss-12th Edition-Wolters Kluwer/ Lippincott Williams And Wilkins
7. Chou's Electrocardiography In Clinical Practice-Surawicz Knilans-6th Edition-Saunders Elsevier
8. Textbook Of Clinical Electrography-S N Chung-3rd Edition-Jaypee

Examination Pattern

Subject		**Duration**
Theory exam:	75 marks	3 hours
Internal assessment (Theory)	25 marks	
	100 marks	

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 75 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question	- 2 X 10 = 20 marks
Short answer question	- 7 X 5 = 35 marks
Very Short answer	- 10 X 2 = 20 marks

12. ADVANCED ECHOCARDIOGRAPH
COURSE CODE: BCLT-012

Placement: II Year (IV Semester) **Time**:**Theory**:60 Hours

Practical :30 Hours

Course Description:

This advanced course is designed for healthcare professionals seeking to deepen their expertise in echocardiography. It covers the latest techniques, interpretation skills, and clinical applications essential for the accurate assessment and management of complex cardiovascular conditions using echocardiography.

UNIT I:

Echo Assessment in Valvular Heart Diseases:

- Mitral Valve Diseases
- Aortic Valve Diseases
- Pulmonary Valve Diseases
- Tricuspid Valve Diseases

UNIT II:

Echo Assessment in Congenital Heart Diseases:

- Atrial Septal Defect
- Ventricular Septal Defect
- Patent Ductus Arteriosus
- Coarctation of Aorta
- Tetralogy of Fallot

UNIT III:

Specialized Echocardiographic Applications:

- Stress echocardiography for ischemic heart disease
- Evaluation of cardiomyopathies -DCMP,HCMP,RCMP
- Evaluation of pericardial diseases-Pericardial Effusion,Cardiac Tamponade,Constrictive Pericarditis
- Interventional echocardiography: guidance for catheter-based procedures

UNIT IV:

New Technologies and Advancements:

- Advances in 3D echocardiography and real-time imaging
- Role of artificial intelligence and machine learning in echocardiography
- Future trends and innovations in echocardiographic practice
- Integrative approaches combining echocardiography with other imaging modalities (CT, MRI)

PRACTICALS:

- Echocardiography Evaluation of Valvular Heart Diseases
- Echocardiography Evaluation of Congenital Heart Diseases
- Stress echocardiography
- Evaluation of cardiomyopathies -DCMP,HCMP,RCMP
- Evaluation of pericardial diseases-Pericardial Effusion,Cardiac Tamponade,Constrictive Pericarditis
- Advances in 3D echocardiography and real-time imaging
- Future trends and innovations in echocardiographic practice
- Integrative approaches combining echocardiography with other imaging modalities

TEXT BOOKS/ REFERENCE BOOKS:

1. Feigenbaum's Echocardiography-William.F.Armstrong-8th Edition-Wolters Kluwer/ Lippincott Williams And Wilkins
2. Practice Of Clinical Echocardiography-Catheriine Otto-6th Edition-Elsevier
3. Textbook Of Clinical Echocardiography-Catheriine Otto-7th Edition-Elsevier
4. Textbook Of Echocardiography-V Amuthan -Sathish K Parashar-2nd Edition-Jaypee
5. Feigenbaum's Echocardiography-William.F.Armstrong-8th Edition-Wolters Kluwer/ Lippincott Williams And Wilkins
6. Practice Of Clinical Echocardiography-Catheriine Otto-6th Edition-Elsevier
7. Textbook Of Clinical Echocardiography-Catheriine Otto-7th Edition-Elsevier
8. Textbook Of Echocardiography-V Amuthan -Sathish K Parashar-2nd Edition-Jaypee

Examination Pattern

Subject		**Duration**
Theory exam:	75 marks	3 hours
Internal assessment (Theory)	25 marks	
	100 marks	

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 75 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question	- 2 X 10 = 20 marks
Short answer question	- 7 X 5 = 35 marks
Very Short answer	- 10 X 2 = 20 marks

13. PATIENT CARE IN INTENSIVE CORONARY CARE UNIT
COURSE CODE: BCLT-013

Placement: II Year (IV Semester) **Time**: **Theory**: 60 Hours
Practical : 30 Hrs

Course Description:

This course is designed to equip healthcare professionals with the knowledge and skills necessary to provide high-quality care to patients in an Intensive Coronary Care Unit (ICCU). Emphasizing both theoretical understanding and practical application, the course covers advanced patient management strategies, critical care protocols, and the latest advancements in coronary care.

Unit I (15 Hrs)

Introduction, Communication and Documentation –

Introduction to Patient Care:

Principles of patient care. Types of patients (gender, age, diseases, severity of illness, triage).

Communication & Documentation: Communication with doctors, colleagues and other staffs. Non-verbal communication, Inter-personnel relationships. patient contact techniques, communication with patients and their relatives,

Documentation: Importance of documentation, initial and follow up notes; documentation of therapy, procedures and communication

Unit II (15 Hrs)

Universal Precautions and Infection Control –

Hand washing and hygiene injuries and Personal protection, Insulation and safety procedures, Aseptic techniques, sterilization and disinfection, Disinfection and Sterilization of devices and equipment, Central sterilization and supply department, Biomedical Medical waste management

Unit III (15 Hrs)

Medication Administration:

Oral/Parenteral route, Parenteral medication administration: Intra venous, intra muscular, sub-cutaneous, intra dermal routes, Intra venous Infusion, Aerosol medication administration, Oxygen therapy, Intravenous fluids, Blood and blood component transfusion.

Interpretation of Laboratory Studies: Chemistries, Cardiac Enzymes, Troponin • Electrolytes • Haematology & Coagulation Studies • Lipid Panel

Unit IV (15 Hrs)

Bedside care and monitoring-

Bedside care: Recording of pulse, blood pressure, respiration, saturation, temperature and Haemostasis,

Point of care testing - ACT, Oximetry

Use and care of catheters and rubber goods.

Monitoring of Patient: Pulse, ECG (Cardiac Monitor), Oxygen Saturation, Blood Pressure, Respiration, Multi parameter monitors, Capnography and End Tidal CO2 (ETCO2), Hydration, intake and output monitoring.

Monitoring ventilator parameters: Respiratory Rate, Volumes, Pressures, Compliance, Resistance.

TEXT BOOKS/ REFERENCE BOOKS:

1. Principles and practice of Nursing - Sr Nancy
2. Introduction to Critical Care Nursing - Mary Lou Sole
3. First Aid - Redcross society guidelines
4. Basic Life Support (BLS) - American Heart Association guidelines

Examination Pattern

Subject		**Duration**
Theory exam:	75 marks	3 hours
Internal assessment (Theory)	25 marks	
	---	
	100 marks	

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 75 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question	- 2 X 10 = 20 marks
Short answer question	- 7 X 5 = 35 marks
Very Short answer	- 10 X 2 = 20 marks

14. CARDIAC CATHETERIZATION PRACTICAL -II
Course Code – BCLT-014
(270 Hours)

PRACTICALS:

- Interpretation of AV Blocks
- Interpretation of ECG in myocardial infarction
- Interpretation of ECG in Arrhythmias
- Interpretation of ECG in Electrolytic and Metabolic Abnormalities
- Interpretation of ECG in hypertension
- Interpretation of ECG in congenital heart disease.
- Interpretation of ECG in Valvular Heart Disease
- Interpretation of ECG in various types of Cardiomyopathy, Pericardial Diseases and Myxodema
- Interpretation of ECG in Dextrocardia
- Interpretation of TMT report
- Interpretation of ST segment Abnormalities in TMT
- Interpretation of Arrhythmias in TMT
- Echocardiography Evaluation of Valvular Heart Diseases
- Echocardiography Evaluation of Congenital Heart Diseases
- Stress echocardiography
- Evaluation of cardiomyopathies -DCMP,HCMP,RCMP
- Evaluation of pericardial diseases-Pericardial Effusion, Cardiac Tamponade, Constrictive Pericarditis
- Advances in 3D echocardiography and real-time imaging
- Future trends and innovations in echocardiographic practice
- Integrative approaches combining echocardiography with other imaging modalities

- **The practical examination will have the following components: (Time 3 hrs)**

Practical Major	30 marks
Practical Minor/ Spotters	20 marks
Viva – Voce	25 marks
	75 marks
Practical Internal Assessment	25 marks
Total Marks	100 marks

ENVIRONMENTAL SCIENCES
COURSE CODE-BCLT C04

Placement: II Year (IV Semester) **Time:** Theory: 30 Hours

Course Description: The students should gain knowledge to understand the multidisciplinary nature of the environment and the awareness of the eco system, which maintains the natural environment.

UNIT I

Multi-disciplinary nature of environmental studies

- Definition
- Scope and importance
- Need for public awareness

UNIT II

Natural Resources

Renewable and non-renewable resources

- Natural resources and associated problems.
  - Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
  - Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
  - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources
  - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.
  - Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.
  - Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- Role of an individual in conservation of natural resources
- Equitable use of resources for sustainable life styles

UNIT III

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of thefollowing ecosystems:-
  - Forest ecosystem
  - Grassland ecosystem
  - Desert ecosystem
  - Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT IV

Biodiversity and its conservation

- Introduction – Definition: genetic, species and ecosystem diversity.
- Bio geographical classification of India.

- Value of biodiversity: consumptive use, productive use, social, ethical,aesthetic and option values.
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation.
- Hot-sports of biodiversity.
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlifeconflicts.
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation ofbiodiversity.

UNIT V

Environmental Pollution

- Definition Cause, effects and control measures of :-
  - Air pollution
  - Water pollution
  - Soil pollution
  - Marine pollution
  - Noise pollution
  - Thermal pollution
  - Nuclear hazards
- Solid waste Management: Causes, effects and control measures of urbanand industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster management: floods, earthquake, cyclone and landslides.

UNIT VI

Social Issues and the Environment

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns.
- Case Studies
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion,nuclear accidents and holocaust. Case Studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and control of Pollution) Act.
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation

UNIT VII

Human Population and the Environment

- Population growth, variation among nations.
- Population explosion – Family Welfare Programme.
- Environment and human health.
- Human Rights.
- Value Education.

- HIV/AIDS
- Women and Child Welfare.
- Role of Information Technology in Environment and human health.
- Case studies

Reference Books:

1. Agarwal, R.K, Environmental Science, Krishna Prakashan, 1st Edition.2020.
2. Bharucha Erach, The Biodiversity of India, Mapin Publication, 1st edition, 2002.

15. CARDIAC EMERGENCIES AND MANAGEMENT IN CARDIAC CATHETERIZATION LABORATORY
COURSE CODE: BCLT-015

Placement: IIIYear (V Semester) **Time**:**Theory**:60 Hours
Practical :30 Hours

Course Description:

This specialized course is designed for healthcare professionals working in or aspiring to work in cardiac catheterization laboratories. It focuses on the recognition, rapid assessment, and management of cardiac emergencies encountered in the catheterization lab setting. Participants will gain the expertise needed to handle critical situations effectively and ensure optimal patient outcomes.

UNIT I (15 Hours)
Common Cardiac Emergencies in the Cath Lab:

- Acute coronary syndromes (ACS) and myocardial infarction
- Cardiogenic shock
- Cardiac tamponade
- Life-threatening arrhythmias

UNIT II (15 Hours)
Emergency Response Protocols:

- Basic Life Support
- Rapid assessment and stabilization of patients
- ACLS protocols and resuscitation techniques
- Hemodynamic monitoring and interpretation

Management of Complications:

- Vascular complications: bleeding, hematoma, and pseudoaneurysm
- Contrast-induced nephropathy
- Allergic reactions to contrast media
- Device-related complications (stent thrombosis, dissection)

UNIT III (15 Hours)
Advanced Interventional Techniques:

- Percutaneous coronary intervention (PCI) in emergency settings
- Use of intra-aortic balloon pump (IABP) and other mechanical circulatory support devices
- Thrombus management: aspiration and thrombectomy

Pharmacological Management:

- Antiplatelet and anticoagulant therapy in emergencies
- Vasopressors and inotropes
- Management of acute chest pain and ischemia

UNIT IV (15 Hours)
Team Dynamics and Communication:

- Roles and responsibilities of the cath lab team during emergencies
- Effective communication and coordination under pressure
- Simulation-based training for emergency scenarios

Post-Procedure Care and Follow-Up:

- Monitoring for post-procedure complications
- Patient education and discharge planning
- Long-term management of patients post-emergency intervention

TEXT BOOKS/ REFERENCE BOOKS:

1. "Grossman & Baim's Cardiac Catheterization, Angiography, and Intervention" by Mauro Moscucci- 8th Edition
2. "The Interventional Cardiology Training Manual" by A. Michael Lincoff and Samir Kapadia- 1st Edition
3. "Management of Acute Coronary Syndromes" by Christopher P. Cannon and Patrick T. O'Gara -2ND Edition
4. Management of Cardiovascular Emergencies" by Amal Mattu, M. Amin Kazzi, William J. Brady,Edition: 1st Edition
5. "Complications of Cardiovascular Procedures: Risk Factors, Management, and Bailout Techniques" edited by Mauro Moscucci- 2nd Edition

Examination Pattern

Subject		**Duration**
Theory exam:	75 marks	3 hours
Internal assessment (Theory)	25 marks	
	---	
	100 marks	

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 75 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question	- 2 X 10 = 20 marks
Short answer question	- 7 X 5 = 35 marks
Very Short answer	- 10 X 2 = 20 marks

16. PHYSICS OF X-RAYS, HARDWARE, EQUIPMENT, AND STERILITY

COURSE CODE: BCLT-016

Placement: IIIYear (V Semester) **Time**:**Theory**:60 Hours
Practical : 30 Hours

Course Description:

This specialized course provides healthcare professionals with a comprehensive understanding of the fundamental principles and practical applications of X-ray physics, equipment operation, hardware components, and sterility protocols specific to the catheterization laboratory (cath lab). Participants will gain essential knowledge and skills necessary for safe and efficient operation within this critical clinical environment.

UNIT I: (20 Hrs)

DISCUSSION OF CARDIAC CATH LAB EQUIPMENT

- X-ray Generators
- X-ray Tube Assembly
- Tube Stand
- Patient Table
- Control Console
- Image Intensifier
- Grids
- Television System
- Cine Lenses and Apertures
- Cine Fluoroscopic Cameras
- Image Framing
- Digital Imaging Systems
- Digital Image Storage, Retrieval, and Display
- Cine Film Imaging

UNIT II: (20 Hrs)

PHYSICS TEST PROCEDURES FOR CARDIAC CATH LABS

- Beam Quality
- Fluoroscopic X-ray Radiation Output
- Typical Patient Entrance Skin Exposure Rates (ESER)
- Maximum Fluoroscopic Entrance Skin Exposure Rate (MFESER)
- Input Radiation into the Image Intensifier (IIIER)
- kVp Calibration Accuracy
- High Contrast Spatial Resolution
- Low Contrast Discrimination
- Cine Film Sensitometry
- Image Intensifier Contrast Ratio (Rc)
- Veiling Glare (VG)
- X-ray Tube Focal Spot Size
- Distortion
- Typical Cine Film Density
- Cine Frame Rate and Pulse Width Accuracy: Cine and Pulsed Fluoroscopy

- Automatic Brightness Control (ABC) Operation
- Field-of-View (FoV) Accuracy and Cine Framing
- X-ray Beam Collimation
- Collimator Tracking Test
- Minimum Source-to-Skin Distance (SSD)
- Safety Interlock Tests
- Temporal Spatial Resolution
- Scattered Radiation Levels and Radiation Protection
- Clinical Radiation Exposure Monitors
- Electrical and Mechanical Safety

UNIT -III: (20 Hrs)

RADIATION MEASUREMENTS

- Overview of Clinical Cardiac Procedures
- Published Radiation Doses from Fluoroscopy and Cine Imaging
- Phantom Radiation Dose Survey
- Scattered Radiation Levels
- Radiation Safety Procedures
- Biological Risks Associated with Radiation Exposure :
    1. Cancer Risks
    2. Skin and Mucosa
    3. Heart and Lungs
    4. Breasts
    5. Thyroid
    6. Eyes
    7. Hematopoietics and Gonads

TEXT BOOKS/ REFERENCE BOOKS:

1. A Categorical Course in Physics: Physical and Technical Aspects of Angiography and Interventional Radiology. S. Balter and T. B. Shope (eds.). Oak Brook, Illinois: Radiological Society of North America (RSNA)
2. The Physics of Medical Imaging: Recording System Measurements and Techniques. A. Haus (ed.).New York: American Institute of Physics
3. Pepine, C. J., J. A. Hill, and C. R. Lambert (eds.). Diagnostic and Therapeutic Cardiac Catheterization, 2nd ed. Philadelphia: Williams & Wilkin, 1994

Examination Pattern

Subject		**Duration**
Theory exam:	75 marks	3 hours
Internal assessment (Theory)	25 marks	
	---	
	100 marks	

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 75 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question	- 2 X 10 = 20 marks
Short answer question	- 7 X 5 = 35 marks
Very Short answer	- 10 X 2 = 20 marks

17. CARDIAC CATHETERIZATION LABORATORY--I
COURSE CODE: BCLT-017

Placement: IIIYear (V Semester) **Time**:**Theory**:60 Hours
Practical:30 Hours

Course Description:

This course provides an in-depth understanding of applied pathology and pharmacology specifically tailored to the needs of professionals working in catheterization laboratories (cath labs). It focuses on the pathological conditions commonly encountered in cath labs and the pharmacological interventions used in the diagnosis, treatment, and management of these conditions.

UNIT I: (10 Hrs)

Cardiac Catheterization :

1) Laboratory Setup
2) Types of Procedures
3)Sterile Techniques in Cath Lab:

- Sterile Areas,
- Sterile Procedure
- Sterile trolley setting
- Scrubbing
- Gowns and Gloves
- Scrubbing and draping patients
- Handling sterile disposables etc.
- Sterlilisation and re-use of hardware

UNIT II: (10 Hrs)

Equipments :

- Cath - Lab equipments
- Defibrillator
- Pacemaker
- IABP
- Boyle's Apparatus
- Suction Machine
- Oxygen
- Infusion Pumps
- Programmed Stimulators
- Pacing System
- Analysers

UNIT III: (10 Hrs)

Hemodynamic Monitoring

- Hemodynamic Recorders
- Transducers
- Recording of Pressure Wave Form
- Cardiac output determination
- Thermo dilution method
- Oxygen dilution method
- Principles of oximetry

- Shunt detection and calculations
- Range
- Gain
- Speed
- Systolic / Diastolic and Mean Pressures in Chambers and Vessels

UNIT IV: (10 Hrs)

Hazard management :

- Radiation Protection
- Infection Prevention
- Injury Prevention : Electrical / Mechanical
- Wastes Management
- Plastics
- Biological Wastes
- Glass / Needle / Syringes

UNIT V:

Role of a Cath Lab Technologist:

- Patient Monitoring
- Procedure Related : Data Collection
- Acquisition and entry of Data, Procedure Books, Log Books, Registers etc.
- Stock of all disposables Eg. Catheters etc.
- Stores (Disposable Items)
- Accounting (Used Items)
- Equipment Maintenance

Cine Angiography:

- Cine Filiming,
- Cine Film Processing and Cine Film Viewing,
- Cine film library

UNIT VI:

Contrast Media

- Contrast Media
- Types of Contrast Media
- Mechanism of Action
- Pharmacokinetics and Pharmacodynamics
- Indications and Applications
- Preparation and Administration
- Safety and Adverse Reactions
- Contrast-Induced Nephropathy (CIN)

Diagnostic Procedures:

- Left Heart Catheterization
- Right Heart Catheterization
- Ventriculography
- Aortography

TEXT BOOKS/ REFERENCE BOOKS:

1. Grossman & Baim's Cardiac Catheterization, Angiography And Intervention-Mauro Moscucci-8th Edition-Wolters Kluwer/ Lippincott Williams And Wilkins
2. The Cardiac Catheterization Handbook-Morton.J.Kern Paul Sorajja Michael.J.Lim- 7th Edition-Elsevier
3. Principle And Practice Of Interventional Cardiology-Sue Apple Joseph Lindsay.Jr-Illustrated Edition-Lippincott
4. Interventional Cardiology-Principles And Practices-George.D.Dangas Carlo.D.Mario & Nicholas N.Kipshidze-3rd Edition-Wiley Blackwell

Examination Pattern

Subject		**Duration**
Theory exam:	75 marks	3 hours
Internal assessment (Theory)	25 marks	
	100 marks	

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 75 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question	- 2 X 10 = 20 marks
Short answer question	- 7 X 5 = 35 marks
Very Short answer	- 10 X 2 = 20 marks

18. CARDIAC CATHETERIZATION PRACTICAL-III
COURSE CODE: BCLT-018
(270 Hours)

Placement: IIIYear (V Semester)

PRACTICALS:

1) Laboratory Setup
2) Types of Procedures
3) Sterile Techniques in Cath Lab
4) Equipments
5) Hemodynamic Monitoring
6) Infection Prevention
7) Injury Prevention : Electrical / Mechanical
8) Wastes Management
9) Plastics
10) Biological Wastes
11) Cine Angiography
12) Contrast Media
13) Left Heart Catheterization
14) Right Heart Catheterization
15) Ventriculography
16) Aortography

TEXT BOOKS/ REFERENCE BOOKS:

1. Grossman & Baim's Cardiac Catheterization, Angiography And Intervention-Mauro Moscucci-8th Edition-Wolters Kluwer/ Lippincott Williams And Wilkins
2. The Cardiac Catheterization Handbook-Morton.J.Kern Paul Sorajja Michael.J.Lim- 7th Edition-Elsevier
3. Principle And Practice of Interventional Cardiology-Sue Apple Joseph Lindsay.Jr-Illustrated Edition-Lippincott
4.Interventional Cardiology-Principles And Practices-George.D.Dangas Carlo.D.Mario & Nicholas N.Kipshidze-3rd Edition-Wiley Blackwell

- **The practical examination will have the following components: (Time 3 hrs)**

Practical Major	30 marks
Practical Minor/ Spotters	20 marks
Viva – Voce	25 marks
	75 marks
Practical Internal Assessment	25 marks
Total Marks	100 marks

BIOSTATISTICS & RESEARCH METHODOLOGY
COURSE CODE: BCLT-C05

Placement: III Year (V Semester) **Time:** Theory: 30 Hours

Course Description: At the end of the course, the students will be able to develop an understanding of the statisticalmethods and apply them in conducting research studies.

UNIT I
Introduction:

- Concepts, types, significance and scope of statistics, Meaning of data,Sample, parameter
- Type and levels of data and their measurement
- Organization and presentation of data – Tabulation of data; Frequencydistribution – Graphical and tabular presentations

UNIT II
Measures of central tendency:

- Mean, Median, Mode

Measures of variability:

- Range, Percentiles, average deviation, quartile deviation, standarddeviation

UNIT III
Normal Distribution:

- Probability,
- Characteristics and application of normal probability curve;
- Sampling

UNIT IV
Measures of relationship:

- Correlation – need and meaning
- Rank order correlation
- Scatter diagram method
- Product moment correlation
- Simple linear regression analysis and prediction.

UNIT V
Significance of Statistic and Significance of difference between two statistics(Testing hypothesis)

- Non parametric test – Chi-square test, Sign, median test, Mann Whitneytest.
- Parametric test –'t' test, ANOVA, MANOVA, ANCOVA

UNIT VI
Research Methods:

- Research Meaning-
- Scope and Objectives
- .Research methods vs. Methodology.

Types of research

- Descriptive vs. Analytical
- Applied vs. Fundamental

- Quantitative vs. Qualitative
- Conceptual vs. Empirical

Concept of applied and basic research process,

- Defining and formulating the research problem
- Selecting the problem, necessity of defining the problem,
- Importance of literature review in defining a problem,
- criteria of good research.

Literature review

- Primary and secondary sources,
- reviews, monograph, patents,
- research databases, web as a source, searching the web,
- critical literature review,
- identifying gap areas from literature and research database, developmentof working hypothesis

UNIT VII

Data Collection And Sampling:

- Data collection
- Classification of data
- Class intervals
- Continuous and discrete measurements
- Drawing frequency polygon
- types of frequency polygon
- Histogram
- Accepts of method validation, observation and collection of data, methodsof data collection

Sampling methods,

Data processing and analysis strategies and tools, data analysis withstatistical package

- Sigma STAT, SPSS forstudent t-test, ANOVA, etc.
- hypothesis testing.

Correlation

- historical contribution
- meaning of correlation
- types: Product, moment, content correlation, variation of product,movement correlation, rank correlation,

Regression analysis.

- Tests of significance- need for
- sampling error
- significance of the mean
- significance of differences between means
- interpretation of probability levels – small samples – large samples.

Reference Books:

1. Mahajan B.K., Methods in Biostatistics for Medical Students and Research Workers, Jaypee, 9th Edi, 2018.
2. Sundar Rao & Richard, Introduction to Biostatistics & Research Methods, Prentice Hall of India, New Delhi, 5th edition, 2012.
3. Negi K.S., Biostatistics, A.I.I.B.S,1st Edi, 2013.
4. Rao & Murthy, Applied Statistics in Health Sciences, J.B. Brothers, New Delhi 2010.
5. Visweswara Rao, Biostatistics & Manual of Statistical Methods for use in Health, Nutrition and Anthropology, J.B. Brothers Publishers Pvt. Ltd., 2009.

19. CARDIAC CATHETERIZATION LABORATORY -II

COURSE CODE: BCLT-019

Placement: IIIYear (VI Semester) **Time**:**Theory**:60 Hours
Practical : 30 Hours

Course Description:

The Advanced Cardiac Catheterization Laboratory Course is designed for healthcare professionals seeking to deepen their knowledge and skills in the field of interventional cardiology. This comprehensive course covers advanced diagnostic and therapeutic techniques used in the cardiac catheterization lab, with a focus on managing complex coronary artery disease, structural heart interventions, and emerging technologies.

UNIT I: (15 Hrs)

Coronary angioplasty (PTCA)

Equipment and hardware used in PTCA:

- Guiding catheters
- Guidewires
- Balloons
- Stents
- Setting up the laboratory for a PTCA case
- Venus and Arterial Check Flow Sheaths, Mainfolds, 3 - way Stock Cocks etc
- Management of complications:
- Slow flow/no flow
- Acute stent thrombosis
- Dissection
- Perforation

Aortic angiography

- **Aortic root** – Introduction, Anatomy, Indications, Preparation, Procedure, Imaging and Interpretation, Complications and Management
- **Arch of Aorta**-– Introduction, Anatomy, Indications, Preparation, Procedure, Imaging and Interpretation, Complications and Management
- **Abdominal aorta**– Introduction, Anatomy, Indications, Preparation, Procedure, Imaging and Interpretation, Complications and Management

UNIT II: (10 Hrs)

Pediatric Interventions :

- Device closure of PDA,ASD,VSD
- Technique and devices used
- Sizing of devices
- Coil.closure of PDAs
- Catheterization and angiography in children with congenital heart disease

UNIT III: (10 Hrs)

Valvular Intervention:

1. Balloon Mitral valvuloplasty (BMV) :
    - Techniques and hardware used in BMV
    - Setting up the laboratory for a BMV case
    - Technique and equipment used for transseptal puncture
    - Recording of trans-mitral pressure gradients
    - Management of cardiac tamponade
2. Aortic and pulmonary valvuloplasty
3. Coarctation angioplasty and stenting

UNIT IV: (10 Hrs)

Peripheral Interventions

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

Intra-Aortic Balloon Pump (IABP)

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

UNIT V: (15 Hrs)

Thromboembolic Disease

- Indications and use of venacaval filters
- Techniques of thrombolysis – drug and catheters used
- Thrombus aspirations systems – coronary, peripheral
- Thrombus aspirations systems – coronary, peripheral

Intracoronary Imaging and Physiology

1. Intravascular Ultrasound (IVUS)
    - Principles and techniques
    - Interpretation of IVUS images
2. Optical Coherence Tomography (OCT)
    - Technology overview
    - Image acquisition and analysis
3. Fractional Flow Reserve (FFR) and Instantaneous Wave-Free Ratio (iFR)
    - Physiological assessment of coronary lesions
    - Clinical decision-making

TEXT BOOKS/ REFERENCE BOOKS:

1. Grossman & Baim's Cardiac Catheterization, Angiography And Intervention-Mauro Moscucci-8th Edition-Wolters Kluwer/ Lippincott Williams And Wilkins
2. The Cardiac Catheterization Handbook-Morton.J.Kern Paul Sorajja Michael.J.Lim- 7th Edition-Elsevier
3. Principle And Practice Of Interventional Cardiology-Sue Apple Joseph Lindsay.Jr-Illustrated Edition-Lippincott
4. Interventional Cardiology-Principles And Practices-George.D.Dangas Carlo.D.Mario & Nicholas N.Kipshidze-3rd Edition-Wiley Blackwell

Examination Pattern

Subject		**Duration**
Theory exam:	75 marks	3 hours
Internal assessment (Theory)	25 marks	
	---	
	100 marks	

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 75 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question	- 2 X 10 = 20 marks
Short answer question	- 7 X 5 = 35 marks
Very Short answer	- 10 X 2 = 20 marks

20. ELECTROPHYSIOLOGY AND CARDIAC PACING
COURSE CODE: BCLT-020

Placement: III Year (VI Semester) **Time**:**Theory**:60 Hours
Clinical : 30 hours

Course Description:

The Electrophysiology and Cardiac Pacing course is designed to provide healthcare professionals with an in-depth understanding of cardiac electrophysiology and the principles and practice of cardiac pacing. This comprehensive course covers the diagnosis and treatment of cardiac arrhythmias, the use of implantable devices, and the latest advancements in electrophysiology.

PACEMAKER: (30 Hrs)

1. Arrhythmias: Brady and Tachy-Arrythmias
2. Temporary pacing –
   - Indications,
   - Contra-Indication
   - Complication
   - Technique
3. Permanent pacing
   - Indications
   - Types of pacemakers and leads
     (i) Single chambered Pacemakers
     (ii) Dual chambered Pacemakers
     (iii) Biventricular Pacemakers
     (iv) Implantable Cardiaoverter Defibrillators.
     (v) Pacemaker Programming and trouble shooting
     (vi) Pacemaker site complications and Infection
   - Modes of Pacing:
     (a) Permanent Pacing : VVI AAI Pacing (Single Chamber Pacing)
     (b) Permanent Pacing : DDD, other Modes of Pacing
     (c) Pacemaker Clinic: Management of Pacemaker Patients, Programmers.
     (d) Intracardiac Electrogram - Technique
   - Setting up the laboratory for permanent pacing
   - Pacemaker parameter checking
   - Follow-up of pacemaker patients
4. Leadless Pacemakers
5. Cardiac Resynchronization Therapy (CRT) Devices

ELECTROPHYSIOLOGY STUDY: (30 Hrs)

1. Cardiac electrophysiology
2. Catheters used in electrophysiology studies
3. Connection of catheters during an EP study
4. Equipment used in arrhythmia induction and mapping

1) Radio Frequency Ablation for arrhythmia's
2) Implantable Cardioverter Defibrillator

5. Image archival systems and compact disc (CD) writing
6. Invasive EP study
7. Therapy for cardiac arrhythmias
8. Cardiac pacemakers and ICD
9. 3D Mapping

TEXT BOOKS/ REFERENCE BOOKS:

1. "Electrophysiological Disorders of the Heart"-Sanjeev Saksena, A. John Camm, et al. 2nd Edition
2. "Clinical Cardiac Pacing, Defibrillation, and Resynchronization Therapy"-Kenneth A. Ellenbogen, Bruce L. Wilkoff, et al.5th Edition

Examination Pattern

Subject		**Duration**
Theory exam:	75 marks	3 hours
Internal assessment (Theory)	25 marks	
	100 marks	

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 75 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question	- 2 X 10 = 20 marks
Short answer question	- 7 X 5 = 35 marks
Very Short answer	- 10 X 2 = 20 marks

21. RECENT ADVANCES IN INTERVENTIONAL CARDIOLOGY-THEORY
COURSE CODE: BCLT-021

Placement: IIIYear (VI Semester) **Time**:**Theory**:60 Hours
Practical :30 Hours

Course Description:

The Recent Advances in Cath Lab course is designed to provide healthcare professionals with the latest updates, techniques, and technologies in the field of cardiac catheterization. This course is ideal for interventional cardiologists, electrophysiologists, cardiac surgeons, and other healthcare professionals who are involved in the diagnosis and treatment of cardiovascular diseases and who wish to stay abreast of the rapid advancements in this field.

1. **Coronary Interventions (10 Hrs)**
    - Chronic Total Occlusion (CTO) Interventions
    - Rotational Atherectomy (Rotablation)
    - Laser Atherectomy
    - Cryoablation
    - Atherectomy

2. **Structural Heart Interventions (10 Hrs)**
    - Transcatheter Aortic Valve Replacement (TAVR)
    - Transcatheter Mitral Valve Repair (TMVR)
    - Left Atrial Appendage Closure (LAAC)
    - Percutaneous Septal Ablation
    - MitralClip Procedure
    - Percutaneous Ventricular Assist Devices (VADs)
    - Percutaneous Septal Ablation

3. **Peripheral Vascular Interventions (10 Hrs)**
    - Endovascular Aneurysm Repair (EVAR)
    - Carotid Artery Stenting

4. **Complex Arrhythmia Management (10 Hrs)**
    - Atrial Fibrillation Ablation
    - Ventricular Tachycardia Ablation
    - His Bundle Pacing
5. **Cardiac Imaging in the Cath Lab (10 Hrs)**
    - 3D Electroanatomical Mapping
    - Intracardiac Echocardiography (ICE)
    - Integration with Electrophysiology (EP) Procedures
    - Three-dimensional rotational angiography
    - Fusion imaging techniques
    - Three-dimensional printing, holography, and stereoscopic imaging for the interventional laboratory
    - Virtual and Augmented Reality (VR/AR)

6. **Emerging Technologies and Techniques (5 Hrs)**
    - Robotic-assisted Interventions
    - Biodegradable Stents
    - Drug-coated Balloons

7. **Patient Management and Safety (5 Hrs)**
    - Anticoagulation and Antiplatelet Therapy
    - Radiation Safety.
    - Complication Management

TEXT BOOKS/ REFERENCE BOOKS:

1. "Grossman & Baim's Cardiac Catheterization, Angiography, and Intervention", Mauro Moscucci,9th Edition (2023)
2. "Textbook of Interventional Cardiology",Eric J. Topol, Paul S. Teirstein-9th Edition (2023)
3. "Interventional Cardiology: Principles and Practice",Samir Kapadia, Stephen Ellis, and Craig Thompson-3rd Edition (2023)
4. "Cardiac Catheterization Handbook",Morton J. Kern, Paul Sorajja, Michael J. Lim-8th Edition (2023)
5. "Complications of Cardiovascular Procedures: Risk Factors, Management, and Bailout Techniques",Mauro Moscucci-3rd Edition (2023)

Examination Pattern

Subject		**Duration**
Theory exam:	75 marks	3 hours
Internal assessment (Theory)	25 marks	
	100 marks	

Guidelines for setting Question Paper for Theory Examination:

1. Prepare the question papers for 75 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Pattern of Question Paper:

Long answer question	- 2 X 10 = 20 marks
Short answer question	- 7 X 5 = 35 marks
Very Short answer	- 10 X 2 = 20 marks

22. CARDIAC CATHETERIZATION LABORATORY PRACTICAL - IV
COURSE CODE: BCLT-022
(270 Hours)

Placement: IIIYear (VI Semester)

PRACTICALS:

- Coronary angioplasty (PTCA)
- Aortic angiography
- Sizing of devices
- Coil.closure of PDAs
- Aortic and pulmonary valvuloplasty
- Coarctation angioplasty and stenting
- Device closure of PDA,
- Device closure of ASD
- Device closure of VSD
- Balloon Mitral valvuloplasty (BMV)
- Peripheral Interventions
- Self-expanding stents, covered stents and cutting ballons
- Intra-Aortic Balloon Pump (IABP)
- Venacaval filters
- Intravascular Ultrasound (IVUS)
- Optical Coherence Tomography (OCT)
- Fractional Flow Reserve (FFR)
- Instantaneous Wave-Free Ratio (iFR)

TEXT BOOKS/ REFERENCE BOOKS:

1. Grossman & Baim's Cardiac Catheterization, Angiography And Intervention-Mauro Moscucci-8th Edition-Wolters Kluwer/ Lippincott Williams And Wilkins
2.The Cardiac Catheterization Handbook-Morton.J.Kern Paul Sorajja Michael.J.Lim- 7th Edition-Elsevier
3.Principle And Practice Of Interventional Cardiology-Sue Apple Joseph Lindsay.Jr-Illustrated Edition-Lippincott
4.Interventional Cardiology-Principles And Practices-George.D.Dangas Carlo.D.Mario & Nicholas N.Kipshidze-3rd Edition-Wiley Blackwell

- **The practical examination will have the following components: (Time 3 hrs)**

Practical Major	30 marks
Practical Minor/ Spotters	20 marks
Viva – Voce	25 marks
	75 marks
Practical Internal Assessment	25 marks
Total Marks	100 marks

MEDICAL LAW, ETHICS & PRACTICE MANAGEMENT

COURSE CODE: C06

Placement: III[rd] Year (VI[th]Semester) **Time:**Theory:30Hours

Course Description: The goal of the course is to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice.

MEDICALLAW & ETHICS

- Medical ethics-Definition-Goal-Scope
- Introduction to Code of conduct

UNIT I

- Basic principles of medical ethics–Confidentiality
- Malpractice and negligence-Rational and irrational drug therapy Autonomy and informed consent-Right of patients
- Care of the terminally ill-Euthanasia
- Organ transplantation

UNIT II

- Medico legal aspects of medical records–Medico legal case and type-Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - Obtaining an informed consent-other various aspects.
- Professional Indemnity insurance policy
- Development of standardized protocol to avoid near missorsentinel events

PRACTICE MANAGEMENT

UNIT III

- BusinessManagement:Practiceestablishmentanddevelopment,Stockcontrolandcosting
- Staffing and staff relations
- Business computerization
- Accounting Principles-Sources of finance, Book keeping and cash flow
- Taxation and taxation planning

UNIT IV

Professionalism and Values

- Professional values
- Integrity, Objectivity, Professional competence and due care, Confidentiality
- Personal values-ethical or moral values
- Attitude and behavior –professional behaviour, treating people equally

- Code of conduct, professional accountability and responsibility, misconduct
- Differences between professions and importance of team efforts
- Cultural issues in the health care environment

TEXTBOOKS/REFERENCE BOOKS:

1. K Park: Park'sText Book of Preventive and Social Medicine, 19th edition, Banarsidas Bhanot publishers, Jabalpur,2007
2. MC Gupta, Mahajan BK, Murthy GVS, 3rd edition. Text Book of Community Medicine, Jaypee Brothers, NewDelhi,2002

VIII. Question Paper Pattern

(Subject with Theory and Practical Exam)

Guidelines for setting a Question Paper for Theory Examination:

1. Prepare the question papers for 80 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Time: 3 hours Max Marks: 80

Pattern of Question Paper

I. Write essay on **any TWO** (2x 10 =20 marks)

1.
2.
3.

II. Write short notes on **any EIGHT** (8 x 5 =40 marks)

4.
5.
6.
7.
8.
9.
10.
11.
12.
13.

III. Very Short Answer – Answer **all questions**: (10 x 2 = 20 marks)

14.
15.
16.
17.
18.
19.
20.
21.
22.
23.

VIII. Question Paper Pattern

(Subject with only Theory Exam and no Practical Exam)

Guidelines for setting a Question Paper for Theory Examination:

1. Prepare the question papers for 75 marks.
2. Set questions within the course syllabus covering entire syllabus with equal distribution from all topics in each section.

Time: 3 hours Max Marks: 75

Pattern of Question Paper

I. Write essay on **any TWO** (2x 10 =20 marks)

1.
2.
3.

II. Write short notes on **any SEVEN (**7 x 5 =35 marks)

4.
5.
6.
7.
8.
9.
10.
11.
12.

III. Very Short Answer – Answer **all questions**: (10 x 2 = 20 marks)

13.
14.
15
16.
17.
18.
19.
20.
21.
22.